Graduate Bulletin
The university represents that the information in this publication is accurate as of the press date. Courses listed in this Graduate Bulletin are subject to change through normal academic channels. New courses and changes in existing coursework are initiated by the responsible departments or programs and approved by the appropriate curriculum committees, the appropriate academic dean, and the Vice Provost for Research and Graduate Studies. Circumstances may require that a given course be withdrawn or that alternative offerings be made. Names of instructors for courses and days and times of class sessions are given in the Class Schedule, available to students at registration. All students are reminded that the State University of New York at Stony Brook is subject to the policies promulgated by the Board of Trustees of the State University of New York. Fees and charges are set forth in accordance with such policies and may well change in response to alterations in policy or actions of the legislature during the two-year period covered by this publication. The university reserves the right to change its policies without notice.

This document provides information intended primarily for students who are already admitted to graduate school. Detailed degree requirements, course listings, and academic rules, regulations, and procedures for students who are already admitted to the graduate school may be found in this Graduate Bulletin. Additional bulletins are published and made available for undergraduate, continuing education (CED), and health sciences students.

Additional Information
For general information about graduate programs and/or application, please write or phone:

The Graduate School
State University of New York
at Stony Brook
Stony Brook, New York 11794
(516) 632-7040

## Contents

### General Information

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

### Academic Regulations and Procedures

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
</tr>
</tbody>
</table>

### Degree Requirements

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
</tr>
</tbody>
</table>

### College of Arts and Sciences

<table>
<thead>
<tr>
<th>Division</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences</td>
<td>20</td>
</tr>
<tr>
<td>Cellular and Developmental Biology (BCD)</td>
<td>21</td>
</tr>
<tr>
<td>Ecology and Evolution (BEE)</td>
<td>23</td>
</tr>
<tr>
<td>Genetics (BGE)</td>
<td>25</td>
</tr>
<tr>
<td>Molecular Biology and Biochemistry (BMO)</td>
<td>26</td>
</tr>
<tr>
<td>Neurobiology and Behavior (BNB)</td>
<td>28</td>
</tr>
<tr>
<td>M.A. Degree in Biological Sciences</td>
<td>30</td>
</tr>
<tr>
<td>Humanities and Fine Arts</td>
<td>31</td>
</tr>
<tr>
<td>Art (ARH, ARS)</td>
<td>32</td>
</tr>
<tr>
<td>Comparative Literature (CLG)</td>
<td>35</td>
</tr>
<tr>
<td>English (EGL)</td>
<td>37</td>
</tr>
<tr>
<td>French and Italian (FRN, ITL, DLF, DLI)</td>
<td>41</td>
</tr>
<tr>
<td>Germanic and Slavic Languages and Literatures (GER, DLG, DLR)</td>
<td>45</td>
</tr>
<tr>
<td>Hispanic Languages and Literature (SPN, DLS)</td>
<td>49</td>
</tr>
<tr>
<td>Music (MUS)</td>
<td>52</td>
</tr>
<tr>
<td>Philosophy (PHI)</td>
<td>57</td>
</tr>
<tr>
<td>Theatre Arts (THR, DRM)</td>
<td>60</td>
</tr>
<tr>
<td>Physical Sciences and Mathematics</td>
<td>63</td>
</tr>
<tr>
<td>Chemistry (CHE)</td>
<td>64</td>
</tr>
<tr>
<td>Earth and Space Sciences (AST, GEO)</td>
<td>67</td>
</tr>
<tr>
<td>Mathematics (MAT)</td>
<td>72</td>
</tr>
<tr>
<td>Physics (PHY)</td>
<td>74</td>
</tr>
</tbody>
</table>
Equal Opportunity and Affirmative Action

The State University of New York at Stony Brook does not discriminate on the basis of race, religion, sex, sexual preference, color, national origin, age, disability, marital status, or status as a disabled or Vietnam-era veteran in its educational programs or employment. Also, the State of New York prohibits discrimination on the basis of sexual orientation.

Discrimination is unlawful. If you are a student or an employee of SUNY at Stony Brook and you consider yourself to be the victim of illegal discrimination, you may file a grievance in writing with the Affirmative Action Office within 45 calendar days of the alleged discriminatory act. If you choose to file a complaint within the university, you do not lose your right to file with an outside enforcement agency such as the State Division of Human Rights or Equal Employment Opportunity Commission.

Any questions concerning this policy or allegations of noncompliance should be directed to:

Marion Metivier
Special Assistant to the President for Equal Opportunity/Affirmative Action Administration Building 474
SUNY at Stony Brook
Stony Brook, New York 11794-0251
Telephone: (516) 632-6280
General Information
Library Hours
During the academic year, the main library is generally open Monday through Thursday, 8:30 a.m. to midnight; Friday, 8:30 a.m. to 8 p.m.; Saturday, 10 a.m. to 6 p.m.; and Sunday, noon to midnight.

During intersession and other vacation periods, hours are generally 8:30 a.m. to 5 p.m., Monday through Friday, and closed weekends. The library is usually closed on those major holidays when classes are not held.

Note: Library hours are subject to change from year to year, and even within the year. Students are urged to check the posted hours of operation at the various branch libraries as well as at the main library.

Graduate Student Organization
The Graduate Student Organization (G.S.O.) is composed of all students enrolled in graduate programs at Stony Brook, including the School of Continuing Education and the Health Sciences Center. The G.S.O. operates a housing service and a part-time job service. Several active committees work on helping to solve problems facing graduate students. The Senate, representing all departments, oversees the spending of the mandatory student activity fee on campus social, cultural, athletic, and public service events.

All graduate students are welcome to help coordinate on-going activities. The G.S.O. office is located in room 219 of the Old Chemistry Building.

Stony Brook Union
The Stony Brook Union is the campus center for hundreds of activities planned for and by students. Its nine meeting rooms, auditorium, ballroom, art gallery, spacious lounges, and courtyards provide space for all recognized university groups.

The Union is also a gathering place for students between classes. Some students gravitate to the bowling alley or the billiards room, while others prefer to relax, watch television, read, or mingle with friends and other members of the campus community in the lounges. The building houses many vital campus services—the post office, check-cashing, locker rentals, and the University Information Center. Hungry students, whether looking for a quick snack or a complete meal, can satisfy their appetites in one of the union's eateries—a cafeteria, a deli, a coffee house, a cookie-candy counter, and a restaurant. For information call the University Information Center at (516) 632-6830.

Weekends at Stony Brook are filled with concerts, plays, movies, speakers, sporting events, and parties. Past concerts have included The Hooters, Eddie Murphy, and George Benson, to name only a few. Craft fairs, club fairs, and special cross-cultural exhibits are popular weekend activities on campus.

The Student Union and Activities staff works with individuals and campus groups in planning programs. The staff also offers workshops in leadership development and in personal skills training that include assertiveness, time management, and an accredited course in theory and practice in leadership.

The Department of Student Union and Activities is located in Room 266 of the Stony Brook Union; call 632-6820 for further information.

Hours of Operation
During the fall and spring semesters, the Union is open Monday through Wednesday, 8 a.m. to 1 a.m.; Thursday and Friday, 8 a.m. to 2 a.m.; Saturday, 10 a.m. to 2 a.m.; and Sunday, 10 a.m. to 1 a.m. During recesses or intersession, it is open Monday through Friday 8:30 a.m. to 5 p.m. and is closed Saturday and Sunday.

Call for information concerning the Union's summer session hours. The Union is closed New Year's Day, Easter Sunday, Memorial Day, Independence Day, Labor Day, Thanksgiving, and Christmas Day.

Note: Union hours are subject to change from year to year and even within the year. For building hours information, call (516) 632-6830.

Gymnasium
The gymnasium building, which includes a swimming pool, three recreational basketball courts, four racquetball courts, four squash courts, a dance studio, two Universal weight rooms, and an exercise room, is open seven days a week from 8:00 a.m. to 11:00 p.m. The gym is closed on all major holidays. The gymnasium also serves as home for Stony Brook's intercollegiate basketball, swimming, and volleyball teams.

Other physical education and athletic facilities include 24 tennis courts, a 400-meter running track and, four single-wall handball courts, two sand volleyball courts, two outdoor basketball courts, and separate fields for varsity soccer, baseball, softball, football,lacrosse, and intramural sports.

Most facilities may be used for recreational purposes when they are not scheduled for classes, intercollegiate or intramural events, or special events. Current schedules of recreation hours may be obtained in the Physical Education Office.

Student Services
Summer Institute in American Living
The Intensive English Center offers a special six-week session, the Summer Institute in American Living, a program of courses and activities in English language and American culture designed to meet the special needs of short-term visitors to the campus and students who wish an intensive pre-university course in English study before beginning their regular academic program in the fall. Participants in the Institute attend English classes, visit American homes, and join excursions to places of cultural and historic interest. A three-day trip to Washington, D.C. affords students the opportunity to visit our nation's capital.

Admission is open to all foreign students and visitors who have completed the equivalent of a secondary school education. For additional information prospective students are invited to call or visit the Intensive English Center, 106 Central Hall, telephone 632-7031.

Career Development Office
The Career Development Office of the Student Affairs Department of Career and Developmental Services assists students and alumni with their career planning concerns and acts as a resource for information on full-time permanent employment. Individual and group consultation in which students are helped by career counselors to relate their academic abilities and interests to career opportunities is open to all.

An on-campus recruitment program permits interested seniors and graduate students to meet with prospective employers and graduate schools. A permanent credentials service is provided to support students in their application for jobs or advanced study.

Students are encouraged to participate in the Student Volunteer Service Program (VITAL), in which experience in different career areas can be obtained by working with agencies and organizations that seek student volunteers.

Group workshops are held to assist students and alumni in writing resumes and in developing individual strategies for applying for employment. As part of the Career Development Office's Out-Reach Program, visits are made by the career counselors to academic departments and residence halls in order to provide career-related information.

The Career Development Resource Library has information pertaining to opportunities in business, government, social service, and education. Relevant materials are available on career planning, teaching certification, health careers, graduate and professional school admissions testing, graduate school and financial aid information, and recruitment options.

Other services available include a computerized system for self-evaluation and career identification called DISCOVER, information and applications for examinations required by various graduate and professional programs (i.e., the GRE,
Child Care Services
The University has day care services for children ranging in age from two months to five years. There are presently three on-campus facilities staffed with professionals in the early childhood field who are assisted by students enrolled in coursework practice. Each of the three centers specializes in a particular age group. The centers are now open from 7:30 a.m. to 5:30 p.m., and fees are charged on a sliding scale. Plans are under way for a major expansion of services which will include extending hours to 6:30 a.m. to 11:00 p.m. Because there are waiting lists for these centers, it is wise to call well in advance of the semester in which they will be needed.

Counseling Center
The University Counseling Center, located on the second floor of the Infirmary, provides individual, group, family, and marital counseling and psychotherapy for students experiencing psychological difficulties. The Center also offers programs for personal growth and enrichment. For information, please call the Center at (516) 632-6725.

Disabled Student Services
The office coordinates services to disabled students and assists them with housing, meals, registration, recreation, academic needs, special parking permits, transportation, and financial aid. The office can loan for short periods such special equipment as tape recorders, tapes, wheelchairs, crutches, and canes.

Disabled Student Services also has a Resource Center that offers the following kinds of support for learning-disabled students: placement testing, vocational assessment, and psychological counseling.

A small Center for the Disabled, located in the Reference Room of the Melville Library, offers assistance to visually and physically disabled students. It includes equipment such as a Kurzweil Reading Machine, a brailler, and a Visual-Tek Machine.

Health Services
The University Health Service, located in the Infirmary, concerns itself with student health needs. It is available to faculty and staff on an emergency basis. The University Health Service hours of operation are Monday through Friday, 8 a.m. - 6 p.m. At other times, students are requested to use the Emergency Department of University Hospital on a fee-for-services basis; therefore, adequate health insurance is important. Information on university-sponsored student health insurance is available at the Infirmary Building. The Walk-in Clinic is staffed by physicians, physician assistants, and nurses. Specialty services for psychiatric and gynecological problems are also available.

Veterans Affairs
The Office of Veterans Affairs, operating within the Division of Career and Developmental Services, offers counseling and advisement to veterans and eligible dependents of veterans. Students are provided with information and assistance in preparing applications for V.A. educational benefits and other financial aid programs for veterans and dependents of veterans.

As part of its outreach efforts, the office publishes a newsletter which includes information on: legislation affecting veterans, changes in V.A. rules and regulations, new programs and services, and other issues of interest to veterans. In addition, a resource collection containing information on a wide variety of topics concerning veterans is available to interested individuals visiting the office.

Students seeking information and assistance are encouraged to contact the Office of Veterans Affairs as soon as possible. The Office is located in Room 155, Central Hall. Office hours are: Monday, Tuesday, and Friday, 1-5 p.m., and Wednesday and Thursday, 9:00 a.m.-noon.

All disabled students are encouraged to contact Disabled Student Services, 133 Humanities Building, prior to the start of classes. The number to call is (516) 632-67489, TDD available. This notice is available on tape and in large print.

The Intensive English Center
The Intensive English Center (IEC) offers classes in English as a second language for all residents of the Long Island community who wish to improve their command of the language. A full-time intensive program is available for those wishing to study for a semester or longer, and participants are eligible to receive a student visa. Part-time study in the day or evening is available when less intensive courses are preferred. Optional afternoon elective classes permit students to take courses in areas of special interest. A structured program of activities, designed to assist students in becoming acculturated to American society, is available to all participants. Guidance in selecting a U.S. college or university assists students not planning to remain at Stony Brook. IEC participants are eligible for on-campus housing and use of all university facilities.

The IEC is located in 108 Central Hall and is open from 10:00 a.m. to 4:00 p.m. the telephone number is 632-7031.

Foreign Student Affairs
The Office of Foreign Student Affairs assists students from other countries with finances, housing, government regulations (including immigration and tax matters), and problems related to cross-cultural differences. Questions relating to academics are usually handled by academic advisors within the individual's school or department. The staff also works with community groups and student organizations to provide access to a varied program of activities during the year, including tours and trips, discussion groups, home hospitality, speaking engagements, and other events. The Director of the Office of Foreign Student Affairs reports to the Dean for International Programs.

An F-1 or J-1 foreign student must take a full course of study of 12 credits, and must consult a foreign student advisor: (1) before accepting employment, (2) before leaving the United States either permanently or temporarily, (3) when transferring to another institution, (4) when withdrawing from the university, (5) when extending his/her entry permit, (6) before leaving the university, (7) before changing his/her address for any reason, (8) when anticipating a status change (for example, from "F1" to "permanent resident"), or (9) to change major or level of study.
All programs, regulations, and schedules of dates are subject to change or withdrawal depending on the availability of funds and the approval of programs by appropriate state authorities.

It is the student’s responsibility to stay abreast of university regulations and procedures as set forth in this Bulletin and in official campus publications and notices.

Organization of Graduate Education at Stony Brook

Under the direction of the Provost, Graduate School administration rests with the Vice Provost for Research and Graduate Studies and the administrative staff of the Graduate School in conjunction with the Graduate Council, composed of faculty, students, and administrators.

The Graduate Council

The membership of the Council includes the Provost, ex officio; the Vice Provost for Graduate Studies; two faculty members elected by the SUSB Senate from each of the following groups: Arts and Humanities, Behavioral Sciences, Biological Sciences, Engineering Sciences, Mathematical Sciences, Social Sciences; two faculty members from the Health Sciences; a member from the School of Continuing Education; one faculty member of the library elected by the library faculty; one member elected by core campus non-teaching professionals; and a graduate student representative chosen by the Graduate Student Organization. Elected faculty members serve for three years with staggered terms. The chairperson and the secretary of the Graduate Council are elected by the Council. Among other duties detailed in the “Faculty By-Laws,” the Council must approve all graduate programs before their submission to the SUNY Central Office and the State Department of Education.

The Department

Each department exercises a large measure of responsibility for its graduate program. Under the general responsibility of the department chairperson, each department has a departmental committee on graduate students and a graduate studies director who administers departmental graduate activities. Individual departments select graduate applicants and recommend them for admission to the Vice Provost for Research and Graduate Studies. The departments are responsible also for the nomination of students and applicants for fellowships, traineeships, and assistantships, as well as for the administration of graduate programs, including coursework, supervised research, teaching assistantships, and graduate examinations. It is the departments which certify to the Graduate School that the student has completed all degree requirements. Some graduate programs are not housed in specific departments. Such interdepartmental programs are governed by faculty committees and are chaired by a graduate studies director. For purposes of graduate education they function as do departments in other disciplines.

Registration

All students who are enrolled in the Graduate School in any program and who have not been granted a leave of absence by the Vice Provost must register each fall and spring for at least one credit until all degree requirements have been met. Students who hold graduate traineeships, research assistantships, or predoctoral fellowships must be registered as full-time students. Neither departments nor faculty members individually have authority to waive these rules.

A student is not considered to be registered until the appropriate forms have been filed with the Office of Records/Registrar and arrangements regarding tuition and fees have been made with the Bursar’s Office.

All graduate students, whether in residence or in absentia, must maintain matriculated status by completing their registration during the regular times designated by the Office of Records/Registrar for graduate student registration. Students failing to register during the advance registration or final registration periods may still register during the first two weeks of the semester, but will be charged a late registration fee of $40.00. Registration is ordinarily not permitted after the end of the second week of classes.

Maintaining Matriculated Status

The requirement that all candidates for degrees register for at least one credit in thesis or dissertation research each semester (or summer term if they plan to graduate in August) applies even to those who are using the library, laboratories, or computer facilities; to those who are consulting with the faculty while working on their dissertations, and to those who are preparing for or taking qualifying or oral examinations at the master’s or doctoral level.

To be eligible to receive a degree, a student must maintain matriculation for each semester prior to and including the semester in which the degree is awarded. Students on approved leaves of absence do not register for those semesters for which a leave has been granted; however, they must register for the semester in which the degree is awarded.

Currently registered students who complete all degree requirements after the deadline for any degree date but before the first day of classes of the next semester or term are eligible for graduation the next time degrees are awarded, without additional registration. Students who complete all degree requirements during the summer term may graduate in December provided they were registered in the preceding spring semester and all requirements were completed before classes began in the fall semester. Students who wish an August degree and do not complete all requirements before the summer term begins must register for the summer term to be eligible for the August degree.

Course Changes

During the first four weeks of classes (as noted in the Academic Calendar) graduate students may add or drop courses by completing the request form available from the Office of Records/Registrar provided the proposed change does not alter the student’s status as defined in “Student Status.” Courses dropped in the first two weeks of the term are deleted from the student’s record. For courses dropped during the first four weeks, tuition is charged at the rates specified in the Schedule of Tuition Liability. After the fourth week of classes no course may be added or dropped. Should it become impossible for a student to complete a course for a reason such as illness or accident, he/she may petition the Vice Provost for Research and Graduate Studies for a waiver of the deadline. Such petitions must be approved by both the chairperson and the graduate studies director of the department. If a petition is approved, a charge of $10.00 is assessed, courses remain on a student’s record and a withdrawal grade of W is recorded.

Leave of Absence

Leaves are granted for a maximum of one year at a time, renewable upon request for the second year. A student on academic probation may be granted a leave of absence only if he/she recognizes that reenrollment is subject to conditions imposed by the Graduate School and his/her department. These conditions will be specified in writing at the time the leave is approved. The semesters in which a student is on an approved leave of absence do not count in the calculation of the time limit for the degree. In order to request a leave, the student must be currently registered or must have been registered for the preceding semester. Students who are admitted to graduate study but never register are not eligible for leaves. Requests for leaves of absence should be made on the Request for a Leave of Absence Form (SUSB 1341) and submitted to the graduate studies director of the individual department. If the graduate studies director and the chairperson of the department approve
the request for leave, they recommend approval to the Vice Provost for Research and Graduate Studies.

Students who have either preregistered or are currently registered must also submit a withdrawal card as described in the section above.

Military leave of absence will be granted for the duration of obligated service to students in good standing.

Students planning to return from leaves should inform their departments of their intention, preferably three months in advance of the term for which they wish to register. A current address should be given to the department. The academic department will then complete a Readmission Form and submit it to the Graduate School for approval.

Withdrawal from the University
A student finding it necessary to withdraw from the university must obtain a withdrawal card from the Office of Records/Registrar. This card must be approved by the appropriate offices indicated on the card and by the Graduate School. The effective date of withdrawal is the date upon which the completed withdrawal card is returned to the Office of Records/Registrar. The process of withdrawing from the university is a formal procedure and the student has the responsibility for initiating it. Students may withdraw from the university up to the last day of classes; however, financial liability to the university remains (See Schedule of Tuition Liability).

Students are urged to discuss all withdrawals with the graduate studies director of their department and with their academic advisor before such an action is taken.

Unauthorized Withdrawal
A student who leaves the university without obtaining an official withdrawal may forfeit the privilege of honorable withdrawal and endanger his/her prospects of readmission to the Graduate School. Such students will be reported as having failed all courses.

Dissertation Research Away from Campus
It is expected that a graduate student's dissertation will normally be conducted at Stony Brook under the direct guidance of the faculty of the department or program in which the degree is sought and with the facilities available here or close by, such as, for example, at Brookhaven National or Cold Spring Harbor laboratories, the hospitals and institutions on the Island, or the libraries of New York City. However, there may be circumstances in which the student's work would be facilitated at an off-campus location such as another institution or research facility. In such cases, the department must present to the Vice Provost for Research and Graduate Studies a letter containing the following:

1. The reasons for the request.
2. The conditions under which the student's work away from campus is to be performed, supervised, and evaluated.
3. Confirmation that the student is registered as a graduate student at Stony Brook and has paid the necessary fees. If the student is supported by a stipend or grant from state funds or from university-monitored federal and private sources, he/she must be registered as a full-time student. If the student is employed elsewhere, in a position not under the university's jurisdiction, matriculation may be maintained by registering for at least one credit of research each semester providing all degree requirements have been fulfilled except for the writing of the thesis or dissertation.
4. For students with financial support, a statement by the chairperson of the department attesting that permission for the student to do work away from campus will not diminish the department's capability to fulfill its instructional commitments.
5. A statement from the institution where the student's work is to be performed in which acceptance of responsibility for its supervision is made. In the case of archival research or fieldwork, a statement of authorization for the student to use such resources must be submitted.
6. The petition must have the approval of the graduate program committee and the chairperson of the department concerned.

Advancement to Candidacy
A student may be advanced to candidacy after having completed Graduate School and departmental requirements other than the dissertation or its equivalent. Students on academic probation cannot be advanced to candidacy. Advancement to candidacy is granted by the Vice Provost for Research and Graduate Studies upon recommendation of the graduate studies director.

SUNY Exchange Program
When the special educational needs of a doctoral student at one SUNY institution or the graduate center of CUNY can be served best by taking courses at another unit of the SUNY system or at the graduate center of CUNY, he/she should obtain an application from the chairperson of his/her department to apply for admission to the desired courses at the host institution. The recommendation from the department should state that the student has the prerequisites for the courses and that, if the courses are successfully completed, credit for them will be accepted toward the degree. The statement from the department chairperson should be approved by the Vice Provost for Research and Graduate Studies. It should be sent to the dean of the graduate school of the host institution, who will clear it with the department concerned. When approval is obtained, the student will be admitted to take the courses requested. The student will pay appropriate tuition and fees at the host institution. If the student has a waiver of tuition at Stony Brook, that waiver will be recognized by the host institution. At the completion of the courses, the host institution will, on request, send a transcript to Stony Brook.

Transfer of Credits
A. From Other Universities
1. A candidate for the master's degree may petition to transfer a maximum of 20 percent of the total graduate credit requirement for the degree toward his/her master's degree requirements.
2. These credits must be from an institution that is authorized to grant graduate degrees by recognized accrediting commissions.
3. Credits must not have been used to fulfill the requirements for either a baccalaureate or another advanced degree.
4. Credits must not be more than five years old at the time the student is admitted to graduate study at Stony Brook.
5. Courses older than five years will be accepted only in rare circumstances.
6. Credits must clearly be graduate level. A course listed as both graduate and/or undergraduate level will not be considered for transfer.
7. Credits carry the grades of A or B. "Pass" or "Satisfactory" grades are not transferrable unless these grades can be substantiated by the former institution as actually B or better. Grades earned in transferred courses are not counted as part of the overall grade point average at Stony Brook.
8. Work from one master's degree is not transferrable to a second master's degree.
9. A candidate for the doctoral degree may transfer those graduate credits which are allowed by the appropriate departmental committee.
10. Students who wish to petition for transfer of credit should submit the Transfer Credit Request Form (SUSB 1343) along with an official copy of the transcript to their departmental committee for review. Departmental recommendation is needed before submission to the Graduate School for final approval.
B. Acceptance of Credits
From the School of Continuing Education (CED) or Non-Matriculated Status (GSP)

1. A maximum of 12 graduate credits from non-degree graduate status at Stony Brook can be applied toward degree requirements at the discretion of the academic department and with the approval of the Graduate School.

2. A maximum of six credits of CED courses not crosslisted with departmental offerings may be applied at the discretion of the academic department and with the approval of the Graduate School.

3. Certain degree programs offer courses that are cross-listed with those offered through CED. The number of such credits permitted toward those required for the program will vary from program to program. The stipulation in paragraph 1 above, also applies to credits earned in cross-listed courses. For more information see the descriptions of individual programs under the appropriate departmental heading or contact the appropriate graduate program director.

The Grading System

The following grading system will be used for graduate students in both graduate and undergraduate courses: A (4.0), A - (3.67), B+ (3.33), B (3.00), B - (2.67), C+ (2.33), C (2.00), C - (1.67), F (0.00). Pass/No Credit (P/NC) and grades of D are not approved grades for graduate students. Plus and minus grades are not applicable for courses taken before fall, 1981.

In addition, the following marks may be awarded at the end of the semester:

I (Incomplete): This is an interim grade. It may be given at the discretion of the instructor but only if the student requests it and upon evidence that good cause, such as serious, protracted illness, prevented the student's completion of course requirements. The grade of I must be resolved by March 15 for courses of the preceding fall semester; November 1 for courses of the preceding spring semester. However, the instructor may require that the work be completed at any time prior to the end of the incomplete extension period. In granting a grade of I, the instructor signifies a willingness to receive student work and prepare grades in accordance with these deadlines. If final grades are not reported to the Office of Records/Registrar by the specified dates, the grade of I will automatically be changed to I/F. Students should confer with their professors to establish how far in advance of the deadline work must be completed. Extension to the end of the succeeding term may be requested by written faculty petition to the Graduate School; any subsequent exception must be appealed by the student with a written letter of support or denial by the faculty member addressed to the Graduate School.

Each student's permanent academic record must reflect a final grade or a withdrawal grade for each course in which he/she was enrolled. If a final grade has not been reported by the scheduled deadlines or appropriately extended, the grade of F will be recorded.

S (Satisfactory): Indicates passing work in those courses, so designated by the department and approved by the Graduate Council, where the normal mode of evaluation is impracticable.

U (Unsatisfactory): Indicates unsatisfactory work in those courses, so designated by the department and approved by the Graduate Council, where the normal mode of evaluation is impracticable.

Courses which are normally offered on a S/U basis are so indicated in the Graduate Class Schedule published for each term.

R (Registered): Indicates attendance during the first semester in a year-long course, the final grade for which will be assigned only after the completion of two semesters.

NR (No Record): An instructor may assign a temporary report of NR only for students who have never, to the instructor's knowledge, participated in the course in any way. An NR report is not to be interpreted as a grade but only as an indication of a temporary state of affairs which requires prompt resolution, leading either to removal of the course from a student's program (whenver it turns out to have appeared as a result of an error in recording the registration information submitted by the student), or to the assignment of a grade. If a final grade is not reported by the deadline date appearing in the Academic Calendar, the grade of N/F will be recorded. The entry of an I, NR, or no grade at all will automatically be calculated into the GPA as F unless properly changed to a letter grade.

Change of Grade

Grades appearing on a student's academic record may not be changed after one calendar year from the end of the term in which the grade was incurred. Final grades appearing on a student's academic transcript at the time of his/her graduation cannot be changed to any other grade subsequent to the graduation date. A final grade may not be changed on the basis of work completed after a term has ended.

Auditing

Auditing is permitted by special arrangement between student and instructor. No record is kept of courses audited.

Academic Probation

When a student's cumulative graduate grade point average falls below B (3.0) for grades earned in courses numbered 500 and above taken at Stony Brook, the student shall be placed on probation. If the student's overall graduate average has been raised to B (3.0) by the end of the next semester of enrollment after being first notified of probation, the student will be returned to regular status. A student on academic probation who fails to achieve a 3.0 cumulative GPA by the end of the second semester on probation will normally not be permitted to re-enroll.

For the purposes of academic probation, the academic record of a graduate student who has changed majors may be treated as two separate records, at the request of the new department. The G.P.A. for the new program may be calculated beginning in the semester in which the change of major becomes effective.

At the discretion of the department, a student who retakes a course for which an F grade was received may replace the F grade with the new grade in the G.P.A. calculation. The student may exercise this option for one F grade only.

Part-time students: A student enrolled part-time who has accumulated five semester credits with a cumulative average below 3.0 will have two semesters or six credits (whichever is longer) to bring his/her cumulative GPA to 3.0.

If admitted on probation, a student must earn an overall graduate average of at least B (3.0) during the first semester of enrollment to be permitted to re-enroll in the subsequent semester. In this case, the student is considered to have achieved regular status. A student admitted on probation who fails to earn a B (3.0) average in the first semester will normally not be permitted to re-enroll.

Standards of Conduct

The university expects of all its students cooperation in developing and maintaining high standards of scholarship and conduct. Students are expected to meet academic requirements and financial obligations, as specified elsewhere in this Bulletin, in order to remain in good standing. Certain nonacademic rules and regulations must also be observed. The university wishes to emphasize its policy that all students are subject to the rules and regulations of the university currently in effect or which, from time to time, are put into effect by the appropriate authorities of the university. Students, in accepting admission, indicate their willingness to subscribe to and be governed by these rules and regulations and acknowledge the
right of the university to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate. University authorities will take action in accordance with due process.

Maintenance of Public Order

The university wishes to maintain public order appropriate for a university campus, without limiting or restricting the freedom of speech or peaceful assembly of the students, faculty or administration. The university has, therefore, issued the Rules for the Maintenance of Public Order to ensure that the rights of others are protected and to set forth prohibited conduct. For a copy of the rules, contact the Office of the Student Judiciary, 347 Administration Building.

Planned Assembly and Demonstrations

All groups using university buildings and grounds for planned assembly and demonstrations should submit a Facilities/Space Use Request Form to register their activities.

Academic Dishonesty

Intellectual honesty is the cornerstone of all academic and scholarly work. Therefore, the university views any form of academic dishonesty as a serious matter. Detailed procedures for hearings and other functions of the judiciary processes are available in the Graduate School.

Grievance Procedures

Students encountering difficulties with departmental or Graduate School policy or procedure should discuss the problem first with their advisor and the graduate studies director of their department. If difficulties continue to be unresolved, the student should follow the guidelines available in the Graduate School for further appeal.

Student Educational Records

The Family Educational Rights and Privacy Act permits current or former students to inspect and review their educational records. Students are also accorded the right to a hearing in order to question the contents of their educational records. Written consent of students may be required before personally identifiable information about them will be released from their educational records as provided by law.


After administrative remedies available at the university have been exhausted, inquiries or complaints may be filed with the Family Educational Rights and Privacy Act Office, Department of Health and Human Services, 330 Independence Avenue, S.W., Washington, DC 20201.

Applicants or students may waive their rights to inspect confidential letters or statements of recommendation.

Transcripts

Students who wish to have transcripts of their academic records at Stony Brook forwarded to another institution or agency, or to themselves for their own use, must submit their requests in writing at least two weeks before the transcripts are needed, except at the end-of-semester peak period when additional time should be allowed. If making the request by mail, address a letter to P.O. Box 619, Stony Brook, N.Y. 11790. Include 1) your full name, 2) your I.D. (social security) number, 3) your complete current address, 4) your dates of attendance at Stony Brook, 5) the exact name, office, institution, and complete address, including zip code, to which the transcript is to be sent and 6) the required fee of $3.00 for each transcript. Make checks payable to SUNY at Stony Brook.

If making the request in person, obtain a Transcript Request Form from the Office of Records/Registrar in the Administration Building and follow the instructions on the form.

All financial obligations to the university must be satisfied before a transcript can be released. A request for a transcript must be made by the student himself/herself, and must be made in writing. Students who have both an undergraduate and a graduate transcript and wish only one of them sent should so specify in their request. Partial transcripts of either the undergraduate or graduate academic records are not issued. When satisfying financial obligations, cash, bank check, or money order is accepted. Personal checks will take two weeks to clear before release of transcripts.

Equivalent Opportunity/Religious Absences

Some students may be unable to attend classes on certain days because of religious beliefs. Section 224-a of the Educational Law provides that:

1. No person shall be expelled from or refused admission as a student to an institution of higher education for the reason that he/she is unable, because of religious beliefs, to attend classes or to participate in any examination, study, or work requirements on a particular day or days.

2. Any student in an institution of higher education who is unable, because of religious beliefs, to attend classes on a particular day or days shall, because of such absence on the particular day or days, be excused from any examination or any study or work requirements.

3. It shall be the responsibility of the faculty and of the administrative officials of each institution of higher education to make available to each student who is absent from school, because of religious beliefs, an equivalent opportunity to make up any examination, study, or work requirements which he/she may have missed because of such absence on any particular day or days. No fees of any kind shall be charged by the institution for making available to the said student such equivalent opportunity.

4. If classes, examinations, study, or work requirements are held on Friday after four o'clock post-meridian or on Saturday, similar or makeup classes, examinations, study, or work requirements shall be made available on other days, where it is possible and practicable to do so. No special fees shall be charged to the student for these classes, examinations, study, or work requirements held on other days.

5. In effectuating the provisions of this section, it shall be the duty of the faculty and of the administrative officials of each institution of higher education to exercise the fullest measure of good faith. No adverse or prejudicial effects shall result to any students because of their availing themselves of the provisions of this section.

6. Any student who is aggrieved by the alleged failure of any faculty or administrative officials to comply in good faith with the provisions of this section shall be entitled to maintain an action or proceeding in the supreme court of the county in which such institution of higher education is located for the enforcement of his or her rights under this section.

7. As used in this section, the term "institution of higher education" shall mean schools under the control of the Board of Trustees of the State University of New York, the Board of Higher Education of the City of New York, or any community college.

Graduate Majors, Codes

<table>
<thead>
<tr>
<th>Graduate Majors</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthropology</td>
<td>ANT</td>
</tr>
<tr>
<td>Applied Linguistics</td>
<td>LIN</td>
</tr>
<tr>
<td>Applied Mathematics and Statistics</td>
<td>AMS</td>
</tr>
<tr>
<td>Art Criticism</td>
<td>ARH</td>
</tr>
<tr>
<td>Astronomical Sciences</td>
<td>AST</td>
</tr>
<tr>
<td>Biological Sciences, M.A.</td>
<td>BIO</td>
</tr>
<tr>
<td>Cellular and Development</td>
<td>BCD</td>
</tr>
<tr>
<td>Biology</td>
<td>CHE</td>
</tr>
<tr>
<td>Chemistry</td>
<td>OCN</td>
</tr>
<tr>
<td>Coastal Oceanography</td>
<td>CLG</td>
</tr>
<tr>
<td>Comparative Literature</td>
<td>CSE</td>
</tr>
<tr>
<td>Computer Science</td>
<td>DLF</td>
</tr>
<tr>
<td>D.A. Foreign Languages</td>
<td>DLG</td>
</tr>
</tbody>
</table>
A detailed academic calendar is prepared each year by the Office of Records, and is made available to students along with the class schedules and various other publications.
Degree Requirements
The requirements listed below are the minimal ones mandated by the Graduate School. Additional requirements may be set by the individual departments or graduate programs. The University reserves the right to alter these regulations without notice.

The Degrees of Master of Arts, Master of Fine Arts, Master of Music, and Master of Science

The granting of the master’s degree is based upon the completion of any special departmental requirements in addition to the items listed below:

A. Courses and Grade Point Average
A student must achieve a 3.0 overall grade point average for a minimum of 30 credits of graduate work to receive a master’s degree.

The academic record of a graduate student who has changed majors may be treated as two separate records, at the request of the new department. The G.P.A. for the new program may be calculated beginning in the semester in which the change of major becomes effective.

At the discretion of the department, a student who retakes a course for which an F grade was received may replace the F grade with the new grade in the G.P.A. calculation. The student may exercise this option for one F grade only.

B. Language Proficiency
Though the Graduate School itself does not require proficiency in a foreign language for the master’s degree, departments have the responsibility for their foreign language requirements and the evaluation of any stated proficiency. Students must comply with their departmental requirements.

C. Teaching
At least one semester of supervised teaching experience is required except for those programs in which teaching is not germane to the degree objectives.

D. Thesis and Comprehensive Examination
The requirement for thesis and comprehensive examination varies from department to department. Some departments require a thesis and others require a comprehensive examination, while some only require a master’s paper. For specific requirements, refer to each departmental section of this Bulletin. If a thesis is to be filed with the Graduate School, it must be prepared in accordance with the guidelines presented in the Guide to the Preparation of Theses and Dissertations in this Bulletin. The University at Stony Brook does not allow multiple authorship of a dissertation.

E. Degree Application
Students must submit a signed degree card to the Graduate School in accordance with published deadlines. If degree requirements are not met, students must reapply for any subsequent awarding period.

F. Registration
Degree candidates must be registered in the program granting their degree for at least one credit in the semester in which the diploma is awarded. There is one exception. If a student is registered in any given semester but fails to complete the degree requirements within the deadlines, the student may reapply to graduate in the next semester or term without registering again.

G. Departmental Recommendation
When all departmental requirements are completed, the graduate studies director may recommend to the Vice Provost for Research and Graduate Studies that the master’s degree be granted.

H. Time Limit
Depending on the student’s first-time, matriculated enrollment in the Graduate School, full-time students must complete all degree requirements within three years; part-time students in five years. If enrollment status changes at a later time, this policy is determined by the student’s initial entrance status. In rare instances, the Vice Provost for Research and Graduate Studies will entertain a petition bearing the endorsement of the graduate studies director of the department for an extension of this time limit. In such instances, the student may be required to repeat certain examinations or present evidence that he/she is still prepared for the thesis or the final examination.

The Master of Arts in Liberal Studies Degree

This is a terminal, non-research degree offered by the School of Continuing Education (CED). Additional information is available in the semester publications from the CED Office.

The Ph.D. Degree

Admission to the Graduate School does not automatically qualify a student as a candidate for the Ph.D. degree. Formal recommendation of advancement to candidacy for the Ph.D. degree must be made by the Graduate School by the department after a review of the student’s performance in courses, independent study and departmental examinations. A candidate for the Ph.D. degree engages in research leading to a dissertation. The requirements listed below are the minimal ones mandated by the Graduate School. Additional requirements may be set by the individual departments or graduate programs.

A. Courses and Grade Point Average
The student will follow an approved program of courses determined to meet his/her needs and to satisfy departmental requirements. A student must achieve a minimum 3.0 overall grade point average in graduate courses taken at Stony Brook in order to receive a doctoral degree.

The academic record of a graduate student who has changed majors may be treated as two separate records, at the request of the new department. The G.P.A. for the new program may be calculated beginning in the semester in which the change of major becomes effective.

At the discretion of the department, a student who retakes a course for which an F grade was received may replace the F grade with the new grade in the G.P.A. calculation. The student may exercise this option for one F grade only.

B. Preliminary Examination
The purpose of the preliminary examination is to ascertain the breadth and depth of the student’s preparation and to appraise readiness to undertake a significant original investigation. At the discretion of the department, the preliminary examination may be oral or written or both and may consist of a series of examinations. The examining committee is appointed by the Vice Provost for Research and Graduate Studies on recommendation of the graduate studies director. It must include at least two faculty members from the program and may include one or more members from outside the program. Results of the preliminary examination will be communicated to the student as soon as possible and to the Graduate School within one week of the completion of the examination. A repetition of the preliminary examination, upon failure, may be scheduled at the discretion of the department. A second repeat must be approved by the Vice Provost for Research and Graduate Studies.

C. Language Proficiency
Though the Graduate School itself does not require proficiency in a foreign language for the Ph.D. degree, departments have the responsibility for their foreign language requirement and the evaluation of any stated proficiency. Students must comply with their departmental requirements. The proficiency examination must normally be passed before permission is given to take the preliminary examination.
D. Advancement to Candidacy
The student must be advanced to candidacy when all Graduate School and departmental requirements for the degree other than the dissertation have been completed. Students on academic probation cannot be advanced to candidacy. Advancement to candidacy is granted by the Vice Provost for Research and Graduate Studies upon recommendation of the graduate studies director.

E. Dissertation
A dissertation is required for the Ph.D. degree. It must convey in a clear and convincing manner the results of an original and significant scholarly investigation. Depending upon the character of the student's research, the graduate studies director will appoint an appropriate supervisor or supervisory committee, in consultation with whom the student will conduct an investigation and write a dissertation. The dissertation must be prepared in accordance with the guidelines presented in the Guide to the Preparation of Theses and Dissertations in this Bulletin. The University at Stony Brook does not allow multiple authorship of a dissertation.

F. Dissertation Examining Committee
The dissertation must be approved by a dissertation examining committee of at least three members of the faculty, appointed by the Vice Provost for Research and Graduate Studies. This committee includes a dissertation supervisor, defense chairperson, at least two faculty members from the department or program, and at least one person outside the department or university. This outside member should have expertise in this student's research field so as to be able to understand, criticize, and contribute to it, as well as to judge the quality and significance of the research. The dissertation supervisor cannot serve as chairperson of the examining committee.

G. Dissertation Defense
At the discretion of the department, approval of the dissertation may or may not involve a formal oral defense. If a formal defense is required, it will be conducted by the dissertation committee and will not be chaired by the supervisor of the dissertation. The formal defense is open to all interested faculty members and graduate students.

In the absence of a formal defense, the student will present the results of the dissertation research at an informal dissertation colloquium convened for that purpose by the department and open to interested faculty and graduate students.

Approval of the dissertation defense will be indicated by the dissertation committee signatures on a committee approval form which comprises page ii of the dissertation manuscript.

H. Teaching
At least a semester of practicum in teaching under supervision is required.

I. Residence Requirement
At least two consecutive semesters of full-time graduate study beyond the baccalaureate are required as a student registered in the program granting the degree. The purpose of the residence requirement is to ensure that the graduate student participates in the professional life of the department beyond class attendance. Owing to the difference in the means by which this requirement can be satisfactorily met, departmental residence requirements may vary from the Graduate School norm and are described in the individual departmental requirements for the degree; the Graduate School regulation pertains unless otherwise specified.

J. Degree Application
The student must submit a signed degree card to the Graduate School in accordance with published deadlines. If degree requirements are not met, students must reapply for any subsequent awarding periods.

K. Departmental Recommendation
When all departmental requirements are completed, the graduate studies director may recommend to the Vice Provost for Research and Graduate Studies that the Ph.D. degree be granted.

L. Registration
Degree candidates must be registered for at least one credit in the semester in which the diploma is awarded. There is one exception. If a student is registered in any given semester but fails to complete the degree requirements within the deadlines, he/she may reapply to graduate in the next semester or term without registering again provided all requirements are met before the first day of classes of the next semester or term.

M. Time Limit
The candidate must satisfy all requirements for the Ph.D. degree within seven years after completing 24 credit hours of graduate courses in the State University of New York at Stony Brook department or program in which he/she is to receive the degree. In rare instances, the Vice Provost for Research and Graduate Studies will entertain a petition to extend this time limit, provided it bears the endorsement of the chairperson of the department or graduate program. The Vice Provost or the department may require evidence that the student is still properly prepared for the completion of work. In particular, the student may be required to pass the preliminary examination again before being permitted to continue work.

The Doctor of Arts Degree in Foreign Language Instruction
Admission to the Graduate School does not automatically qualify a student as a candidate for the D.A. degree. Formal recommendation of advancement to candidacy for the D.A. degree must be made to the Graduate School by the department after a review of the student's performance in courses, independent study and departmental examinations. A candidate for the D.A. degree engages in a creative research project leading to a dissertation. The requirements listed below are the minimal ones mandated by the Graduate School. Additional requirements may be set by the individual departments or graduate programs.

A. Courses and Grade Point Average
The student will follow an approved program of courses determined to meet his/her needs and to satisfy departmental requirements. A student must achieve a minimum 3.0 overall grade point average in graduate courses taken at Stony Brook in order to receive a doctoral degree.

The academic record of a graduate student who has changed majors may be treated as two separate records, at the request of the new department. The G.P.A. for the new program may be calculated beginning in the semester in which the change of major becomes effective.

At the discretion of the department, a student who retakes a course for which an F grade was received may replace the F grade with the new grade in the G.P.A. calculation. The student may exercise this option for one F grade only.

B. Language Proficiency
The student must have a master's degree or its equivalent with specialization in one of the following languages: French, German, Italian, Russian, Spanish, or TESOL.

C. Practicum
Teaching an elementary or intermediate course in the major is required.

D. Internship
Team-teaching a course of literature, advanced language or culture for one semester is required.

E. Externship
Full-time teaching for one semester (three courses) at the secondary or college level is required.
F. Comprehensive Examination
The final evaluation is to include both a written and an oral comprehensive examination and will include topics from all areas covered in the program. The comprehensive examination will be administered only after the candidate has demonstrated competence in verbal fluency in the target language and in language instruction and methodology. A doctoral committee will test the verbal fluency of all candidates.

It will be the responsibility of the candidate to prepare, with his/her major and minor advisors, a reading list to cover his/her individual specialties. This list must be submitted and approved one semester prior to taking the comprehensive examination.

G. Advancement to Candidacy
A student may be advanced to candidacy when Graduate School and departmental requirements other than the dissertation or its equivalent have been completed. Students on academic probation cannot be advanced to candidacy. Advancement to candidacy is granted by the Vice Provost for Research and Graduate Studies upon recommendation of the director of graduate studies.

H. Dissertation
All doctoral candidates must complete a creative research project. The subject of the research project will be determined by the candidate’s professional interest and training. The dissertation will be undertaken after the student has completed all coursework and has been reviewed by the doctoral committee, which will make the final determination for recommendation for conferral of the degree of Doctor of Arts in foreign language instruction. The dissertation must be prepared in accordance with the guidelines presented in the Guide to the Preparation of Theses and Dissertations in this Bulletin. The University at Stony Brook does not allow multiple authorship of a dissertation.

I. Dissertation Examining Committee
The dissertation must be approved by a dissertation examining committee of at least three members of the faculty, appointed by the Vice Provost for Research and Graduate Studies. This committee includes a dissertation supervisor, defense chairperson, at least two faculty members from the department or program, and at least one person outside the department or university. This outside member should have expertise in this student’s research field so as to be able to understand, criticize, and contribute to it, as well as to judge the quality and significance of the research. The dissertation supervisor cannot serve as chairperson of the examining committee.

Approval of the dissertation will be indicated by the doctoral committee signatures on a committee approval form which comprises page ii of the dissertation manuscript.

J. Residence Requirement
At least two consecutive semesters of full-time graduate study beyond the baccalaureate are required as a student registered in the program granting the degree. The purpose of the residence requirement is to ensure that the graduate student participates in the professional life of the department beyond class attendance. Owing to the difference in the means by which this requirement can be satisfactorily met, departmental residence requirements may vary from the Graduate School norm and are described in the individual departmental requirements for the degree; the Graduate School regulation pertains unless otherwise specified.

K. Degree Application
The submission of a signed degree card to the Graduate School is required in accordance with published deadlines. If degree requirements are not met, students must reapply for any subsequent awarding periods.

L. Departmental Recommendation
When all departmental requirements are completed, the graduate studies director may recommend to the Vice Provost for Research and Graduate Studies that the D.A. degree be granted.

M. Registration
Degree candidates must be registered for at least one credit in the semester in which the diploma is awarded. There is one exception. If a student is registered in any given semester but fails to complete the degree requirements within the deadlines, he/she may reapply to graduate in the next semester or term without registering again provided all requirements are met before the first day of classes of the next semester or term.

N. Time Limit
The candidate must satisfy all requirements for the D.A. degree within seven years after completing 24 credit hours of graduate courses in the State University of New York at Stony Brook department or program in which he/she is to receive the degree. In rare instances, the Vice Provost for Research and Graduate Studies will enter­tain a petition to extend this time limit, provided it bears the endorsement of the chairperson of the department or graduate program, The Vice Provost or the department may require evidence that the student is still properly prepared for the completion of work. In particular, the student may be required to pass the comprehensive examination again before being permitted to continue work.

The Doctor of Musical Arts Degree
Admission to the Graduate School does not automatically qualify a student as a candidate for the D.M.A. degree. Formal recommendation of advancement to candidacy for the D.M.A. degree must be made to the Graduate School by the department after a review of the student’s performance in courses, independent study, and departmental examinations. The requirements listed below are the minimal ones mandated by the Graduate School. Additional requirements may be set by the individual departments or graduate programs.

A. Courses and Grade Point Average
The student will follow a program of courses determined to meet his/her needs and to satisfy the departmental requirements. A student must achieve a minimum 3.0 overall grade point average in graduate courses taken at Stony Brook in order to receive the D.M.A. degree.

The academic record of a graduate student who has changed majors may be treated as two separate records, at the request of the student. The G.P.A. for the new program may be calculated beginning in the semester in which the change of major becomes effective.

At the discretion of the department, a student who retakes a course for which an F grade was received may replace the F grade with the new grade in the G.P.A. calculation. The student may exercise this option for one F grade only.

B. Contract toward Candidacy
The student must fulfill the specific requirements of an approved contract toward candidacy.

C. Language Proficiency
Although the Graduate School itself does not require proficiency in a foreign language, the departments have the responsibility for their foreign language requirements and the evaluation of any stated proficiency. Students must comply with their departmental requirements.

D. Advancement to Candidacy
The student may be advanced to candidacy when all Graduate School and departmental requirements for the degree other than the doctoral recital have been completed. Students on academic probation cannot be advanced to candidacy. Advancement to candidacy is granted by the Vice Provost for Research and Graduate Studies upon recommendation of the graduate studies director.

17
E. Doctoral Recital
The doctoral recital must demonstrate a distinguished level of performance. A cassette recording of it is to be kept permanently in the university library. In addition, an official copy of the program and the original program notes must be submitted to the Graduate School.

F. Teaching
A practicum in teaching under supervision is required.

G. Residence Requirement
At least two consecutive semesters of full-time graduate study beyond the baccalaureate are required as a student registered in the program granting the degree. The purpose of the residence requirement is to ensure that the graduate student participates in the professional life of the department beyond class attendance. Owing to the difference in the means by which this requirement can be satisfactorily met, departmental residence requirements may vary from the Graduate School norm and are described in the individual departmental requirements for the degree; the Graduate School regulation pertains unless otherwise specified.

H. Degree Application
The student must submit a signed degree card to the Graduate School in accordance with published deadlines. If degree requirements are not met, students must reapply for any subsequent awarding periods.

I. Departmental Recommendation
When all departmental requirements are completed, the chairperson or graduate studies director may recommend to the Vice Provost for Research and Graduate Studies that the D.M.A. degree be granted.

J. Registration
Degree candidates must be registered for at least one credit in the semester in which the diploma is awarded. There is one exception. If a student is registered in any given semester but fails to complete the degree requirements within the deadlines, he/she may reapply to graduate in the next semester or term without registering again provided all requirements are met before the first day of classes of the next semester or term.

K. Time Limit
The candidate must satisfy all requirements for the D.M.A. degree within seven years after completing 24 credit hours of graduate courses in the State University of New York at Stony Brook department or program in which he/she is to receive the degree. In rare instances, the Vice Provost for Research and Graduate Studies will entertain a petition to extend this time limit provided it bears the endorsement of the chairperson of the department or graduate program. The Vice Provost or the department may require evidence that the student is still properly prepared for the completion of work.

Award of Degree
When all requirements have been completed, the department chairperson will so certify to the Vice Provost for Research and Graduate Studies and recommend that the degree be awarded. Degrees are awarded three times a year: May, August, and December. Formal investiture, however, will only be at the spring commencement. To be eligible for a degree a student must have completed all university requirements, satisfied any provisional admission requirements, submitted the appropriate manuscripts, obtained all university clearances and have maintained matriculation according to the regulations outlined under the section titled Registration for Maintaining Matriculation, elsewhere in this Bulletin.

Waiver of Regulations
Specified requirements may be waived by the Vice Provost for Research and Graduate Studies in individual instances. A petition for such a waiver must be endorsed by the chairperson of the department and the graduate studies director, who shall append their reasons for believing that the requested waiver would not result in a breach of the spirit of the regulations.
Division of Biological Sciences

Acting Dean, Eugene R. Katz
Life Sciences 130
(516) 632-8520

The Division of Biological Sciences consists of three academic departments: Biochemistry, Ecology and Evolution, and Neurobiology and Behavior. The faculty of these departments, together with individual members of the Department of Chemistry, Marine Sciences Research Center, the School of Basic Health Sciences, Cold Spring Harbor Laboratory, and Brookhaven National Laboratory, collaborate in offering six different fields of graduate study in various areas of the biological sciences. Some faculty members participate in more than one of these fields. Through these interdepartmental interactions it is possible to meet the needs of students with diverse intellectual and professional interests without the constraints imposed by traditional departmental boundaries. The division offers programs leading to the Ph.D. degree with Graduate Studies in Cellular and Developmental Biology, Ecology and Evolution, Genetics, Molecular Biology and Biochemistry, and Neurobiology and Behavior, and a program leading to an M.A. degree in Biological Sciences. Each of the programs is guided by a director and an executive committee, and each establishes its own entrance standards and degree requirements.

Each of the programs also separately evaluates candidates for admission. The following pages describe the programs in detail. Interested students should address inquiries directly to the appropriate graduate studies director.
Cellular and Developmental Biology (BCD)

Graduate Studies Director: Harvard Lyman
Department of Anatomical Sciences
Life Sciences Building 310 (516)632-8534

Degree Requirements
Requirements for the M.A. Degree
Graduate Studies in Cellular and Developmental Biology normally does not accept a student whose goal is a master's degree. In exceptional instances, a student already enrolled may be awarded an M.A. degree upon completing an approved course study, including a minimum of 30 graduate credit hours, passing a comprehensive examination, presenting and defending a research thesis, and fulfilling the minimum requirements of the Graduate School.

Requirements for the Ph.D. Degree
A. Course Requirements
1. Cell Biology at the graduate level (BCD 656).
2. Developmental Biology at the graduate level (BCD 657).
3. Molecular Genetics (BIO 360), or Molecular Genetics (HBM 503).
5. Student seminar for at least four semesters (BCD 531, 532). One acceptable seminar is to be given each semester until advancement to candidacy and attendance at all research seminars (BCD 621, 622) is required.
6. Two semesters of research (BCD 530) in staff laboratories. The students generally must work in four different laboratories during the two semesters. The particular laboratories involved will be decided in consultation with the student and with approval of the executive committee.
7. At least three approved elective graduate courses.

B. Comprehensive Examination
At the beginning of the fourth semester, the student will take a written comprehensive examination covering the areas of cell and developmental biology.

C. Teaching Requirement
It is expected that each graduate student completing a doctoral degree will have functioned as a teaching assistant during at least two semesters of his/her graduate career (BIO 600/601).

D. Residence Requirement
The university requires at least two consecutive semesters of full-time graduate study. The demands of the program necessitate a longer period of residence.

Courses
BCD 500 Directed Readings in Genetics and Developmental Biology
Directed readings in topics of current interest, under supervision of a faculty sponsor culminating in one or more critical review papers. Prerequisite: Sponsor and approval of master's programs executive committee. Yearly, 1-3 credits, repetitive

BCD 527 Photoperiodic Control of Plant and Animal Development
Examination of seasonally correlated developmental processes that are modulated and controlled by light, the physiological and biochemical pathways whereby the control is mediated, and the nature of the biological timing mechanism involved. Topics will include flowering and phytochrome system, insect development, annual reproductive cycles in birds and mammals, the Buring hypothesis, and circannual rhythms. Fall, alternate years, 3 credits

BCD 529 Organelle Development
This course is concerned primarily with the development of the mitochondrion and the chloroplast. Subjects will include the biogenesis of these organelles and their relation to the interaction with the nucleus. Emphasis will be on genetical and biochemical analysis. Fall, 3 credits

BCD 530 Projects in Developmental Biology
Individual laboratory projects, closely supervised by staff members, to be carried out in staff research laboratories on a rotation basis. Fall and spring, 2 credits

BCD 531, 532 Graduate Seminar in Developmental Biology
Seminars are given by graduate students on current literature in the field of developmental biology. Fall and spring, 1 credit

BCD 535 Physiology and Development of Higher Plants
Survey of selected topics in plant physiology with emphasis on developmental aspects. Areas from which specific problems will be selected include photomorphogenesis, hormonal control of plant growth and plant tissue culture. Fall, alternate semesters, 2 credits

BCD 536 Biological Clocks
An in-depth consideration of the temporal dimension of biological organization and of the cellular and molecular timekeeping mechanisms characteristic of living systems. Topics include a survey of circadian rhythms and their properties in eukaryotic systems, cell cycle clocks, the quest for anatomical loci, dissection of clocks by chemical and molecular genetic techniques, entrainment and coupling pathways, biochemical and molecular models of circadian oscillators, pacemaker dysfunction, and the cellular aspects of chronopharmacology and chronotherapy, and cellular clocks in development and aging. Crosslisted with HBA 536. Spring, 3 credits

BCD 537 Physiology and Biochemistry of the Cell Cycle
An integrated view of the cell development cycle in prokaryotes and eukaryotes. Topics considered will include cell cycle anatomy; cell population dynamics; general patterns of nucleic acid synthesis; regulation of enzyme activity during the cell cycle; temporal control of gene expression; development and function of cellular organelles during the cell cycle; and the control of cell division. Crosslisted with HBA 537. Fall, 3 credits

BCD 599 Research
Original investigation under the supervision of a member of the staff. Fall and spring, credit to be arranged.

BCD 621, 622 Developmental Biology Seminar
A weekly series of seminars by members of the staff, postdoctoral students, advanced graduate students, and invited guests. The topics vary each year.
students, and visiting scientists on current research in developmental biology.

Fall and spring, 1 credit

**BCD 656 Comparative Cell and Tissue Biology**
Introduction to the structural organization of cells and tissues and to the way structure relates to function. Particular emphasis placed on cell organelle structure and function in specialized cells in tissues. The organization and interaction of cells in tissues will also be covered. The course will be comparative and will include examples of tissues from vertebrates and invertebrates.

Crosslisted with HBA 656.

*Spring, 4 credits*

**BCD 657 Principles of Development**
This course will deal with developing systems at all levels from the morphological to the molecular. Illustrative material from both animal and plant kingdoms will be used. Special attention will be given to gametogenesis, genetic control of early development, translational control of protein synthesis, the role of cell division and cell movements, and cell-to-cell interactions in defining developing systems. Crosslisted with HBA 657.

*Prerequisite: BCD 656*

*Fall, 3 credits*

**BCD 682-684 Advanced Seminars**
Topics to be arranged.

*Fall and spring, variable and repetitive credit*

**BCD 699 Dissertation Research**
Original investigations undertaken as part of the Ph.D. program under supervision of research committee.

*Fall and spring, credit to be arranged*
Degree Requirements
Requirements for the M.A. Degree
Graduate Studies in Ecology and Evolution usually does not accept a student whose goal is an M.A. degree. However, a student already in graduate studies may be awarded an M.A. degree upon satisfaction of the following requirements in addition to the minimum Graduate School requirements:
A. Completion of an approved course of study including 30 graduate credit hours.
B. Preparation of a research thesis.

Requirements for the Ph.D. Degree
A. Course Requirements
1. During the first year in residence, students are normally required to take Principles of Ecology (BEE 550), Principles of Evolution (BEE 551), Biometry (BEE 552), and Research Areas in Ecology and Evolution (BEE 556).
2. Students must take a minimum of three other graduate courses, other than seminars, within this or other departments of this or other universities.
3. Colloquium in Ecology and Evolution (BEE 671-672) must be taken each year.
4. A minimum of one graduate seminar per year is required under normal circumstances.
5. The faculty feels that each student will require advanced training in various ancillary disciplines appropriate to the student’s chosen field or research. Requirements for any specific student will be determined by the student’s advisory committee and might include one or more foreign languages or advanced studies in mathematics, statistics, computer sciences, biochemistry, taxonomy or other areas.

B. General Graduate Examination
During the fall semester of the second year, each student takes a written examination consisting of essay questions in ecology, evolution and genetics, and ancillary areas. This examination, which is uniform for all students in a given year, tests for breadth of the student’s command of ecology and evolution.

C. Preliminary Examination
No later than the end of the fourth year of study a student takes a preliminary examination tailored to the student's interests and administered by his/her advisory committee. The examination includes an oral portion and may include a written portion, at the option of the student. The student and his/her committee agree in advance on the areas of knowledge to be covered in this examination.

C. Language Requirements
The language requirement will be established by the student’s advisory committee and will not exceed reading knowledge of two foreign languages.

D. Advancement to Candidacy
The faculty will recommend a student to the Graduate School for advancement to candidacy upon satisfactory completion of the preliminary examination and any language requirement established for the student, and upon acceptance of a thesis proposal by the faculty.

E. Research and Dissertation
A dissertation is required for the Ph.D. degree. It must contain the results of original and significant investigation. A dissertation proposal must be approved by the faculty during an early stage of the student’s research.

F. Dissertation Committee
Students select a temporary advisor during the first semester in residence and a permanent advisor is usually selected before or during the third semester. The advisory committee, consisting of the permanent advisor and at least two other faculty members from outside Graduate School in Ecology and Evolution, is nominated by the student in consultation with his/her permanent advisor and must be approved by the graduate studies director. Additional members from departments outside Graduate Studies in Ecology and Evolution may be appointed to the dissertation committee.

G. Final Examination
The completed dissertation must be approved by the student’s advisory committee. A dissertation examining committee is then appointed by the Vice Provost for Research and Graduate Studies. A formal public oral defense of the dissertation is scheduled, at which the student presents his/her findings and is questioned by members of the examining committee and by other members of the audience.

H. Teaching Requirement
It is expected that all graduate students completing a doctoral degree will have functioned as teaching assistants during at least two semesters of their graduate careers.

I. Residence Requirement
At least two consecutive semesters of full-time graduate study are required. The demands of the course of study usually necessitate a longer period of residence.

J. Time Limit
The time limit imposed by the Graduate School is observed by Graduate Studies in Ecology and Evolution. Students must satisfy all requirements for the Ph.D. degree within seven years after completing 24 credit hours of graduate courses in Graduate Studies in Ecology and Evolution.

Courses
BEE 500 Directed Readings in Population Biology
Directed readings in topics of current interest, under supervision of a faculty member culminating in one or more critical review papers. Prerequisites: Sponsor and approval of master’s program executive committee. Fall and spring. 1-3 credits, repetitive
BEE 501 Directed Readings in the Biology of Organisms
Directed readings in topics of current interest, under supervision of a faculty sponsor culminating in one or more critical review papers. Prerequisite: Sponsor and approval of master's program executive committee. Fall and spring, 1-3 credits, repetitive.

BEE 550 Principles of Ecology
Population dynamics, interactions of organisms, theoretical concepts of community structure and their biological and evolutionary implications. Prerequisite: Permission of instructor. Fall, 4 credits

BEE 551 Principles of Evolution
Biological evolution including the genetics of populations, speciation, evolution of higher taxa and the fossil record. Fall, 4 credits

BEE 552 Biometry
An intensive course in statistical theory and methodology. The analysis of real biological data is emphasized. Topics include analysis of variance, simple multiple and curvilinear regression analysis, correlation analysis and goodness of fit tests. Spring, 4 credits

BEE 553 Multivariate Analysis in Biology
An introduction to multivariate statistical analysis for biologists. Topics include general least squares analysis, MANOVA, cluster analysis, and factor analysis. Prerequisite: BEE 552 or equivalent Fall, odd years, 3 credits

BEE 554 Population Genetics and Evolution
A general introduction to mathematical population genetics and evolutionary theory. The effects of mutation, recombination, selection, and migration are studied. Modern concepts in both theoretical and experimental population genetics are covered. Prerequisite: BIO 220, BEE 552 or their equivalents, and a course in evolution Spring, even years, 3 credits

BEE 555 Mathematical Methods in Population Biology
This course covers a variety of mathematical methods used in modern theoretical biology. Topics include linear algebra and applications, ordinary and partial differential equations, stochastic processes. Examples from population biology, i.e., mathematical ecology and population genetics, are used throughout. Spring, 3 credits, even years

BEE 556 Research Areas of Ecology and Evolution
A description of the current research areas of ecology and evolution broadly conceived. All first-year ecology and evolution students are expected to participate. Fall, 1 credit, spring, variable credit

BEE 557 Numerical Taxonomy
The application of numerical techniques to classificatory problems in biology. Lectures cover the theory of classification and include phenetic, cladistic, and evolutionary approaches. Topics include character coding, similarity coefficients, cluster analysis, ordination, graph-theoretic methods, and techniques applicable to numerical cladistics. Fall, even years, 3 credits

BEE 558 Tutorial Readings
Individual tutorial study with an instructor in the Ecology and Evolution Program for the purpose of background reading in an area of ecology and evolution. Fall and spring, variable credit

BEE 559 Individual Studies in Organisms
A detailed study of the biology of a selected systematic group chosen by the graduate student and a faculty member. This is conducted as a tutorial course. Fall and spring, variable credit

BEE 580 Advanced Ecology
Intensive treatment of topics such as history of community theory, spatially structured competition, plant-animal interactions, parasite population models, multivariate techniques of community analysis, behavioral ecology, and measurement of natural selection. Spring, even years, 4 credits

BEE 582 Advanced Invertebrate Zoology
Lectures, student seminars, and discussions on selected topics in invertebrate zoology, with emphasis on the local and tropical American fauna. Spring, 2 credits, repetitive

BEE 583/5CN 583 Mathematical Marine Ecology
Course focuses on the use of mathematics in marine ecological problems. Topics include population dynamics; diffusion-reaction models; critical path-size problems; biofluid mechanics; catastrophe-chaos problems; and animal swarming. Prerequisite: MAR 555 or permission of instructor Spring, 3 credits

BEE 585 Molecular Evolution
An introduction to the use of molecular information in population genetics, evolution, and taxonomy. This course will combine discussions of methodology, data, and theory to illustrate how molecular information is changing our view of the evolutionary process. Prerequisite: BEE 551 or permission of instructor Spring, odd years, 3 credits

BEE 586 Applied Ecology
This course focuses on the role of ecology in solving practical environmental problems. Ecologically based technologies and methods of ecological risk analysis applied to terrestrial and aquatic ecosystems will be developed. Modern problems related to genetically engineered organisms, responses of ecosystems to pollution, and overexploitation form the basis of the course. Spring, odd years, 2 credits

BEE 571 The Institutions of Environmental Policy
The environmental effects of existing economic, legal, and other social institutions will be examined with emphasis on identification of areas of agreement and conflict with ecological theory. Fall, odd years, 3 credits

BEE 575 Phylogenetics
A survey of principles and methods of phylogenetic systematics, covering both principles of classification and methods for inferring phylogenetic relationships. A quantitative approach is stressed throughout and instruction on computer methods of phylogenetic analysis is included. The discrimination between phylogenetic and biogeographical theories is also covered. Spring, odd years, 3 credits

BEE 587 Computer Programming and Modelling Techniques in Biology
An introduction for advanced biology, mathematics, and physics students to PASCAL programming applications in ecology, population genetics, and taxonomy. Mathematical methods used in modeling of biological phenomena. Both analytical and simulation techniques will be emphasized. Prerequisite: A year of calculus; either BIO 151, 152 or PHY 102 or 104 Fall, 3 credits

BEE 588 Current Topics in Ecology and Evolution
The subject matter of the special topics course varies from semester to semester, depending upon the interests of students and staff. Fall and spring, variable and repetitive credit

BEE 599 Research
Original investigation undertaken with the supervision of a member of the staff. Fall and spring, variable and repetitive credit

BEE 670 Informal Seminar
Presentation of preliminary research results and research problems by students and faculty. Fall and spring, no credit

BEE 671, 672 Ecology and Evolution Colloquium
A weekly series of research seminars presented by visiting scientists as well as by the faculty. Required every semester of all ecology and evolution graduate students. Fall and spring, no credit

BEE 689 Seminar on Adaptations of Marine Organisms
Seminars on selected topics concerning ecological, genetic, and evolutionary problems in the marine environment. Fall and spring, 2 credits, repetitive

BEE 690 Seminar on Evolutionary Processes
Seminars on selected topics concerning evolutionary processes. Fall and spring, 2 credits, repetitive

BEE 691 Seminar on Systematics and Phylogeny
Seminars on selected topics in systematics. Topics will include the theory of classification and numerical taxonomy, both phenetic and cladistic. Fall and spring, 2 credits, repetitive

BEE 692 Seminar on the Environment and Human Affairs
Student seminars on selected topics concerned with the effect of man on the environment. Application of ecological and evolutionary theory to the solution of human problems. Fall and spring, 2 credits, repetitive

BEE 693 Seminar on Population and Community Ecology
Student seminars on selected topics in population and community ecology. Fall and spring, 2 credits, repetitive

BEE 699 Dissertation Research
Original investigations undertaken as part of the Ph.D. Program in Ecology and Evolution. Prerequisite: Advancement to candidacy. Fall and spring, variable and repetitive credit
Degree Requirements
Requirements for the M.A. Degree
Graduate Studies in Genetics normally does not accept a student whose goal is a master’s degree. In exceptional instances, a student already in the Graduate Studies may be awarded an M.A. degree upon completing an approved course of study, including a minimum of 30 graduate credit hours, passing a comprehensive examination, presenting and defending a research thesis, and fulfilling the minimum requirements of the Graduate School.

Requirements for the Ph.D. Degree
In addition to the requirements of the Graduate School, the following are required:

A. Course Requirements
1. Molecular Genetics (HBM 503).
2. Graduate Genetics (BGE 510).
4. Graduate Student Seminar in Genetics (BGE 531, must be taken four semesters).
5. Laboratory Rotation in Genetics (BGE 530, two semesters). The student will generally work in two different laboratories during the two semesters. The particular laboratories will be decided by the student’s advisory committee in conjunction with the student. One or two additional rotations may be taken in the summer.
6. The faculty feels that each student will require advanced training appropriate to the student’s area of specialization within genetics. Requirements for any specific student, in addition to those enumerated above, will be determined by the student’s advisory committee.

B. Comprehensive (Preliminary) Examination
At the end of the fourth semester, the student will take a written comprehensive examination covering all areas of genetics.

C. Thesis Proposal Examination
After successful completion of the comprehensive examination, the student selects a thesis advisor and writes a proposal for thesis research. After approval by the thesis advisor, the proposal is orally defended before a thesis committee.

D. Advancement to Candidacy
After successful completion of all required and elective courses, the comprehensive examination, and the thesis proposal examination, the student will be recommended to the Graduate School for advancement to candidacy.

E. Ph.D. Dissertation
The research for the Ph.D. dissertation is conducted under the supervision of the thesis committee. Upon approval of the completed dissertation by this committee, a dissertation examining committee is appointed by the Vice Provost for Research and Graduate Studies. A formal public oral defense of the dissertation is scheduled, at which the student presents his/her findings and is questioned by members of the examining committee and by other members of the audience.

F. Teaching Requirement
It is expected that each graduate student completing a doctoral degree will have functioned as a teaching assistant during at least two semesters of his/her graduate career (BIO 600).

G. Residence Requirement
The university requires at least two consecutive semesters of full-time graduate study. The demands of the course of study necessitate a longer period of residence.

Courses
BGE 510 Graduate Genetics
This introductory course for graduate students will cover a specific topic each time it is offered and will treat that topic from different scientific perspectives, such as a) Molecular Genetics, b) Developmental Genetics, c) Immunogenetics, d) Evolutionary Genetics, and e) Human Genetics. The semester topics will include Genetic Recombination, Mutation and Gene Organization.
Prerequisite: Permission of instructor
Spring, 3 credits

BGE 530 Laboratory Rotation
The student rotates through two professors’ laboratories, during the first year. The selection of laboratories is made by the student in consultation with his/her advisor committee. By taking part in ongoing projects the student will learn experimental procedures and techniques and become acquainted with research opportunities in the participating departments.
Prerequisite: Permission of instructor
Fall and spring, 2 credits each semester

BGE 531 Graduate Student Seminar in Genetics
Seminars are given by graduate students on the current literature in genetics.
Prerequisite: Permission of instructor
Fall and spring, 1 credit each semester

BGE 540 Readings in Genetics
Prerequisite: Permission of instructor
Fall, 1-3 credits, variable

BGE 550 Genetics Seminar
A weekly series of seminars in genetics given by outstanding visiting scientists, supplemented by members of the staff, postdoctoral students, and advanced graduate students.
Prerequisite: Permission of instructor
Fall and spring, 1 credit each semester

BGE 599 Research
Original investigation undertaken under the supervision of a member of the staff.
Fall and spring, 1-8 credits, variable

BGE 699 Dissertation Research
Original investigations undertaken as part of the Ph.D. program under supervision of a member of the staff.
Prerequisite: Advancement to candidacy
Fall and spring, 1-9 credits, variable
Molecular Biology and Biochemistry (BMO)

Acting Chairperson, Department of Biochemistry: Martin Freundlich
Life Sciences Building 450 (516) 632-8550
Graduate Studies Director: Rolf Sternglanz
Life Sciences Building 472 (516) 632-8550

Degree Requirements
Requirements for the M.A. Degree

Graduate Studies in Molecular Biology and Biochemistry normally does not accept students whose goal is a master's degree. In exceptional instances, a student already in the Graduate Studies program may be awarded an M.A. degree upon completing an approved course of study, including a minimum of 30 graduate credit hours; passing a comprehensive examination, submitting and defending a master's thesis, and fulfilling the minimum requirements of the Graduate School.

Requirements for the Ph.D. Degree

A. Course Requirements

Core courses:
1. Graduate Biochemistry I, II (BMO 520, 521), a two-semester course.
2. Molecular Genetics (HBM 503).
4. Experimental Biochemistry (BMO 509, 510), a two-semester course in which the student spends a half semester in each of four different faculty laboratories actively participating in the research work of the laboratory.
5. Three elective courses in molecular biology or related fields.
6. Enrollment every semester in three seminar courses: Colloquium in Molecular Biology (BMO 601, 602), which is a series of invited lectures by visiting scientists from other institutions; Student Seminar (BMO 603, 604), in which each student presents a talk on a topic from the current literature; and Molecular Biology Workshop (BMO 605, 606), in which faculty members, postdoctoral fellows, and advanced students present informal progress reports on their current research activities.

B. Qualifying Examination

At the end of the first year all students take a written qualifying examination covering the material from the core courses. This examination tests the student's ability to integrate basic concepts and information from the core courses.

C. Proposition Examination

After passing the written qualifying examination, each student is required to prepare and defend one proposition. The student proposes an original mechanism or theory which could serve to explain a biological phenomenon in molecular terms, and devises hypothetical experiments designed to test the proposal. The proposition may be in any area of molecular biology, including the probable area of the Ph.D. thesis. The student presents a detailed write-up of the background and logic of the proposition and the experiments proposed to test it, which then forms the basis for an oral proposition examination. The qualifying examination and the proposition examination together constitute the preliminary examination specified in the regulations of the Graduate School.

D. Advancement to Candidacy

When the above requirements have been satisfactorily completed, a recommendation for advancement to candidacy for the Ph.D. will be forwarded to the Graduate School.

E. Ph.D. Dissertation

During the second year the student initiates a dissertation research project in the laboratory of a particular member of the program faculty. After the student has passed the proposition examination, a research committee is appointed to guide the dissertation research, and when the research nears completion, a dissertation examining committee is appointed by the Vice Provost for Research and Graduate Studies.

F. Dissertation Defense

The dissertation defense, which completes the requirements for the Ph.D., consists of a public seminar presentation of the dissertation work followed by an oral examination before the dissertation examining committee.

G. Teaching Experience

All students in molecular biology and biochemistry, whether or not they are supported by teaching assistantships, are required to gain experience in teaching by assisting in laboratory sections, leading discussion sections or helping to formulate and grade examination papers. The teaching experience may be in either undergraduate or graduate courses, and extends over a period of three semesters.

H. Residence Requirement

The university requires at least two consecutive semesters of full-time graduate study. The demands of the course of study necessitate a longer period of residence.

Courses

BMO 500 Directed Readings in Molecular Biology
Directed readings in topics of current interest, under supervision of a faculty sponsor culminating in one or more critical review papers. Prerequisite: Sponsor and approval of Master's Program Executive Committee Yearly, 1-3 credits

BMO 507/BNB 540 Molecular Approaches to the Nervous System
An advanced course for critical evaluation of biochemical, molecular biological, and cellular electrophysiological analysis of neuronal func-
tion and synaptic transmission. The format emphasizes discussion and evaluation of recent research findings by all participants.

Prerequisites: BMO 520, BNB 561 or permission of instructor.

Spring, alternate years, 2 credits

BMO 509, 510 Experimental Biochemistry
An introduction to modern biochemical research techniques. The student spends a half-semester in the laboratory of each of four different members of the faculty. In each laboratory the student participates in some aspect of the research being pursued by the faculty member.

Fall and spring, minimum 2 credits each semester, variable

BMO 512 Physical Biochemistry
Theoretical principles and experimental methods used in the study of proteins and nucleic acids, e.g., hydrodynamics, spectroscopy, magnetic resonance, and diffraction.

Prerequisites: BMO 520, 521; CHE 301 or 312

Fall, 3 credits

BMO 517 Biomembranes
The molecular architecture of membranes: the organization, functions, and assembly of lipids and proteins in biological membranes; and biophysical phenomena such as diffusion and conductivity, which are amenable to detailed molecular analysis, will also be examined.

Spring, 3 credits

BMO 520 Graduate Biochemistry I
Several topics in modern biochemistry will be treated at an advanced level. Topics covered will include protein structure; enzyme kinetics and mechanisms; metabolism of carbohydrates; amino acids and lipids; biomembranes, membrane transport, and bioenergetics.

Prerequisite: Introductory Biochemistry

Fall, 4 credits

BMO 521 Graduate Biochemistry II
Topics in the molecular biological aspects of biochemistry will be covered, including nucleic acid replication, transcription and protein synthesis in both in vivo and in vitro systems.

Prerequisite: Introductory Biochemistry

Spring, 3 credits

BMO 599 Research
Original investigation undertaken under the supervision of a member of the staff.

Fall and spring, credit to be arranged

BMO 601, 602 Colloquium in Molecular Biology
A weekly series of talks and discussions by visiting scientists in which current research and thinking in various aspects of molecular and cellular biology will be presented. This course is required of all students every semester in which they are registered in Graduate Studies in Molecular Biology and Biochemistry and attendance is mandatory. Visitors are welcome.

Fall and spring, 1 credit each semester

BMO 603, 604 Student Seminar in Molecular Biology
Seminars given by graduate students on recent work taken from the literature in the area of molecular or cellular biology. This course is required of all students every semester in which they are registered in Graduate Studies in Molecular Biology and Biochemistry and attendance is mandatory. Visitors are welcome.

Fall and spring, 1 credit each semester

BMO 605, 606 Molecular Biology Workshop
Progress reports given each week by members of the faculty, postdoctoral fellows, and advanced graduate students on their current research. This course is required of all students every semester in which they are registered in Graduate Studies in Molecular Biology and Biochemistry and attendance is mandatory. Visitors are welcome.

Fall and spring, 1 credit each semester

BMO 685-688 Advanced Seminars
Topics to be arranged. Visitors are welcome.

Fall and spring, 1 credit each semester

BMO 699 Dissertation Research
Original investigations undertaken as part of the Ph.D. program under supervision of a research committee.

Prerequisite: Advancement to candidacy

Fall and spring, credit to be arranged
Degree Requirements
Requirements for the M.A. Degree
Graduate Studies in Neurobiology and Behavior normally does not accept a student whose goal is an M.A. degree. In exceptional instances, a student already in the Graduate Studies may be awarded an M.A. degree upon completion of an approved course of study, including 30 graduate credit hours, a comprehensive examination, a research thesis, and fulfilling the minimum requirements of the Graduate School.

Requirements for the Ph.D. Degree
A. Course Requirements
1. Basic biology
   a. Biochemistry (BIO 361, HBC 531 or BMO 520). This requirement can be waived if the student can demonstrate that a sufficient course has been successfully completed.
   b. Cell Biology (BIO 310 or BCD 656). This requirement can be waived if the student can demonstrate that a sufficient course has already been taken.
2. Introduction to Neurobiology and Behavior I, II (BNB 561, BNB 562). A two-semester course taught by members of the Department of Neurobiology and Behavior in which the student is introduced to a broad variety of topics in neurobiology. These will be taken in the fall and spring semesters of the first year.
3. Advanced Neurobiology and Behavior (BNB 531, BNB 532). Four of these one-semester courses given by various faculty members are required to be taken consecutively during the period of residency and will begin normally in the spring of the first year.

These courses will include presentations by both faculty and students. Each semester will be organized around a specific topic, e.g., neurochemistry, development and plasticity, excitable membranes, etc.

4. Medical Neuroanatomy (HBA 534) or Mammalian Neuroanatomy (HBA 660). This requirement can be waived if the student can demonstrate that a sufficient course has been successfully completed.

5. Electives. Two courses in various biological sciences (graduate level), or physical or mathematical sciences (either graduate or undergraduate level) must be selected by the student in consultation with the student's grade advisor.

B. Preliminary Examination
In January or February of the second year after admission, each student must take the preliminary examination. The examination consists of both written and oral parts and emphasizes integration of information from a variety of sources, including courses, seminars, and readings.

C. Advancement to Candidacy
The faculty will recommend a student to the Graduate School for advancement to candidacy upon satisfactory completion of all course requirements, the preliminary examination, and dissertation proposal.

D. Ph.D. Dissertation
A dissertation that constitutes an original and significant contribution to the field of neurobiology and behavior is required for the Ph.D. The work must be of a quality acceptable for publication in a recognized scientific journal. By the end of the second year, the student should initiate a dissertation research program in the laboratory of a member of the department. After consultation with an advisory committee appointed to guide the dissertation research, the student should present and defend a dissertation proposal. Upon completion of the dissertation research, the student will present a departmental seminar based on the dissertation. Following this the student will be given an oral examination on the dissertation research and related areas by the dissertation committee.

E. Teaching Requirements
All students, as part of their training, are required to participate in teaching at the undergraduate level for at least two semesters. If supported by a teaching assistantship, the student must participate in teaching each semester the assistantship is held.

F. Residence Requirement
The university requires at least two consecutive semesters of full-time study. The demands of the course of study necessitate a longer period of residence.

Courses
BNB 500 Directed Readings in Neurobiology and Behavior
Directed readings in topics of current interest, under supervision of a faculty sponsor, culminating in one or more critical review papers.
Prerequisite: Sponsor and approval of master's program executive committee
Yearly, 1-3 credits, repetitive

BNB 531 Advanced Neurobiology
Advanced seminar course centered around a topic to be determined. Examples include neurochemistry, membrane biophysics, neuronal plasticity, synaptic mechanisms, molecular neurobiology, developmental neurobiology. Students will be expected to read original literature and deliver oral presentations of material.
Prerequisite: Permission of instructor
Fall, 3 credits, repetitive
BNB 532 Advanced Neurobiology
Advanced seminar course centered around a topic to be determined. Students will be expected to read original literature and deliver oral presentations of material.
Prerequisite: Permission of instructor
Spring, 3 credits, repetitive

BNB 533 Advanced Seminar in Behavioral Neurobiology
Advanced seminar course centered around selected topics in behavioral neurobiology. Topics include, for example, neuropharmacology, biological rhythms, neuroendocrinology, and neural control of feeding and drinking. Students will be expected to read original literature and deliver oral presentations of material.
Spring, 3 credits, repetitive

BNB 540 Molecular Approaches to the Nervous System
An advanced course for critical evaluation of biochemical, molecular biological, and cellular electrophysiological analysis of neuronal function and synaptic transmission. The format emphasizes discussion and evaluation of recent research findings by all participants.
Prerequisite: BMO 520, BNB 561, or permission of instructor
Spring, 2 credits, alternate years

BNB 547 Readings in Neurophysiology
Discussion and critical evaluation of neurophysiological research published in biological journals. Critical analyses of techniques, methodology, and conclusions of the research will provide the primary focus of this seminar.
Prerequisite: Permission of instructor
Fall and spring, 1-3 credits each semester

BNB 551 Neurobiological Techniques I
A series of laboratory exercises designed to give students "hands on" experience in the basic laboratory techniques of contemporary neuroscience. This includes intracellular and extracellular recording, neuronal tissue culture, neuroanatomical techniques, and integrative physiology.
Fall, 2 credits

BNB 552 Neurobiological Techniques II
A series of laboratory exercises designed to give students "hands on" experience in the basic laboratory techniques of contemporary neuroscience. This includes intracellular and extracellular recording, neuronal tissue culture, neuroanatomical techniques, and integrative physiology.
Spring, 2 credits

BNB 555 Neuropharmacology
An advanced course for graduate students interested in developing an understanding of neuropharmacology and research on this topic. Following a general introduction to the nerve cell structure, synaptic and chemical transmission, three themes of receptors, receptors as channels, and G-protein-coupled receptors will be developed. Recent advances in cell and molecular biology provide the framework for instruction and discussion.
Prerequisites: Staff approval
Fall, 3 credits

BNB 561 Introduction to Neurobiology and Behavior I
A survey of cellular neurobiology. Topics to be treated include cell biology of neurons; electrophysiology of axons, synapses, and sensory receptors; neurochemistry of synaptic transmission; neural development.
Prerequisite: BIO 334 or permission of instructor
Fall, 3 credits

BNB 562 Introduction to Neurobiology and Behavior II
A survey of integrative neurobiology. Topics include sensory and motor systems, autonomic nervous system and organization of brain stem and cortex.
Prerequisite: BNB 561
Spring, 3 credits

BNB 563 Introduction to Behavioral Neurobiology
A survey of behavioral neurobiology. Topics to be discussed include neurotransmitters and behavior, development and plasticity of the brain, neural control of homeostatic behaviors, and biological rhythms.
Fall, 3 credits

BNB 579 Topics in Developmental Neurobiology
An introduction to the development of the nervous system. Topics include neuroembryology, neuronal differentiation, synapse formation, and specificity and plasticity of connections in vertebrates and invertebrates. Students will be expected to do at least one oral presentation.
Prerequisite: Permission of instructor
Spring, biennially, 3 credits

BNB 583-585 Special Seminars
Topics to be arranged.
Fall and spring, variable and repetitive credit

BNB 589 Research
Original investigation undertaken with supervision of a member of the staff.
Fall and spring, credit to be arranged

BNB 693-699 Advanced Seminars
Topics to be arranged.
Fall and spring, variable and repetitive credit

BNB 697 Advanced Neurobiology and Behavior Seminar
Seminar presentations delivered by faculty, associates, students, and visiting speakers.
Prerequisite: Permission of instructor
Fall and spring, repetitive credit, 1 credit each semester

BNB 699 Dissertation Research
Original investigation undertaken as part of the Ph.D. program under the supervision of the dissertation committee.
Fall and spring, credit to be arranged
Degree Requirements
Requirements for the M.A. Degree in Biological Sciences
In addition to the requirements of the Graduate School, the following are required:

A. Course Requirements
The M.A. in Biological Sciences requires completion of an approved course of study, a project, and a minimum of 30 graduate credits (a maximum of six approved transfer credits may be applied to this requirement). The overall grade point average in graduate courses must be at least 3.0.

The program of study must include at least one course in Area I—Research and Educational Techniques, and at least one course in three of the other five areas: II—Molecular Biology, III—Cellular and Developmental Biology and Genetics, IV—Neurobiology and Behavior, V—Animal and Plant Biology, and VI—Ecology and Evolution. Additional courses may be taken from the offerings of the other graduate programs, with permission of the instructor. At least six (but no more than 15) credits must be taken as individual study under the headings of directed readings, laboratory research, and master’s project (the last for at least three credits). Faculty sponsors must be obtained for this part of the program.

B. Master’s Project
The master’s project may be a thesis presenting the results of a laboratory and/or field study. Alternatively, it may be a paper providing either a critical assessment of a topic, based largely on the primary literature, or a curriculum in biology for secondary schools or community colleges, developed by the student. In all cases, the results must be accepted by a project committee appointed by the program.

C. Residence Requirement
Graduate Studies in Biology has no full-time residency requirement, but all part-time students must work continuously by taking at least one course each semester. Deviations from such a minimum schedule require the consent of the graduate studies director.

Courses
BIO 500 Natural History of Intertidal Organisms
Adaptations, reproductive strategies, classification, evolution, and ecology of selected intertidal organisms. Emphasis on local invertebrate fauna. Visits to course exhibits required. Prerequisite: 1 year of general biology, zoology, or zoology-botany
Summer, 3 credits
BIO 561 Human Genetics
This course assumes a knowledge of the fundamentals of general genetics. It focuses upon the study of genes in human kindreds and populations, giving attention to human cytogenetics and to the importance of genetic factors in human development, disease, society, and evolution.
Fall, 3 credits
BIO 593-598 Special Seminars
Topics to be arranged.
Fall, spring, summer, 1-3 credits, repetitive
BIO 599 Research
Under the supervision of a member of the graduate staff the student does an independent laboratory, field, or theoretical research project.
Fall, spring, summer, credit to be arranged
BIO 600 Practicum in Teaching
Participation in the presentation of a biology course, under supervision of the course director.
Fall, spring, 0 credits, repetitive
BIO 601 Practicum in Teaching
Participation in the presentation of a biology course, under supervision of the course director.
Fall, spring, 1-3 credits, repetitive
Note: Additional courses are available from the offerings of other graduate programs.
Division of Humanities and Fine Arts

Dean Don Ihde
Library E2340 (516) 632-6992

The Division of Humanities and Fine Arts consists of the departments of Art, English, Comparative Studies, French and Italian, Germanic and Slavic Languages and Literatures, Hispanic Languages and Literature, Music, Philosophy, and Theatre Arts.

English, Hispanic Languages and Literature, Music, and Philosophy offer the Ph.D., as does Comparative Literature within the Department of Comparative Studies (which also comprises programs in Classics, Humanities, Judaic Studies, Korean Studies, and Religious Studies). The Doctor of Arts is offered through the language departments, and all language departments offer the M.A. Art and Theatre Arts offer both the M.A. and the M.F.A., and Music offers, in addition to the Ph.D., the Doctor of Musical Arts and the Master of Music as well as the M.A. The Philosophy Department, in addition to the Ph.D., offers the Master of Arts in Philosophical Perspectives as well as the M.A.

The departments of Art, Music, and Theatre Arts include both studio and performance work and history, theory and criticism in their programs. The language and literature departments focus both on the practice and research in language teaching and upon traditional and contemporary scholarship in the literatures and cultures represented. The Department of English has programs in the teaching of writing as well as in literary theory and criticism. The Philosophy Department emphasizes contemporary styles of philosophy and interdisciplinary work in the Ph.D. and M.A. programs and applied philosophy in the M.A. in Philosophical Perspectives.

Related to all the Humanities and Fine Arts disciplines is the Humanities Institute, an organized research institute, which, in collaboration with the graduate programs of the Division, also offers an upper-level set of interdisciplinary graduate seminars. These seminars are related to annual themes and bring together faculty and students from many disciplines.

The Division of Humanities and Fine Arts thus provides opportunities for concrete linkings between theoretical and applied interests, between performance and studio creative activities, and between critical and historical studies. Details are found in the program descriptions that follow.
Art

(ARH, ARS)

Chairperson: Melvin Pekarsky
Fine Arts Center 2221 (516) 632-7260
Graduate Studies Director: James H. Rubin
Fine Arts Center 4213 (516) 632-7270

Degree Requirements
Requirements for the M.A.
Degree in Art History and Criticism

A. Course Requirements
The student will be required to complete successfully 36 credits of graduate work, as outlined in the list of courses below:
1. ARH 502 History of 19th-Century Art Criticism and Theory (3 credits).
2. ARH 503 History of 20th-Century Art Criticism and Theory (3 credits).
3. ARH 546 Topics in 20th-Century Art (3 credits).
4. ARH 540 Methodologies of Art History (3 credits), normally to be taken in the first semester of matriculation.
5. Two or three of the following, one of which must be a criticism course (6-9 credits):
   - ARH 501 History of Renaissance and Baroque Art Criticism and Theory (3 credits).
   - ARH 591 Practicum in the Writing of Art Criticism (3 credits).
   - ARH 541 Topics in Ancient Art (3 credits).
   - ARH 542 Topics in Medieval Art (3 credits).
   - ARH 543 Topics in Renaissance Art (3 credits).
   - ARH 544 Topics in Baroque Art (3 credits).
   - ARH 545 Topics in 19th-Century Art (3 credits).
   - ARH 547 Topics in Primitive Art (3 credits).
6. Two or three electives in the Humanities and/or Social Sciences (6-9 credits), to be chosen in consultation with a faculty advisor and with the approval of the graduate studies director. One of these should be in philosophy; others might be on relevant aspects of literary studies or criticism, history, musicology, sociology, anthropology, etc.
7. ARH 598 Thesis (up to 6 credits).
   Note: A student who takes only two courses from group 5 must take three from group 6, and vice versa. Total credits from groups 5 and 6 must be 15.

B. Comprehensive Examination
This test of basic competency will include questions examining the student's knowledge of particular periods in the history of art and individual artists and works of art, as well as essay questions designed to test the student's knowledge of the theoretical and critical issues at stake in a particular art. The student must take this examination during the third semester of study in order to continue in the program. An extension will be allowed to part-time students.

C. Foreign Language
A reading knowledge of French or German must be acquired before graduation. Students planning to advance to doctoral work will be encouraged to master both of these languages.

D. Teaching Requirement
All graduate students will be expected to assist in teaching a minimum of one semester. The course in which the student will assist shall ordinarily be an introductory level undergraduate course. Competency in teaching will be judged through teacher evaluation questionnaires and classroom visits by the course's faculty supervisor.

E. Thesis
At the beginning of the third semester, the student, together with his/her directing committee, which shall consist of the student's advisor and one or two other faculty members, will jointly agree on a thesis topic. The student must at that time submit a prospectus outlining the nature and aims of the thesis. The thesis shall be a significant original work in the form of one or more essays relevant to the examination of art history, criticism, and theory.

Requirements for the M.F.A. in Studio Art

A. Areas of Concentration
The candidate for the M.F.A. degree will choose from one of the three areas of concentration in studio art offered by the Department of Art: Painting and Drawing, Sculpture, and Printmaking.

B. Demonstrations of Studio Proficiency
All M.F.A. candidates must demonstrate proficiency in the disciplines of their chosen area of concentration. In addition, M.F.A. candidates in sculpture must demonstrate proficiency in drawing, modeling, carving, and welding. Proficiency is determined by a board of review through an interview and an evaluation of the candidate's progress prior to admission to the final year of studies toward the M.F.A. This review will take place no later than the end of the spring semester before the final year of full-time residency. At this time, the department will notify the candidate in writing as to whether he/she has been accepted for completion of the program, has been found inadequate to the professional standards of the program and has been dropped, or is deficient in some area that must be made up before continuing or completing his/her studies.

C. Final Year Residency and One-Person Exhibition
The final year of study must be taken in full-time residency. During this period, in addition to regular coursework, the student will prepare a final one-person exhibition of work. As part of this requirement, the student will submit to the department for its files a 35mm color slide record of the exhibition and a written commentary in depth, by the student, discussing the works, their objectives, etc. (Together, these are commonly known as the M.F.A. thesis.)
D. Recommended Foreign Language
The department recommends, but does not require, proficiency in a foreign language, preferably French, German, or Italian.

E. Teaching or Internship Requirement
All graduate students are required either to assist in teaching a minimum of one semester, or to choose a graduate internship or apprenticeship, to be arranged by the department. In consultation with his/her graduate advisor and with permission of the department, the student may pursue an internship in addition to the graduate teaching practicum. In such cases, the second course will be counted as one of the required studio courses outside the student's major area of concentration.

F. Course Requirements
The student will be required to complete successfully 60 credits of graduate work, as outlined in the list of courses below. No graduate studio course may be taken for more than three credits per semester.

1. One semester of Graduate Drawing Studio (ARS 550) to be taken during the first year. This course may be counted toward either 2 or 4 below, but not for both.
2. Six graduate studio courses in the major area of concentration (3 credits per course, total 18 credits). Three semesters of ARS 580 Visual Arts Seminar (3 credits per semester, total 12 credits).
3. Three graduate studio courses outside the major area of concentration (3 credits per course, total 9 credits). (See 6, below, for exception.)
4. Four courses in graduate liberal arts, e.g., art history, languages, literature, philosophy, computer graphics, etc. (3 credits each course, total 12 credits).
5. Either ARS 530 Professional Experience Internship (3 credits), or ARS 531 Graduate Teaching Practicum (3 credits). If both are taken, the second may be counted as a non-major area graduate studio course. See 4, above.
6. ARS 532 Thesis Project (up to 6 credits).

Art History and Criticism Courses

ARH 501 History of Renaissance and Baroque Art Criticism and Theory
An examination of theoretical treatises and other writings on art during the Renaissance and Baroque periods. The influence of theory on practice—and vice versa—will be explored through close examination of selected monuments. Changing concepts of the artist's place in society will also be studied as reflected in contemporary critical and expository writing. Fall, 3 credits

ARH 502 History of 19th Century Art Criticism and Theory
A study of European art criticism and theory of the 19th century, including relationships between art and the history of ideas. Readings will concentrate on primary sources, including reviews of art exhibitions (Diderot, Stendhal, Zola), artists' letters (Constable, Delacroix, the Impressionists), and treatises relating to art (Winckelmann, Proudhon, Ruskin). Special emphasis will be given to Baudelaire. Comparisons will be made between ways of seeing art as well as between critical and theoretical attitudes to artists' intentions. Fall, 3 credits

ARH 503 History of 20th Century Art Criticism and Theory
The literature of art has expanded enormously in the 20th century—for beyond attempts to organize it developmentally or conceptually. An attempt will be made to define types of criticism both in relation to the critics and their relation to the support system for the arts of which they are part. Spring, 3 credits

ARH 540 Methodologies of Art History
This course will focus primarily on three approaches to the history of art: (1) style and connoisseurship; (2) structuralism, semiotics, and related issues; and (3) social history. Under (1), various methods of stylistic analysis—such as cyclical schema and period and regional schemes—will be examined in relation to general theory and to particular kinds of art. Connoisseurship will be considered as another aspect of the methodology of style. Under (2), there will be a discussion of a variety of methods for investigating the nature of signs and symbols in art. In addition to structural-semiotic approaches, iconography and psychoanalytic methods will be included in this section. Under (3), there will be a discussion of methods that treat the work of art and the artist as parts of a larger social and political context. Consideration will be given to both Marxist critiques of establishment history and practice, and to other non-Marxist approaches. Annual, 3 credits

ARH 541 Topics in Ancient Art
This course will deal with a variety of topics relating to ancient art and its influence on later European art thought. Areas to be explored will include ancient art history, aesthetics, and comparative criticism; Roman uses of Greek art; pagan imagery in early Christian and medieval art; and the Renaissance (use of prototypes); collecting antiquities (from the Medici to Getty); archaeological exploration and publication in the 18th and 19th centuries; French neoclassicism; and the iconography of Greek vases (Hamilton, Blake, Flaxman, Ingres, Picasso). Every two years, 3 credits

ARH 542 Topics in Medieval Art
A topic in medieval art or architecture, such as early medieval manuscript illumination, ornament and design, or Gothic Cathedral, is selected and explored during the semester in lectures, discussions, and student reports or papers. Every two years, 3 credits

ARH 543 Topics in Renaissance Art
This course, usually a seminar, will deal with one or several of the following aspects of Renaissance art: iconographic problems, style and connoisseurship (including the study of individual works at the Metropolitan Museum or the Frick Collection); and the subject and content of a work, the exchange of artistic ideas between northern and southern Europe, and Renaissance sources in antiquity and the Middle Ages. Every two years, 3 credits

ARH 544 Topics in Baroque Art
Specific areas within 17th-century art will be studied through lectures and seminar reports. Possible topics are manners and mores in 17th-century Dutch painting—the evolution of genre painting from its roots in the religious and moralizing images of the 16th century to scenes of domesticity and satire; the iconography of 17th-century religious art—a study of the direct impact of the Council of Trent on religious art in the 17th century, and of transformations in Christian iconography after the Counter-Reformation. Every two years, 3 credits

ARH 545 Topics in 19th Century Art
Selected topics in 19th-century art with an emphasis on interdisciplinary approaches to interpretation. Possible topics include politics and art during the French Revolution; English landscape painting and the theory of the picturesque; and French realism and mid-19th-century social thought. Every two years, 3 credits

ARH 546 Topics in 20th Century Art
Twentieth-century art considered as an international movement, European and American, and the nationalism or internationalism of art. Emphasis will vary with topics ranging over stylistic analysis, iconographical interpretations, and theoretical studies. Students are expected to undertake original research and interpretation. Every two years, 3 credits

ARH 547 Topics in Primitive Art
Study of the various theoretical approaches to the interpretation of primitive art. Topics will include structural analysis of art, socioeconomic structure and art, and the symbolism and art. Every two years, 3 credits

ARH 550 Inquiries into Art Criticism and Theory
This course will deal with the theoretical approaches to the study of art that cross historical boundaries. Topics will vary from semester to semester. They may be an expansion of one of the areas generally covered in ARH 540, such as psychology of art or the iconography of architecture. Other investigations may focus on subjects requiring a special methodological approach, such as the theory and history of ornament and design or the role of public art. Every two years, 3 credits

ARH 591 Practicum in the Writing of Art Criticism
This course is designed as a practicum in the writing of art criticism under the supervision of the faculty. Fall and spring, 3 credits

ARH 592 Practicum in Teaching
Instruction in the department under the supervision of the faculty. (This course may not be included more than once in the courses taken in fulfillment of the 36 credit hour requirement.) Fall and spring, 3 credits

ARH 595 Directed Readings in Art History, Criticism, and Theory
An independent reading course to be arranged with a particular faculty member. Normally this course is reserved for advanced students who have fulfilled most of their course requirements and for whom the proposed program of study cannot be organized within other existing course structures. Fall and spring, 1-3 credits, variable and repetitive

ARH 598 Thesis
Prerequisite: Completion of all degree requirements. Fall and spring, 1-12 credits, variable and repetitive
Studio Art Courses

ARS 520 Special Projects for M.F.A. Candidates
Advanced projects in areas that may not be included in the M.F.A. curriculum, utilizing the unique talents of regular and visiting faculty, the facilities of the Art Department or other aspects of the university environment, and possibly utilizing facilities at other locations or institutions. Prerequisites: Faculty sponsor, permission of graduate studies director. Fall, spring and summer, 1-3 credits

ARS 530 Professional Experience Internship
Internship in professional art world of New York City and its environs, required of all M.F.A. candidates, in lieu of or in addition to the teaching practicum. Depending on the professional objectives of the M.F.A. candidate, the student may choose to intern at a foundry, printmaking atelier, art gallery or museum, known artist's studio, or related facility or institution. Prerequisites: Accepted candidate for M.F.A. Fall, spring, and summer, 1-3 credits

ARS 531 Graduate Teaching Practicum
Supervised teaching practicum in undergraduate studio or studio/theory course. Prerequisites: Accepted candidate for M.F.A. Fall and spring, 1-3 credits

ARS 532 Thesis Project
Preparation of thesis under departmental advisor. Prerequisites: Accepted candidate for M.F.A., review board passed. Fall, spring, and summer, 1-3 credits (may be repeated once)

ARS 540 Graduate Photo Studio
Photographic studio, theory, and laboratory emphasizing individual development as a photographer. Color and black-and-white studies and darkrooms. Fine arts, reportage, illustration, commercial, industrial. Prerequisites: Demonstration of appropriate level of proficiency, permission of instructor. Once every three semesters, 3 credits

ARS 541 Photographing Works of Art
Graduate-level course for art history and criticism students, studio art students, and others examining in detail the techniques of photographing works of art and architecture and of photo reproduction; black-and-white and color work for portfolio, publication, teaching, cataloguing slide and photograph collections, etc. No laboratory work. Prerequisites: Art history and criticism; art studio or other graduate standing or permission of department. Once every three semesters, 1½ credits

ARS 550 Graduate Drawing Studio
Graduate theory and practice of drawing; investigations of historical and contemporary concepts of drawing, with concentration on individual development as an artist. Models, space for conceptual and environmental works, and other wide-ranging facilities available. Prerequisites: Accepted candidate for M.F.A. or permission of department Fall or spring, 3 credits

ARS 551 Graduate Painting Studio
Studio and theory in painting and related visual forms, with instruction and facilities available in all media and techniques; emphasis on individual development as an artist. Models and space for environmental and conceptual works available. Prerequisites: Permission of instructor; accepted candidate for M.F.A. or permission of department Fall and spring, 3 credits

ARS 560 Graduate Sculpture Studio
Theory and practice of sculpture for the graduate student, with instruction and facilities available in all media and techniques; emphasis on individual development as an artist. Studio facilities include air, electric, and hydraulic power equipment; TIG, MIG, Arc, and flame welding; forging; woodworking; modeling, molding, and casting facilities for clay, wax, plaster, and plastics; and metal casting capabilities in investment, shell, sand, and centrifugal. Prerequisites: Permission of instructor; accepted candidate for M.F.A. or permission of department Fall and spring, 3 credits

ARS 561 Graduate Ceramics and/or Ceramic Sculpture Studio
Theory and practice of ceramics and ceramic sculpture for the graduate student. Advanced studio instruction in handbuilding: coil, slab, pinch; wheelthrowing; casting, inclusive of multipiece plaster pour-molds; various firing techniques; reduction; oxidation; high-and-low fire overglaze techniques. Prerequisites: Permission of instructor; accepted candidate for M.F.A. or permission of department. Once every three semesters, 3 credits

ARS 570 Graduate Printmaking Studio
Graduate studio in the theory and practice of printmaking. Color, black-and-white, and photomechanical processes in plate and stone lithography, serigraphy, relief, and intaglio, emphasizing the student's individual development as an artist. Prerequisites: Permission of instructor; accepted candidate for M.F.A. or permission of department. Fall and spring, 3 credits

ARS 580 Visual Arts Seminar
Required seminar and critique throughout the M.F.A. curriculum. Guest speakers, artists, and critics; demonstrations and lectures; seminars; individual and group critiques. The M.F.A. candidate will, as part of this seminar, regularly participate in critiques in which his/her work is analyzed by faculty, art history/criticism faculty, and art history/criticism graduate students, as well as by his/her peers. The Visual Arts Seminar will, where applicable, include field trips and assignments of special lectures, panels, seminars, and other events of the professional art world. Fall and spring, 3 credits

ARS 591 Graduate Design Studio
Graduate theory and practice of two- and three-dimensional design; projections; perspective; maquettes; various techniques, including airbrush and experimental; conceptual development of ideas, leading to completion of a design idea or design research project. Prerequisite: Permission of instructor. Once every three semesters, 3 credits
Degree Requirements
Requirements for the M.A. Degree, Graduate Studies in Comparative Literature

In addition to the minimum requirements of the Graduate School, the following are required:

A. Course Requirements
The minimum course requirement for the M.A. degree is 30 graduate credit hours. An M.A. candidate is expected to take CLT 500 and CLT 501 (History of Literary Theory I and II), CLT 502 (Theory and Practice of Translation), CLT 510 (Comparative Literature Methodology), and at least one interdisciplinary seminar (CLT 508 or CLT 602). The remaining courses may be distributed among graduate courses in comparative literature, English, foreign languages, philosophy, history, art criticism, theatre, and music.

B. Foreign Language Requirement
Entering students are expected to have a good command of one and preferably two foreign languages. Students must ultimately be competent in one major and one minor language (non-native speakers of English may offer English as one of the two languages). All students must have passed their language requirements before they are allowed to take the M.A. examination. To demonstrate competence in the major language, students must take, for credit, and earn a grade of B or better in, at least one graduate or advanced undergraduate literature course conducted in the language (final papers may be written in English). Competence in the minor language can be demonstrated by (1) earning a grade of B or better in a graduate translation or language course such as CLT 520 or a graduate translation course in a foreign language department; or (2) passing a CLT examination to be taken with a dictionary. (For details see the department handbook.)

C. M.A. Examination
The student will take a written master's examination in the first or second year of graduate study. The exam measures the student's knowledge and mastery of literary theory and its history, familiarity with the major texts of world literature, and ability to write a competent exposition de texte.

Requirements for the Ph.D. Degree, Graduate Studies in Comparative Literature

In addition to the minimum requirements of the Graduate School, the following are required:

A. Course Requirements
1. CLT 500 and CLT 501 (Literary Theory I and II)
2. CLT 502 (Theory and Practice of Translation)
3. CLT 510 (Comparative Literature Methodology)
4. At least seven seminars on the 500- or 600-level, including one interdisciplinary seminar (CLT 510 or CLT 602). For students without an M.A. degree in Comparative Literature or a related discipline, the course requirement is 51 credits.

B. Foreign Language Requirement
Students may choose to demonstrate competence in either two major foreign languages, or one major and two minor languages for the Ph.D. For options to demonstrate competence, see Foreign Language Requirement under the master's degree heading and consult the department handbook.

C. Comprehensive Examination
Full-time students who are candidates for the Ph.D. will normally take an oral comprehensive examination no more than one year after completing their coursework. All language requirements must be completed at least three months before the comprehensive examination. Each student will have a committee of five faculty members who can examine the candidate in one or more areas of the comprehensive examination, and who will assist the candidate in preparing a reading list for the examination. The examination consists of four parts: literary theory and its history, a literary genre, a period of literary history, and a special area of comparative nature related to the student's plan for the dissertation. (For more details see the department handbook.)

D. Dissertation
The dissertation represents the culmination of the student's degree program and should be a serious contribution to scholarship. Candidates choose their dissertation director and the dissertation committee in consultation with the chairperson and the graduate studies director. A Ph.D. dissertation proposal should be presented to the dissertation director within three months after completion of the comprehensive examination. Early involvement of all members of the committee in the ongoing research and writing is strongly recommended. The student's formal defense of the dissertation is open to all members of the university community.

E. Teaching Assistantships
All students are asked to acquire some experience in teaching. Guidelines permit graduate students to be supported as teaching assistants (T.A.) for a maximum of four years. However, in exceptional cases the Graduate School may grant permission for accomplished T.A.'s who work in areas of department need to be considered for support after 4 years in the department. Graduate students in comparative literature have the opportunity to teach a wide variety of courses: traditionally they have taught foreign language courses, English composition, interdisciplinary courses offered in the undergraduate humanities program, and sections of the entry-level comparative literature courses.
F. Additional Information
A Handbook for Graduate Studies in Comparative Literature includes more extensive information on comparative literature at Stony Brook. A copy can be picked up at the Comparative Literature Office or requested by mail.

Courses

CLT 500 History of Literary Theory I: Plato to Kant
The basic texts in literary criticism from Plato to Kant. Stress will be placed on the ethical and mimetic approach of classical theory, its transformation in the Renaissance and neoclassical periods, and its reformulation in subsequent theory.
Fall, 3 credits

CLT 501 History of Literary Theory II: Romanticism to the Present
The important developments in literary theory in the 19th and 20th centuries. Attention will be given to the influence of other disciplines such as psychology and linguistics; theorists considered include Coleridge, Hegel, Nietzsche, Richards, Eliot, Auerbach, Frye.
Spring, 3 credits

CLT 502 Translation Theory
After an overview of the history of translation theory, students will study recent work to gain familiarity with the existing translations of works in their period of specialization.
3 credits

CLT 503 Comparative Studies in Literary History
Changing topics in the study of literary periods and styles.
Fall and spring, 3 credits each semester, repetitive

CLT 504 Comparative Studies in Genre
Changing topics in the study of the history and theory of literary genres.
Fall and spring, 3 credits each semester, repetitive

CLT 508 Interdisciplinary Seminar
Specific problems in the relations between literature and other disciplines.
Fall and spring, 3 credits each semester, repetitive

CLT 510 Comparative Literature Methodology
An introduction to the discipline of comparative literature. Stress will be given to the history of the discipline as well as to the various methodologies essential to it, e.g., thematology, periodization, influence and genre studies, literary relations between countries, interdisciplinary studies, etc.
Fall, 3 credits

CLT 520 Problems in Translation
After studying translation theory, students will translate a literary text. May be repeated for credit in different languages.
Fall and spring, 3 credits

CLT 597 Directed Readings for M.A. Students
Fall and spring, variable and repetitive credit

CLT 598 Directed Readings for Doctoral Candidates
Fall and spring, variable and repetitive credit

CLT 601 Seminar in Literary Theory
Changing topics in the specialized examinations of recent or historical trends such as semiotics, Marxism, reader-response, psychoanalysis, hermeneutics, deconstruction, etc.
Fall and spring, 3 credits each semester, repetitive

CLT 602 Interdisciplinary Seminar
Specific problems in the relations between literature and other disciplines.
Fall and spring, 3 credits each semester, repetitive

CLT 690 Dissertation Research
Fall and spring, variable and repetitive credit

CLT 698 Practicum in Teaching
Fall and spring, variable and repetitive credit

CLT 699 Directed Readings for Doctoral Candidates
Fall and spring, variable and repetitive credit
Degree Requirements
Requirements for the M.A. Degree in English
In addition to the minimum requirements of the Graduate School, the following are required:

A. Course Requirements
In broad outline, a master's degree in English requires 10 three-credit graduate courses, competence in one foreign language, and passing the master's examination. Of these 10 courses, one must be a course in Shakespeare, another a course in Chaucer or Milton, and one in the history and structure of the English language, although courses previously taken on the undergraduate level and passed with a grade of B or better may be accepted as fulfilling these requirements. The required 10 courses must be distributed among at least four of the following six areas with at least one course in American literature:

1. Old and Middle English
2. Renaissance (1500-1660)
3. Restoration and 18th Century
4. 19th-Century British
5. American Literature to 1900
6. 20th-Century British and American

Note: Courses taken to satisfy the Shakespeare and Chaucer or Milton requirements cannot be used to satisfy area distribution.

B. Independent Studies
Only one course numbered EGL 599, Independent Studies, will be permitted to count toward the total courses required for the degree of Master of Arts in English. EGL 599 cannot be elected during the student's first semester of work toward the master's degree. EGL 599 may be elected during the second semester only if the student has a B+ average in the first semester and has no Incompletes at the time of registering for EGL 599. A proposal for a 599 course should be submitted in writing before the end of the first semester to that member of the faculty under whose direction the student plans to study. The proposal must be approved in writing by both that faculty member and the graduate program committee of the department before the student registers for EGL 599.

C. Foreign Language Requirement
Competition in one foreign language may be satisfied by having completed the second year of a foreign language at the undergraduate level within the past five years with a grade of B or better, or by examination arranged by the English Department. The following languages are automatically accepted for fulfilling this requirement: Greek, Latin, Hebrew, French, German, Italian, Russian, and Spanish. Other languages relevant to a student's graduate program may be approved upon petition to the graduate program committee.

D. Master's Examination
The master's examination is based on a reading list of about a dozen texts announced at the beginning of each academic year. This three-hour written examination will be in two parts: an explanation of a passage from one of the texts on the list, and an essay that requires comparing and contrasting two or more texts on the list. Students must pass both sections of the examination. The examination may be retaken only once. Copies of previous examinations may be consulted in the Graduate English Office.

E. The Graduate English Colloquium
Each student in the master's program is encouraged to participate in the Graduate English Colloquium, a series of lecture-discussions by members of the English faculty on texts included in that year's master's examination reading list. The lecture-discussions are not intended as materials on which students will be examined but as provocations to engagement with the texts on the list. The meetings of the colloquium, held in the late afternoon or evening, include a lecture and discussion period and informal opportunities to meet faculty and fellow students.

Requirements for the M.A. Degree, Graduate Studies in Creative Writing
In addition to the minimum requirements of the Graduate School, the following are required:

A. Course Requirements
Those admitted to Graduate Studies in Creative Writing must take three literature courses designated from our present traditional offerings. In addition, the candidate will take four writing courses, ordinarily two in each semester, from workshops in the following subjects: poetry, fiction, drama, and nonfiction. Each candidate must take workshops in at least two areas.

B. Master's Project
Finally, students in Graduate Studies in Creative Writing are required to submit an extended work of substantial literary merit—for example, eight or ten short stories, a novel, a novel, a one-act play, a full-length play, a volume of poems, a film script—to be determined by the candidate and his/her committee. One distinction of this curriculum is that the candidate begins the project under close supervision in the first rather than the second year. Students register for a total of nine credits toward completion of this project.

Transfer Credit and Standards of Performance in English at the M.A. Level
Mindful that many applicants may have interrupted an earlier graduate career, the department permits the transfer of six hours of credit in suitable graduate work done elsewhere that resulted in a grade of B or better. The student must, however, make special application after admission. In all coursework done at Stony Brook, an average grade of B is the minimum required, but no more than two C's will be permitted.
Requirements for the Ph.D. Degree in English

In addition to the minimum requirements of the Graduate School, the following are required:

A. Course Requirements
The minimum course requirement for students in the doctoral program is 11 courses, including at least seven 600-level seminars. No course with a grade below B - may be used to satisfy course requirements. An average grade of B or better in all coursework must be maintained at all times, and no more than two grades below B - will be permitted. No transfer credit is accepted at the seminar level.

Among the seven seminars the student must satisfactorily complete EGL 600 (Classical Backgrounds of English Literature) and EGL 611 (Critical Theory). Because these seminars provide essential contexts for later study, students must take them in their first year in the program.

Students must have one course in the history and structure of the English language, one course in Shakespeare, and one course in Chaucer or Milton. Courses previously passed with a grade of B or better at the undergraduate or M.A. level may be accepted as fulfilling this requirement.

Finally, each student must take at least one course in four of the following six areas:

1. Old and Middle English
2. Renaissance (1500-1660)
3. Restoration and 18th Century
4. 19th-Century British
5. American Literature to 1900
6. 20th-Century British and American Languages relevant to the area of study, and (2) knowledge of the major literature of that language in the original oral language on the major literary figures or works of the language. Students should consult the graduate studies director about setting up such an examination. The passing of the reading and/or comprehensive examination at the M.A. level shall not be sufficient evidence that the student has met Option II.

The following languages are automatically accepted for fulfilling the language requirement: Greek, Latin, Hebrew, French, German, Italian, Russian, and Spanish. Other languages relevant to a student's graduate program may be approved upon petition to the graduate studies director.

Students will not be permitted to take the special field examination without first satisfying the foreign language requirement. Students choosing Option I must satisfy one language requirement before taking the three area examinations and the second before taking the special field examination.

C. The Area Written Examinations
The area examinations are four-hour written examinations on three of the six literary periods listed above, or on two of those areas and one of the following modes of study: History and Theory of Criticism, Rhetoric and Composition, Bibliography and Textual Criticism, Practice and Theory of Creative Writing, Feminist Theory and Criticism. The area examinations will be based on reading lists for each area available in the Graduate English Office. The examinations will be offered twice a year (in the week preceding the beginning of the fall and spring semesters). Students must take the examinations before beginning the fifth semester in the program. Students must pass all three areas; those who fail one or more areas may retake those examinations one time only.

D. The Special Field Oral Examination
This oral examination will be based on a written rationale and a reading list prepared by the student with the advice and approval of the student's chosen major professor, and approved by the graduate studies director at least one month before the date of the examination. The examination will usually be focused on a major author, a literary genre, and a literary period and will include both primary and secondary texts. The examining committee will be chaired by the student's chosen major professor and will include two other members of the faculty selected by the graduate studies director in consultation with the committee chairperson.

Students are encouraged, but not required, to include a dissertation proposal as part of this examination. The special field examination may be re-taken one time only.

All the doctoral requirements described above must be completed before a student is allowed to take the special field examination.

E. Advancement to Candidacy
After successful completion of the oral examination the student is recommended to the Vice Provost for Research and Graduate Studies for advancement to candidacy.

F. Dissertation Seminar
This required seminar is designed to help the student prepare their dissertation proposals and get their dissertations under way. Students should take this seminar during the semester they take the special field examination or in the semester immediately after passing that exam.

In the seminar, students will present for discussion work in progress on dissertation proposals and dissertations, and essays being prepared for publication. Admission to the seminar is by permission of the faculty coordinator whose role will be to organize the seminar, see that relevant texts are made available, and contribute to the discussion of student work. To pass the seminar, students must attend regularly, present their work, and complete a dissertation proposal by the end of the semester.

The dissertation seminar may also be the forum for the dissertation colloquium, when students who have completed their dissertations make a public presentation of their research to interested faculty and graduate students.

G. Dissertation
As soon as possible after passing the oral examination, students must prepare a written statement setting out the scope and method of the dissertation and submit it to their dissertation director and two other members of the department who will serve as readers. After the student's director has conferred with the other readers and the dissertation committee has approved the proposal, the director will submit the proposal and names of the committee members to the graduate program committee of the department for its approval. The graduate studies director in consultation with the student's dissertation committee will name a reader from outside the department.

The four readers of the dissertation must recommend acceptance of the dissertation before it can be approved by the Graduate School. Students will present the results of dissertation research at a colloquium convened for that purpose by the Department of English, which will be open to interested faculty and graduate students.
H. Teaching Program
Training in teaching is stressed by the department and every student is expected to do some teaching as part of the doctoral program. Teaching assistants instruct in a variety of courses including composition; introductions to poetry, fiction, and drama; tutoring in the Writing Center; and assisting in large lecture courses. An important part of the teaching experience is the practicum in teaching (EGL 697 and 698) required of all teaching assistants.

The Director of Writing Programs for the English Department will, upon application, decide to what extent a student's teaching experience elsewhere will satisfy the requirements at Stony Brook.

I. Residency Requirement
The Graduate School requires at least two consecutive semesters of full-time graduate study beyond the baccalaureate. Students will be considered in full-time residence during any semester in which they: (1) are taking at least one 500-level course or 600-level seminar or, are, in the opinion of the graduate program committee, properly preparing for the special field oral examination; (2) are holding no position other than that required under the teaching program; (3) are registered for EGL 690, Dissertation Research, or EGL 699, Directed Reading for Doctoral Candidates, for three, six, nine or twelve credit hours, depending on the number of other courses being taken and the teaching assignment, the total of all these credits and teaching hours to be no more than 12.

J. The Graduate English Colloquium
Doctoral students are encouraged to participate in the Graduate English Colloquium, a series of lecture-discussions by members of the English faculty on works included in that year’s master’s examination reading list. The meetings of the colloquia, held in the late afternoon or evening, include lecture-discussions intended to provoke engagement with important literary texts and provide informal opportunities to meet faculty and fellow students.

K. Review of Student's Progress
Each incoming student will meet with the graduate studies director in English before the start of classes to plan in some detail the first year's coursework. Each spring semester, when departmental course offerings for the following year have been announced, the student must compose a tentative program for the following year's study and bring it to the advisor for discussion. These plans, along with the record of the student's work to date and faculty evaluations, will be reviewed by the graduate program committee. This committee will determine whether the candidate may proceed with doctoral studies, may continue if certain requirements are met, or may not continue in the doctoral program because of unsatisfactory work.

Matters Pertaining to All Advanced Degrees in English (Including Graduate Studies in Comparative Literature and Creative Writing)

A. Extension of time limits: Extensions of time limits are granted at the discretion of the graduate program committee of the department and the Vice Provost for Research and Graduate Studies and are normally for one year at a time.

B. Incompletes: The graduate program committee has established as sufficient grounds for the granting of incompletes either medical reasons on the part of the students themselves or emergencies arising within students' families.

C. Graduate courses in the 500 series are open to all graduate students. Courses in the 600 series are normally open only to students admitted to study for the Ph.D. degree, although M.A. students with adequate preparation and background can sometimes be admitted with the permission of the instructor. All graduate courses normally carry three credits.

Each course in the 500 and 600 series to be offered in a given semester will be described by the instructor in some detail in a special departmental announcement prepared and distributed toward the end of the semester prior to that in which it is to be offered. None of the courses numbered 690-699 can be taken to satisfy the requirement of seven seminars as stated in the sections outlining course requirements for the English and comparative literature departments.

Advisement
There are a number of problems that the preceding explanations make no attempt to cover; for example, there are students whose careers may fall into two widely separated phases, whose previous records may show only a minor rather than a major interest in English or comparative literature, whose academic preparation now seems remote, or whose recent experiences have kindled new interests.

Students are encouraged to raise individual questions about the graduate program with the graduate studies director in English.

Courses
All courses are for three credits, except where noted with an asterisk. Content varies each semester.

EGL 501 Studies in Chaucer
EGL 502 Studies in Shakespeare

EGL 503 Studies in Milton
EGL 505 Studies in Genre
EGL 506 Studies in Literary Theory
EGL 509 Studies in Language and Linguistics
EGL 510 Old English Language and Literature
EGL 515 Middle English Language and Literature
EGL 520 Studies in the Renaissance
EGL 525 17th-Century Literature
EGL 530 Studies in the Age of Dryden
EGL 535 Studies in Neoclassicism
EGL 540 Studies in Romanticism
EGL 545 Studies in Victorian Literature
EGL 547 Late 19th-Century British Literature
EGL 550 20th-Century British Literature
EGL 555 Studies in Irish Literature
EGL 560 Studies in Early American Literature
EGL 565 19th-Century American Literature
EGL 570 20th-Century American Literature
EGL 575 British and American Literature
EGL 580 Poetry Workshop
EGL 581 Fiction Workshop
EGL 582 Drama Workshop
EGL 583 Nonfiction Workshop
EGL 585 Creative Writing Project
EGL 592 Problems in Teaching Writing or Composition
EGL 593 Problems in Teaching Literature
EGL 594 Contexts of Literary Study
EGL 597 Practicum in Methods of Research
EGL 599 Independent Study
EGL 600 Proseminar I (Classical Backgrounds of English Literature)
EGL 601 Problems in History and Structure of the English Language
EGL 602 Problems in Bibliography, Editing, and Textual Criticism
EGL 603 Problems in Literary Theory and Criticism
EGL 604 Problems in Literary Analysis
EGL 605 Problems in Convention and Genre
EGL 606 Period and Tradition
EGL 607 Individual Authors
EGL 608 Problems in the Relationship of Literature to Other Disciplines
EGL 611 Proseminar II (Critical Theory)
EGL 612 Theories in Composition

39
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGL 613</td>
<td>Research in Composition</td>
</tr>
<tr>
<td>EGL 614</td>
<td>Topics in Composition and Writing</td>
</tr>
<tr>
<td>EGL 690*</td>
<td>Dissertation Research</td>
</tr>
<tr>
<td>EGL 695</td>
<td>Methods of Teaching English</td>
</tr>
<tr>
<td>EGL 697</td>
<td>Practicum in Teaching English Literature</td>
</tr>
<tr>
<td>EGL 698</td>
<td>Teaching Practicum</td>
</tr>
<tr>
<td>EGL 699*</td>
<td>Directed Reading</td>
</tr>
</tbody>
</table>

*Variable and repetitive credit.
French and Italian
(FRN, ITL, DLF, DLI)

Chairperson: Mario Mignone
Frank Melville, Jr. Memorial Library 4005 (516) 632-7440
Graduate Studies Director: Carol Blum
Frank Melville, Jr. Memorial Library 4003 (516) 632-7437

Degree Requirements
Requirements for the M.A. Degree, Graduate Studies
in French

A standard course of study in French is offered for candidates intending to teach at the secondary school level and for pre-Ph.D. candidates. In addition to the minimum Graduate School requirements, the following are required:

A. Course Requirements

<table>
<thead>
<tr>
<th>Course Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRN 507 Advanced Stylistics</td>
<td>3</td>
</tr>
<tr>
<td>FRN 508 Explication de Texte</td>
<td>3</td>
</tr>
<tr>
<td>Six courses in literature</td>
<td>18</td>
</tr>
<tr>
<td>Electives: Two courses of which one FRN 501 Contemporary French Culture and Institutions is highly recommended</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

B. Performance
Average of B or better for all courses listed under A is required.

C. Comprehensive Examination
At the completion of all coursework, candidates will take an oral and written comprehensive examination.

Requirements for the M.A. Degree, Graduate Studies
in Italian

The Department offers two tracks for concentration in Italian. In addition to the minimum requirements of the Graduate School, the following are required:

A. Course Requirements

<table>
<thead>
<tr>
<th>Course Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITL 501 Contemporary Italy</td>
<td>3</td>
</tr>
<tr>
<td>ITL 502 Italia in Transizione</td>
<td>3</td>
</tr>
<tr>
<td>ITL 505 Strategies for Teaching Italian or any Romance philology or linguistics course</td>
<td>3</td>
</tr>
<tr>
<td>ITL 508 Advanced Grammar and Stylistics</td>
<td>3</td>
</tr>
<tr>
<td>ITL 511 History of the Italian Language</td>
<td>9</td>
</tr>
<tr>
<td>Three courses in literature</td>
<td>6</td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

B. Performance
Average of B or better for all courses listed under A is required.

C. Comprehensive Examination
At the completion of all coursework, candidates will take an oral and written comprehensive examination.

Requirements for the M.A. Degree in Romance Languages, Concentrations in French and Italian, French and Spanish, or Italian and Spanish

Candidates will choose one language as a major and one as a minor, and must be able to do graduate work in both. To qualify for the degree the M.A. candidate in French and Italian, French and Spanish, or Italian and Spanish will normally complete 36 credit hours (12 courses). The distribution of these courses will vary according to whether the student chooses Track I, with a concentration in literature, or Track II, with a concentration in language.

In addition to the minimum requirements of the Graduate School, the following are required:

A. Course Requirements

<table>
<thead>
<tr>
<th>Course Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRN 501 Contemporary French Culture and Institutions</td>
<td>6</td>
</tr>
<tr>
<td>FRN 507 Advanced Stylistics</td>
<td>3</td>
</tr>
<tr>
<td>FRN 508 Explication de Texte</td>
<td>3</td>
</tr>
<tr>
<td>Minor in Italian*</td>
<td>9</td>
</tr>
<tr>
<td>ITL 501, ITL 508</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

* Major in French
** Minor in Italian

Track I—French and Italian with Concentration in Literature

Track II—Italian with Concentration in Language
C. Comprehensive Examination
At the completion of all coursework candidates will take an oral and written comprehensive examination.
* Total of 24 major credits
** Total of 12 minor credits.
Total credits required: 36

French and Spanish
A. Course Requirements

<table>
<thead>
<tr>
<th>Language</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>French</td>
<td></td>
</tr>
<tr>
<td>FRN 501 Contemporary French Culture and Institutions</td>
<td>3</td>
</tr>
<tr>
<td>FRN 507 Advanced Stylistics</td>
<td>3</td>
</tr>
<tr>
<td>FRN 508 Explication de Texte</td>
<td>3</td>
</tr>
<tr>
<td>Spanish</td>
<td></td>
</tr>
<tr>
<td>SPN 501 Spanish Linguistics</td>
<td>3</td>
</tr>
<tr>
<td>SPN 510 The Hispanic Culture</td>
<td>3</td>
</tr>
<tr>
<td>SPN 515 Spanish Composition and Stylistics</td>
<td>3</td>
</tr>
</tbody>
</table>

Total 21

2. At least 12 credits (four courses) in literature in two areas of concentration (6 credits). The student will select two areas of concentration and will take 6 credits (two courses) in each of them, three in French and three in Spanish. One area will be chosen among group A, and the other from group B:

A
1. 20th Century
2. 19th Century
3. Theatre
4. Prose Fiction, or
5. Lyrics (6 credits)

B
1. Italian Renaissance, Baroque and Spanish Golden Age, or
2. Medieval (6 credits)

3. Elective

Total 36

B. Performance
Average of B or better for all courses listed under A is required.

C. Comprehensive Examination
At the completion of all coursework, candidates will take an oral and written comprehensive examination.

Requirements for the Doctor of Arts Degree in Foreign Language Instruction, Graduate Studies in French and/or Italian

The following are required in addition to the regular Graduate School requirements:

A. Course Requirements

<table>
<thead>
<tr>
<th>Language</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italian</td>
<td></td>
</tr>
<tr>
<td>ITL 501 Contemporary Italy</td>
<td>3</td>
</tr>
<tr>
<td>SPN 508 Advanced Grammar and Stylistics</td>
<td>3</td>
</tr>
<tr>
<td>ITL 511 History of the Italian Language or Linguistics course</td>
<td>3</td>
</tr>
<tr>
<td>Approved Linguistics elective</td>
<td>3</td>
</tr>
<tr>
<td>Spanish</td>
<td></td>
</tr>
<tr>
<td>SPN 501 Spanish Linguistics</td>
<td>3</td>
</tr>
<tr>
<td>SPN 510 Hispanic Culture</td>
<td>3</td>
</tr>
<tr>
<td>SPN 515 Spanish Composition and Stylistics</td>
<td>3</td>
</tr>
</tbody>
</table>

Total 36
B. Teaching Experience
All candidates are required to fulfill the following teaching assignments during the program:
1. Practicum: The student is given charge of a three-hour section in a beginning or intermediate course in the area of language instruction. The practicum is to be assigned after the student has successfully completed a course in language instruction. This experience includes defining objectives, grading, and testing.
2. Internship: The student is apprenticed to a professor in charge of an appropriate literature, linguistics, and/or culture course for at least one semester. The internship may not precede the practicum.
3. Externship: The student will be required to teach at the undergraduate or secondary level in the local area, when feasible. The student will normally be given three courses, e.g., a beginning course in the major field, a beginning course in the second competence, and an introductory literature course in the major field.

C. Final Evaluation
The final evaluation will be based directly on the specific program of study that the candidate has completed. In addition to demonstrating mastery of the individual curriculum requirements, the candidate is expected to evidence a certain synthesis of knowledge based on the component parts of the program. This final examination will be scheduled twice yearly: November and April.

The final evaluation is to include both a written and an oral comprehensive examination and will include topics from all areas covered in the program. The comprehensive examination will be administered only after the candidate has demonstrated competence in the major area and in language instruction and methodology. All candidates will be furnished a basic reading list. However, it will be the responsibility of the candidates to prepare, with their major and minor advisors, the optional part of the reading list to cover their individual specialties.

D. Dissertation
All doctoral candidates must complete a creative research project. The subject of the research project will be determined by the candidate's professional interest and training. The dissertation will be undertaken after the candidate has completed all coursework and has been reviewed by the doctoral committee, which will make final determination for conferral of the degree of Doctor of Arts in Foreign Language Instruction.

French Courses
FRN 500 Techniques of Reading for Graduate Research
Through intensive study of language structures and idiomatic usage, with extensive practice in written translation of scholarly texts, candidates for advanced degrees are able to attain the proficiency level of the graduate French reading requirement. Several departments grant exemption from further examination for successful completion of this course.
Fall or spring, 3 credits
FRN 501 Contemporary French Literature and Institutions
Analysis of contemporary French civilization through the study of the development of its historical, cultural, political, and social characteristics. Designed for potential teachers of French at the college level as well as in secondary schools, this course will emphasize and trace the evolution of the character and institutions of contemporary France.
Fall or spring, 3 credits
FRN 504 The French Language and New Technologies
A course designed to meet the demands of the changing field of French language instruction. Students will participate in language classes where specially edited video cassettes and authentic written documents will foster aural comprehension, vocabulary acquisition, and cultural awareness. This approach will serve as a model for French language instruction at all levels. Students will receive basic training in video techniques and will be asked to produce some original video material, based on one or several aspects of French life. They will use portable units of the Office Audio-Visuel of the Université de Poitiers (OAVUP), and their productions will subsequently be edited and transcoded for use in United States schools. For secondary teachers.
Alternate years, 3 credits
FRN 506 The French Language II (French Immersion Institute in Poitiers)
Along with visiting the Loire valley, La Rochelle, Poitiers, Poitou region, and Paris, participants will attend civilization classes and a number of seminars on contemporary France and francophone countries. They will be asked to prepare their own "authentic documents," using newspapers, radio broadcasts, and other field work. Duplicating facilities will be made available by OAVUP. Designed for secondary school teachers of French and other qualified students.
Alternate years, 3 credits
FRN 507 Advanced Stylistics
Designed to deepen the advanced student's knowledge of the finer points of the syntax, structure, and stylistic versatility of the French language. This course will emphasize three principal exercises: translations from English into French stressing idiomatic turns of phrase and correct structuring, compositions in the French language, and advanced work in major discrepancies between French and English syntax.
Fall or spring, 3 credits
FRN 508 Explication de Texte
Emphasis will be placed upon weekly explication de texte, beginning with Renaissance literature, and proceeding to the modern period, in which analysis will be made of those effects that, taken together, constitute a given author's stylistic pattern.
Fall or spring, 3 credits
FRN 509 Introduction to Bibliography
Students will acquaint themselves with library resources, organization, reference materials, catalogues, and computer access. Each student is to compile a bibliography on a topic related to his/her special field of interest.
Spring, 1 credit
FRN 510 Graduate French Phonetics and Dictation
A course designed to perfect the mastery of the spoken language through the use of phonetics, analysis of intonation, rhythm, and accent. It will include practical corrective techniques and methods of self-correction. At least one hour of laboratory weekly will be required.
Fall or spring, 3 credits
FRN 514 Seminar in Medieval French Literature
This course may be repeated for credit when topic changes. Topic to be arranged.
Fall or spring, 3 credits
FRN 521 Literature of the French Renaissance
A study of the major literary and cultural developments characteristic of the civilization of the Renaissance in France. The works of such writers as Rabelais and Montaigne will serve as both focus and starting point for broader inquiry into the artistic, social, and cultural movements accompanying the rebirth of art and letters in France.
Fall or spring, 3 credits
FRN 531 Studies in the Classical Theatre
Analysis of classical dramaturgy and some of the major themes of 17th-century tragedy and comedy. Careful reading of Corneille, Racine, and Mollière.
Fall or spring, 3 credits
FRN 541 Studies in 18th-Century French Literature
The literary, intellectual, and political atmosphere in France since the end of the 17th century. The rise of the Philosophes, the French Revolution. The battle around the Encyclopédie. Impact of this new spirit on the French Revolution.
Fall, 3 credits
FRN 551 Studies in Romanticism
Reading and research in the background and manifestation of Romanticism in French literature.
Fall or spring, 3 credits
FRN 552 Studies in 19th-Century French Literature
Through discussion of selected texts by Balzac, Saint-Beuve, Flaubert, and Zola, this course will explore the nature of realistic prose and its place in French literary history.
Fall or spring, 3 credits
FRN 561 Seminar in 20th-Century French Literature
Investigations of special topics and movements in 20th-century French prose, poetry, and theatre based on the study of the works of such authors as Cocteau, Colette, Sarraute, Beckett, Ionesco, Ro- main Rolland, Camus, Mauriac, Gide, Malraux, and Proust.
Fall and spring, 3 credits
FRN 562 Studies in Contemporary Literature
The active pursuit of humanist ideas from Anatole France to Louis Guilloux, from Romain Rolland to Camus, with emphasis on the works of Valery
Italian Courses

**ITAL 500 Reading Italian**
Designed to prepare graduate students to read contemporary research in their respective disciplines published in Italian, the course will present systematic instruction in the fundamentals of reading comprehension and in specialized subject-oriented vocabulary.
Fall or spring, 3 credits

**ITAL 501 Contemporary Italy**
Analysis of contemporary Italy and its civilization through the study of the development of its historical, cultural, political, and social characteristics. Designed for potential teachers of Italian at the college as well as secondary school levels, this course will emphasize and trace the evolution of the character and institutions of contemporary Italy.
Fall or spring, 3 credits

**ITAL 502 Italia in Transizione**
This course will examine the impact on Italy of new issues such as feminism, and of unresolved problems such as that of the underdeveloped South, from 1968 to the present. Readings will come from leading Italian daily newspapers and news magazines, as well as from books dealing with individual problems. Completion of one research project required.
Spring, alternate years, 3 credits

**ITAL 505 Strategies for Teaching Italian**
A workshop for teachers of Italian on all levels. Teaching strategies will be discussed and demonstrated. Materials will be developed by the participants. Guest lecturers and workshop leaders from various levels of instruction will assist with several aspects of the course. Topics will include communicative skills, use of realia, testing, visuals, and teaching culture.
Fall or spring, 3 credits

**ITAL 508 Advanced Grammar and Stylistics**
This course is designed to analyze and discuss the finer points of Italian grammar and to investigate diverse styles in writing. Students will be expected to develop grammatical drills from elementary through advanced levels. Literary masterpieces will be translated from English to Italian in order to demonstrate types of style and possible alternatives in writing.
Fall or spring, 3 credits

**ITAL 509 Contrasting Italian and English**
This course seeks to isolate and analyze interference patterns in English-speaking persons learning the Italian language, on all levels — phonetic, morphological, syntactic, and lexical. It should be especially desirable for those planning to teach the language to native English speakers.
Prerequisite: Good knowledge of Italian 3 credits

**ITAL 511 History of the Italian Language**
A study of development of the Italian language beginning with its origins in Latin, through the vulgate (dialects) and finally as an outgrowth of Tuscan.
Spring, alternate years, 3 credits

**ITAL 516-517 Seminar on Dante**
The Vita Nuova, the Opere Minori and the Divine Comedy will be studied based on the historical, social, and moral contexts of 13th-14th century Italy.
Fall and spring, 3 credits

**ITAL 518 Boccaccio: Seminar**
The course emphasizes the origin of Italian prose fiction, as seen through the first attempts at the short story, such as the Novellino, but it deals mainly with Boccaccio's Decameron as the perfection of the genre.
Fall or spring, 3 credits

**ITAL 522 Seminar in Italian Humanism and Renaissance Literature**
Analysis of the works of such writers as Petrarch, Boccaccio, Ariosto, Machiavelli, Castiglione, Aretino, Tasso, and Michelangelo. Study of the relation of the individual works of these writers to broader historical, cultural, and intellectual developments of the period. This course may be repeated for credit with a different topic.
Fall or spring, 3 credits

**ITAL 541 Studies in 18th-Century Italian Literature**
Study of the Enlightenment in Italy and its repercussions throughout the 18th century. Extensive reading of such authors as Metastasio, Goldoni, Parini, and Vico. The topics will vary from semester to semester depending on the authors selected.
Fall or spring, 3 credits

**ITAL 551 Studies in Italian Romanticism**
Italian Romanticism is unique and it will be compared with the movement as it took place in other countries, such as England, Germany, and France. The works of Foscolo, Leopardi, and Manzoni will be studied in the philosophical and sociological context of the period.
Fall or spring, 3 credits

**ITAL 552 Studies in the Modern Novel**
A study of the development of the Italian novel from Verga to the latest trends. Stress will be placed on the major shifts in sensibility occurring at the beginning of the 19th century and after World War II. This course may be repeated for credit with a different topic.
Fall or spring, 3 credits

**ITAL 562 Studies in Contemporary Literature**
Contemporary Italian Poetry: The Quest for Meaning
Contemporary Italian poetry reflects a universe that does not answer to human expectations and desires. Although without faith or hope, the poets cannot become prisoners of ignorance about their own destiny and conduct an indomitable search for new values and answers. Besides the poetry of the two Nobel Prize winners, Quasimodo and Montale, readings will include selected poems by other outstanding poets such as Ungaretti, Saba, Campana, and Pasolini. This course may be repeated with a different topic.
Fall or spring, 3 credits

**ITAL 571 Italian Autobiography**
A study of the development of introspection and self-awareness in Italian autobiography from Petrarch to the 20th century.
Fall or spring, 3 credits

**ITAL 581 Independent Individual Studies**
Fall and spring, variable and repetitive credit

**ITAL 599 Practicum in Teaching**
Fall and spring, variable and repetitive credit

**D.A. Courses**
The following courses are available only to candidates in the Doctor of Arts Program:

**DLF 601, DLI 601 Internship in Foreign Languages: French and Italian**
Students in the Doctor of Arts program will assist an instructor as an aide in a literature, culture, or language course on the undergraduate level. Fall and spring, 1-3 credits

**DLF 602, DLI 602 Externship in Foreign Languages: French and Italian**
Students in the Doctor of Arts program will teach one to three courses at the high school, junior college, or college level under the supervision of a master teacher.
Prerequisite: All other coursework completed.
Fall and spring, 1-3 credits

**DLF 699, DLI 699 Doctoral Research in Foreign Languages: French and Italian**
Independent research for the Doctor of Arts degree. Open only to candidates for the Doctor of Arts who have passed the preliminary examination.
Fall and spring, 1-6 credits, repetitive
Degree Requirements

Requirements for the M.A. Degree in Germanic Languages and Literatures

- Option 1:
  A. Course Requirements
  1. GER 549 Modern Trends in Literary Theory 3
     One 20th-century German Literature course: e.g., GER 545 or GER 546 3
     GER 557 History of the German Language 3
     GER 561 Goethezeit 3
     GER 599 Thesis 6
     2. Four additional offerings at the graduate level from courses within the department or, upon prior approval by the department, from those of other departments within the Graduate School 12
     30

  B. Performance
  Average of B or better for all courses listed under A is required.

  C. M.A. Paper
  Submission of a scholarly essay on a topic and of a standard acceptable to the department is required.

- Option II:
  A. Course Requirements
  No thesis required—all 30 credits can be fulfilled by coursework as follows:

  1. GER 504 German Cultural History 3
     GER 539 Contrastive Structures 3
     One course in older Germanic languages: e.g., GER 558, GER 562, or GER 563 3
     One course in 20th-century German literature: e.g., GER 545 or GER 546 3
     2. Six additional offerings at the graduate level from courses within the department or, upon prior approval by the department, from those of other departments within the Graduate School 18
     30

  B. Language Proficiency
  The required proficiency in Russian and one other Slavic language may be met by one or more of the following:
  1. A proficiency examination administered by the department according to ACTFL Guidelines
  2. Appropriate coursework in the department in consultation with the graduate program director
  3. One semester of study abroad in an approved program in Eastern Europe or the Soviet Union

  C. Thesis
  A master's thesis or comprehensive examination based on a reading list and coursework.
  Students in the M.A. program in Germanic Languages and Literatures and in the M.A. program in Slavic Languages and Literatures are subject to Graduate School regulations and policies with respect to transfer credit, extension of time limitation, grade point average, supervised teaching experience, registration, and other requirements.

Requirements for the M.A. Degree in Slavic Languages and Literatures

A. Course Requirements

<table>
<thead>
<tr>
<th>Course Requirements</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLV 571 Comparative Slavic Linguistics</td>
<td>3</td>
</tr>
<tr>
<td>RUS 506 Stylistics of Russian Literature</td>
<td>3</td>
</tr>
<tr>
<td>SLV 504 Topics in Slavic Cultures</td>
<td>3</td>
</tr>
<tr>
<td>RUS 539 Strategies of Teaching Russian</td>
<td>3</td>
</tr>
<tr>
<td>Special Topic in Slavic Language I, II</td>
<td>6</td>
</tr>
<tr>
<td>One course in 19th-century Russian literature</td>
<td>3</td>
</tr>
<tr>
<td>One course in 20th-century Russian literature</td>
<td>3</td>
</tr>
<tr>
<td>Two electives at the graduate level with approval of the department</td>
<td>6</td>
</tr>
<tr>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

Requirements for the D.A. Degree in Foreign Language Instruction

A minimum of 36 credits is required, to be distributed as follows:
A. Major Field Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>German major</td>
<td></td>
</tr>
<tr>
<td>Phonetics/Phonology of German</td>
<td>3</td>
</tr>
<tr>
<td>Morphology/Syntax of German</td>
<td>3</td>
</tr>
<tr>
<td>History of the German Language</td>
<td>3</td>
</tr>
<tr>
<td>German Stylistics or Literary Translation</td>
<td>3</td>
</tr>
<tr>
<td>German Culture and Civilization</td>
<td>3</td>
</tr>
<tr>
<td>Three courses in German literature to be selected from courses within the department.</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
</tr>
</tbody>
</table>

Russian Major

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phonetics/Phonology of Russian</td>
<td>3</td>
</tr>
<tr>
<td>Morphology/Syntax of Russian</td>
<td>3</td>
</tr>
<tr>
<td>History of the Russian Literary Language</td>
<td>3</td>
</tr>
<tr>
<td>Russian Stylistics or Literary Translation</td>
<td>3</td>
</tr>
<tr>
<td>Russian or Slavic Culture</td>
<td>3</td>
</tr>
<tr>
<td>Three courses in Russian literature to be selected from courses within the department.</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
</tr>
</tbody>
</table>

B. Professional Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second Language Acquisition</td>
<td>3</td>
</tr>
<tr>
<td>Methods of Foreign Language Teaching</td>
<td>3</td>
</tr>
<tr>
<td>Practicum</td>
<td>3</td>
</tr>
<tr>
<td>Internship or Externship</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

Additional courses may be required to meet individual needs upon consultation with the major advisor and the program director.

Degree candidates who are full-time teachers will, where possible, do their externship at an institution other than where they normally teach, e.g., high school teachers will be encouraged to teach an evening college course. Those teaching at a two-year or four-year college will be encouraged to teach at the secondary school level. When these arrangements are not possible, other provisions will be made in consultation with the D.A. committee.

C. Language Proficiency

Upon completion of 24 credits, all candidates will be expected to demonstrate proficiency in the major language.

Proficiency in the major language may be demonstrated:

1. By written recommendation of professors of the pertinent courses taken; or
2. Upon recommendation of the supervisor of the practicum, internship, or externship; or
3. By formal written examination (MLA) when the major advisor and D.A. committee deem it necessary.

Unsuccessful candidates may request a second testing during the subsequent semester.

D. Practical Experience

All candidates are required to fulfill the following teaching assignments during the program:

1. Practicum: The student is given charge of a three-hour section in a beginning or intermediate course in the area of language instruction. The practicum is to be assigned after the student has successfully completed a course in language instruction. This experience includes objectives, grading, and testing. When these arrangements are not feasible, the practicum may be done in the form of a tutorial.
2. Internship: The student is apprenticed to a professor in charge of an appropriate literature, linguistics, and/or culture course for at least one semester. The internship may precede the practicum.
3. Externship: The student will be required to teach at the undergraduate or secondary level in the local area, when feasible.

E. Final Evaluation

The final evaluation will be based directly on the specific program of study that the candidate has completed. In addition to demonstrating mastery of the individual curriculum requirements, the candidate is expected to evidence a certain synthesis of knowledge based on the component parts of the program. This final examination will be scheduled twice yearly, in November and April.

1. The final examination is to include both a written and an oral comprehensive examination and will include topics from all areas covered in the program. Comprehensive examination will be administered only after the candidate has demonstrated competence in the major area and in language instruction and methodology. All candidates will be provided with a basic reading list. However, it will be the responsibility of the candidates to prepare, with their major advisors, the optional part of the reading list to cover their individual specialties.
2. Dissertation: After the comprehensive exam the candidates, in consultation with their dissertation director, must submit a dissertation proposal which will be reviewed by the D.A. committee. After the proposal is approved, a dissertation director and two readers will be appointed, in consultation with the program director. Six optional thesis credits are available for those who desire them.

Transfer Credit

The doctor of arts committee may accept six post-M.A. transfer credits earned within the past five years from non-SUNY institutions. Nine credits may be accepted from all SUNY institutions.

Normally, a maximum of six credits of CED courses or CED cross-listed courses may be transferred. Under special circumstances and with approval of the department and the graduate program director, additional CED/cross-listed credits may be counted towards the D.A. requirements.

Requirements for the Ph.D. Degree in Germanic and Slavic Languages and Literatures

In addition to the minimum requirements, the following are required:

A. Course Requirements

In addition to those listed under the master's degree, students must take the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ger 601 Special Author</td>
<td>3</td>
</tr>
<tr>
<td>Ger 602 Special Period</td>
<td>3</td>
</tr>
</tbody>
</table>

2. Six additional offerings at the graduate level from courses within the department or, with prior approval by the department, from those of other departments within the Graduate School.

(Students should note that the comprehensive examination can be expected to cover material drawn from not only the four courses listed under the M.A. requirements but also GER 558 Middle High German and GER 563 Old High German).

Persons wishing to stress Germanic philology will be encouraged to do so by substituting appropriate courses from within the department's offerings as well as those from other departments, such as FRN 511, EGL 509, EGL 510, EGL 515, or EGL 601.

Graduate work in Slavic is offered and may be credited toward the M.A.L.S., D.A., and Ph.D. degrees.

*The doctoral program is currently not accepting new students.*
B. Comprehensive Examination
Before the end of the fourth semester of full-time residence after receiving the M.A., a student will be required to take and pass the departmental comprehensive examination testing knowledge and critical understanding of German literature and language.

C. Foreign Language Requirements
A student who has not fulfilled the language requirement during the master's program must pass an examination in at least one other ancient or modern language approved by the department.

D. Dissertation Subject
A candidate must present a proposal for a doctoral dissertation that is supported by the member of the department who has agreed to sponsor the dissertation.

E. Residence Requirement
A minimum of two consecutive semesters of full-time study is required.

German Courses
GER 500 Intensive Reading German
Intensive introductory German for non-majors. Practice in reading and translation; German prose; use of dictionaries and reference materials; as much attention as possible to special problems of various disciplines. Fall and spring, 3 credits each semester.

GER 501 Strategies of Teaching German
Detailed examination of various approaches to teaching German as a foreign language, conventional teaching aids, use of media in instruction. (Given at Goethe House in New York City.) Fall, 3 credits.

GER 502 Language Practicum
Techniques of classroom instruction; teacher and peer evaluation. To be taken in conjunction with initial teaching assignment. Fall and spring, 3 credits each semester.

GER 503 Literature Practicum
Apprenticeship to a senior professor for work in an undergraduate literature course. Preparation and delivery of lectures, evaluation of students' work in class and written work. Fall and spring, 3 credits each semester.

GER 504 German Cultural History
Examination of major developments in the German-speaking countries in the areas of history, philosophy, education, and the arts as related to various literary periods. Spring, 3 credits.

GER 505 Minor Germanic Languages
German loan words in Scandinavian: Intensive study of Dutch, Danish, Icelandic, Faroese, and Norwegian, as indicated, and their relation to English and German. Fall, 3 credits.

GER 506 Advanced Stylistics
Advanced stylistics and textual analysis. Designed to deepen the advanced student's knowledge of the finer points of syntax, structure, and stylistic versatility of the German language. Spring, 3 credits.

GER 539 Contrastive Structures: German-English
Contrastive study of German and English language structure. Fall, 3 credits.

GER 541 Literature of the Goethe Period
Die Weimarer Klassik: Goethe and Schiller. The major figures considered as poets, philosophers, and theoreticians of the arts and literature. Spring, 3 credits.

GER 542 Literature of the Romantic Period
Selections from representative prose works, drama, and poetry from the period 1795-1830 are examined from various perspectives, including the sociology of literature. Fall or spring, 3 credits.

GER 545 20th-Century Prose and Poetry
A survey of 20th-century prose and poetry, with emphasis on the poetry of expressionism. Spring, 3 credits.

GER 546 20th-Century Drama
Concentration on aspects of modern drama, e.g., Brecht's anti-illusionistic theater, and drama as a vehicle for dissemination of political ideology. Fall and spring, 3 credits.

GER 547 Special Author Studies
Tutorial. Fall and spring, 3 credits.

GER 548 Special Period Studies
Tutorial. Fall and spring, 3 credits.

GER 549 Theory and Criticism
From Herder to Habermas and beyond: idealist and materialist dialectic, sociology of literature, Marxism and socialist realism, theories of reception, problems of hermeneutics, semiotics, discourse analysis, speech acts, problems of popular culture. Special emphasis will be on the achievements of the "Frankfurt School" and its heirs, relatives, and foes. Spring, 3 credits.

GER 551 Baroque
A survey of the literature of the period. Spring, 3 credits.

GER 553 Realism
Selections from representative prose works, drama, and poetry from the period 1825 to 1865 are examined from various perspectives, including the sociology of literature. Spring, 3 credits.

GER 555 Scandinavian Literature

GER 557 History of the German Language
The development of the German language from Indo-European to modern High German: a representative selection of texts from different periods will be examined. Fall, 3 credits.

GER 558 Middle High German
An introduction to Middle High German grammar with representative reading from the Middle High German classics. Fall, 3 credits.

GER 561 Goethezeit
A study of the cultural changes in Germany during Goethe's lifetime, 1749-1832. Fall or spring (as feasible), 3 credits.

GER 562 Gothic and Indo-European
An introduction to the principles of historical linguistics, with the applications of these principles applied to the tracing of Gothic from Indo-European. The bulk of the course will be devoted to the Gothic language per se, with readings from the UT translation of the Bible. Fall or spring (as feasible), 3 credits.

GER 563 Old High German
An introduction to the literary form of German of the ninth century. The language will be approached as a foreign language. The bulk of the course, however, will be directed toward a discussion of the genres of the period, the heroic epic, charms and incantations, glossarium, homilies, sermons, and excerpts from the Bible. Fall or spring (as feasible), 3 credits.

GER 565 Middle High German Literature
An introduction to German literature of the high court period (1150-1250). Among genres discussed will be the courtly romance, the heroic epic, and the Minneleeer. Spring, 3 credits.

GER 580 Translation from Germanic Languages
A course enabling those who take it to translate from Icelandic, Danish, Norwegian, and Swedish according to the needs of the class, concentrating on medieval texts such as Saxo Grammaticus, Sankta Birgitta, and various types of Iceland and Norwegian sagas. We will translate folk stories from the various Scandinavian countries. Spring, 3 credits.

GER 599 Master's Thesis
Variable and repetitve credit.

GER 601 Special Author Studies
Tutorial. To be arranged with appropriate staff member. Fall and spring, 3 credits each semester.

GER 602 Special Period Studies
Tutorial. To be arranged with appropriate staff member. Fall and spring, 3 credits each semester.

GER 603 The Middle Ages
Medieval German lyric, Middle High German lyric, and its antecedents. Fall, 3 credits.

GER 699 Doctoral Dissertation
Taken after advancement to candidacy. Variable and repetitve credit.

Russian and Slavic Courses
RUS 500 Reading Russian
An intensive introduction to Russian for non-majors. Practice in reading and translation of selected Russian texts and technical literature. As much attention as possible will be given to special problems of various disciplines. Spring, 3 credits.

RUS 506 Stylistics of Russian
Advanced stylistics and textual analysis of the diverse styles of the Russian language: journalistic, literary, and technical. Fall, 3 credits.

RUS 508 Major Russian Authors
A seminar in selected major Russian authors, focusing on one or two authors such as Pushkin, Gogol, Dostoevsky, Turgeniev, Tolstoy. May be repeated. Fall, 3 credits.

RUS 509 Dostoevsky and the West
Dostoevsky's major texts viewed in cross-cultural perspective with particular emphasis on literary and philosophical traditions common to Russia and Europe. Cross-listed with CLT 504. Fall, 3 credits.
RUS 511 Studies in Literary Genres
A seminar devoted to a specific genre (poetry, novel, short fiction, drama) in Russian literature. May be repeated. Spring, 3 credits

RUS 512 Early 20th-Century Russian Literature
An introduction to the various schools which characterize the pre-revolutionary period of 20th-century Russian literature—Symbolism, Acmeism, and Futurism. Particular emphasis is placed on the works of Blok, Solzhenitsyn, Kantor, Armatova, Mandelstam, Pasternak, Esenin, and Mayakovksy. Fall, 3 credits

RUS 514 Russian Literature
Since 1917
A seminar in Soviet pre-revolutionary and emigre prose. The course deals with Russian prose fiction—such as trope genres, literary movements, and major authors such as Bulgakov, Pasternak, and Solzhenitsyn. Fall, 3 credits

RUS 517 History of the Russian Literary Language
The development of the Russian literary language from the 10th century to the present. Although its emphasis is primarily on the historical development of the language, the course includes readings from early East Slavic and Middle Russian texts, such as the Tale of Igor's Campaign, The Life of Avasvam, etc., as well as discussions of genre and style. Fall, 3 credits

RUS 520 Applied Linguistics
An advanced practical course in Russian syntax, idiomatic phraseology, and word order. Fall, 3 credits

RUS 538 Structure of Russian
The course investigates the phonetics, phonology, and morphology of contemporary standard Russian. Fall, 3 credits

RUS 539 Teaching Strategies in Russian
An investigation of the methodology and materials available to teachers of Russian. The course examines applied linguistics in teaching. Spring, 3 credits

RUS 540 Techniques of Class Instruction (Practicum)
Teacher supervision, visitation, and evaluation as well as help in development of lesson plans. To be taken in conjunction with a teaching assignment. Fall or spring, 3 credits

RUS 599 Master's Thesis
Maximum 6 credits

RUS 602 Literature and Theatre
The relationship of literature and theatre with specific examples taken from Russian cultural history. The stage adaptations of prose by Stanislavsky, Meyerhold, and contemporary directors will be studied as forms of aesthetic conjunction and response to social-ideological context. Spring, 3 credits

SLV 501 Special Topics in Slavic Literature
Special topics in Slavic literature investigating an author, period, genre, or theoretical issue. Designed to provide a forum for advanced research in critical methodology. Spring, 3 credits

SLV 502 Problems of Literary Translation
The course addresses theoretical and practical problems of translation from the Slavic languages. Published translations of literary texts as well as translations prepared by participants of the seminar will be compared and analyzed. Prerequisite: Advanced knowledge of Slavic languages. Spring, 3 credits

SLV 503 Special Topics in Slavic Linguistics
The course will investigate various topics in Slavic linguistics. Its orientation is primarily theoretical and may include discussion of Slavic accentology; history of Slavistics; or the phonology, morphology, or syntax of a given Slavic language. Spring, 3 credits

SLV 504 Topics in Slavic Cultures
The course examines major topics in Slavic cultures and focuses on Slavic contributions to Western civilization. Fall or spring, 3 credits

SLV 505 Introduction to Scholarly Editing and Bibliography
Students will be involved in editing, translating, and preparing final copy for one issue of the professional journal Slavic and East European Arts. The course will also include training in bibliography, reference materials, and annotation. Fall or spring, 3 credits

SLV 571 Introduction to Slavic Linguistics
An investigation of the major East, and South Slavic languages with particular attention to their historical development. The course includes comparative and contrastive studies in the areas of phonology, morphology, and syntax. Fall, 3 credits

*Offered alternate years.

Scandinavian Courses

SCN 506 Advanced Stylistics—Scandinavian Language
Advanced stylistics and textual analysis. Designed to deepen the student's knowledge of the finer points of syntax, structure, and stylistic versatility of the Scandinavian languages. Spring, 3 credits

SCN 584 Old Norse Language
Formerly GER 564
Fall, 3 credits

SCN 585 Old Norse Literature
Spring, 3 credits

D.A. Courses

The following courses are available only to candidates in the Doctor of Arts Program:

DLG 601, DLR 601 Internship in Foreign Languages: German and Russian
Students in the Doctor of Arts program will assist an instructor as an aide in a literature, culture, or language course on the undergraduate level. Fall and spring, 1-3 credits

DLG 602, DLR 602 Internship in Foreign Languages: German and Russian
Students in the Doctor of Arts program will teach one or more courses at the high school, junior college, or college level under the supervision of a master teacher. Prerequisite: All other coursework completed. Fall and spring, 3-6 credits

DLG 603, DLR 603 Independent Readings in Foreign Languages: German and Russian
Independent readings on a selected topic in German language or literature and Russian language or literature. Fall and spring, 1-6 credits, repetitive

DLG 699, DLR 699 Doctoral Research in Foreign Languages: German and Russian
Independent research for the Doctor of Arts degree. Open only to candidates for the Doctor of Arts who have passed the preliminary examination. Fall and spring, 1-6 credits, repetitive

48
Hispanic Languages and Literature (SPN, DLS)

Chairperson: Roman De la Campa
Frank Melville, Jr. Memorial Library N3022-3023 (516) 632-6950/6935
Graduate Studies Director: Jaime Giordano
Frank Melville, Jr. Memorial Library N3018 (516) 632-6936/6935

Degree Requirements
Requirements for the M.A. Degrees

The curricula leading to the Master of Arts degrees may be terminal or may be continued with the Doctor of Arts or Doctor of Philosophy programs of study. In addition to the minimum requirements of the Graduate School, there are the following specific requirements:

For the M.A. Degree in Spanish (Hispanic literature and language teaching):

A. Students must demonstrate proficiency in both Spanish and English and a reading knowledge of a third language. (French is recommended for students who intend to continue toward a Ph.D. degree.)

B. There is a general requirement of 36 graduate credits. Together with satisfactory completion of 30 credits in coursework, a student must either take a basic comprehensive examination or complete a thesis/project; either of these options carries 6 graduate credits.

C. At least one course should be taken in each of the following areas: teaching methods (a practicum), Spanish literature, and Spanish-American literature. Courses in linguistics, advanced language, and problems in bilingual education are recommended.

D. Students working on a part-time basis should complete all requirements for the M.A. within four years after their first regular graduate registration.

For the M.A. degree (a) in Romance Languages or (b) in Hispanic Languages and Linguistics:

A. A student must complete 36 credits of coursework either (a) in two different Romance languages (Spanish and French or Spanish and Italian), or (b) in Hispanic languages and linguistics. Students must arrange an appropriate course of study in conjunction (a) with the interdepartmental Romance M.A. advisors, or (b) with the advisor in Spanish linguistics.

B. Students must pass a comprehensive examination based on a special reading list.

C. Students must demonstrate proficiency in English, Spanish, and another language.

Requirements for the Doctorate of Arts Degree

In addition to the minimum requirements of the Graduate School, the following are required:

A. In the Spanish major 24 credits (depending on previous preparation) are to be distributed evenly among literature, advanced language, and culture courses.

B. Additional requirements are one course in advanced composition, one course in general linguistics, and three education courses (including one in testing).

C. The total number of credits required normally ranges from 45 to 51.

D. The requirements of a practicum, an internship, and an externship vary in individual cases.

E. Practical experience in teaching.

F. A B average in coursework must be maintained.

G. After completion of the coursework, students must pass a comprehensive examination (written and oral) and fulfill a doctoral project.

Requirements for the Ph.D. Degree

In addition to the minimum requirements of the Graduate School, the following are required:

A. Course Requirements

Students must complete one course in Spanish historical linguistics and four 600-level seminars. A student's course curriculum must show at least one course each in Cervantes, Spanish-American Modernism, and Literary Theory (at the 500 or 600 levels). Specializations are offered in Spanish or Spanish-American literature. The number of credit hours required in the Ph.D. program depends on the student's previous preparation. A student with a B.A. (or equivalent) and an undergraduate major in Spanish is usually expected to earn 72 graduate credits (three full years of study). A student with an M.A. (or equivalent) in Spanish is usually expected to earn 36 additional graduate credits (about two years of study). A student who has already done a year's work or more in another institution beyond the M.A. level is required to complete at least two consecutive semesters of full-time graduate study (18 credits) at Stony Brook.

Teaching experience and one practicum is required and may be counted as part of the student's full-time study. Undergraduate courses may also be considered as part of full-time study, but without graduate credit. Before registering for each semester, the student must consult with the chairperson and/or the graduate studies director and work out an approved combination of courses.

B. Qualifying Examination

In addition to completing coursework successfully (that is, maintaining at least a B average), all full-time graduate students intending to work for a Ph.D. must pass a qualifying examination either after their first or their third full-time semester, according to individual qualifications. This examination, usually given in February, is based on a list of five literary works, and serves to indicate preparation and aptitude for doctoral work in Spanish. It consists of a written part (four hours) and an oral part (one-half hour). This examination may not be repeated.
C. Language Requirements

In addition to proficiency in Spanish and English, the Ph.D. candidate must demonstrate a reading knowledge of French and another language related to the field of the dissertation. A knowledge of Latin, for example, is required for research in philology or medieval literature, and may be required for research in Renaissance literature. Students are urged to demonstrate a reading knowledge of French by the beginning of the second year of full-time study; they are required to fulfill both language requirements prior to being advanced to candidacy. A language requirement may be fulfilled by 1) passing the Princeton Graduate School Foreign Language Test (GSFLT); 2) successful completion (that is, with a grade of B or better) of a graduate reading course or regular graduate course in the foreign language; or 3) passing a special reading examination administered by the Department of Hispanic Languages and Literature.

D. Comprehensive (Preliminary) Examination

When the student has completed one of the department's two standard reading lists (emphasis on either Peninsular literature or Spanish-American literature), he/she may take the first part of his/her comprehensive (preliminary) examination. However, the student must first pass the mandatory linguistics course, have a reading knowledge of French, and possess no outstanding incomplete grades.

This examination will consist of nine hours of written work and one hour of oral questions and answers. The written examination will be given on two days of the same week. One day, six hours will be devoted to the area of specialization; on the second day, the other area will be covered in three hours. (No less than one week or more than one month shall pass between the written and the oral parts).

The second part of the comprehensive (preliminary) examination—a discussion of the dissertation topic—is usually combined with the oral examination. If not, it must be presented within six months of the first section of the written examination. It is planned by the student in consultation with the prospective director of his/her dissertation. (Both language requirements must have been fulfilled by this time). A specialized bibliography of relevant works is drawn up by the director in conjunction with the student. The student then drafts a thesis prospectus to be presented with the bibliography to the department at large and to his/her examination committee. An oral examination lasting at least one hour, based on the bibliography and thesis prospectus, must be satisfactorily passed before the student can be advanced to doctoral candidacy.

E. Dissertation

The qualified doctoral candidate will concentrate on a dissertation (written results of specialized study and research) under the supervision of a member of the graduate faculty, with advice of a second reader. At least six weeks before his/her scheduled dissertation defense, an open draft must be submitted for advice and discussion to the dissertation committee. After the dissertation is completed, a final draft is submitted to this committee, accompanied by a dissertation abstract. If the dissertation is approved by the committee, the candidate is recommended for the Doctor of Philosophy degree, and is usually asked to give a public lecture on the subject of the dissertation.

Courses

SPN 501 Historical Linguistics I
General processes of language change, exemplified by the development of the Romance languages with particular reference to Spanish. Prerequisite: B.A. degree and one semester of linguistics.
Fall or spring, every 2 years or more, 3 credits

SPN 502 Historical Linguistics II
After a brief descriptive introduction to morphological terminology, the course will be divided into two parts: the nominal systems of Latin and modern Spanish, and conservative versus innovations in the verbal system. Prerequisite: B.A. degree or permission of instructor.
Fall or spring, every 3 years or more, 3 credits

SPN 504 Contrastive Analysis: Spanish and English
Course intended to develop students' ability to (1) analyze language for themselves through systematic observation of actual usage, and consequently (2) exercise critical judgment in using existing pedagogical materials (language textbooks). Topics addressed include linguistic interference: its basis and its manifestations, in-depth discussion of specific syntactic/semantic areas with reference to possible Spanish/English interference, major phonological differences between Spanish and English and consequent learning difficulties, non-linguistic factors which may affect learning in different groups (e.g., children versus adults, United States traditions versus Hispanic traditions) in different situations. Prerequisite: B.A. degree.
Fall or spring, 3 credits

SPN 505 Seminar in Hispanic Linguistics
Dialectology and sociolinguistics: Hispanic varieties. The course is intended to familiarize students with major theoretical issues involved in analysis of geographic and social variation and with the principal methods used in its investigation, as applied to varieties of Spanish, Portuguese, and Catalan. Semantic analysis: discussion of different theoretical approaches and their implications for the analysis of syntactic and pragmatic phenomena in Hispanic languages. Students will be required to complete an original research project. Prerequisite: Two semesters of linguistics and permission of instructor.
Fall or spring, 3 credits, repetitive

SPN 509 Literary Theory
A study of outstanding methods of analysis and literary research, and a survey of major works pertaining to the study of literature as a science. A required course for Ph.D. candidates in Spanish.
Prerequisite: B.A. degree.
Fall or spring, every 2 years or more, 3 credits

SPN 510 Hispanic Culture
An introduction to the essential aspects of Peninsular and/or Latin American cultures and civilizations, designed to provide incoming graduate students with enough background to undertake the advanced study of Hispanic language and literature.
Prerequisite: B.A. degree.
Fall or spring, every 2 years or more, 3 credits, repetitive

SPN 512 Medieval Literature
Major literary works within the medieval period will be read and discussed in depth, and their interaction with the cultural context analyzed. Topics may vary.
Prerequisite: B.A. degree.
Fall or spring, 3 credits, repetitive

SPN 515 Graduate Spanish Composition and Stylistics
Theory and practice of problems in composition and in translation with relation of difficult points in advanced Spanish grammar. Classroom analysis and discussion. Required course for Doctor of Arts students (DLS); also useful for M.A. and Ph.D. students.
Prerequisite: B.A. degree.
Fall or spring, 3 credits

SPN 523 Golden Age Literature
Major literary works within the Renaissance and/or baroque periods, read and analyzed in depth, and their interaction with the cultural context discussed. Topics may vary.
Prerequisite: B.A. degree.
Fall or spring, 3 credits, repetitive

SPN 528 Miguel de Cervantes
Miguel de Cervantes' works will be read, analyzed, and discussed in depth. A required course for Ph.D. students (when not offered as a seminar). Advanced Doctor of Arts (D.L.S) and M.A. students will be accepted.
Prerequisite: M.A. degree or permission of instructor.
Fall or spring, 3 credits, repetitive

SPN 531 Spanish Enlightenment and Romanticism
A course devoted to the Spanish literature of the enlightenment and the romantic period, with particular attention to the significance of the ideas prevalent at the time in literary theory and the historical and social context.
Prerequisite: B.A. degree.
Fall or spring, 3 credits, repetitive

SPN 541 19th-Century Spanish Literature
Major literary works within the period will be read and analyzed in depth, and their interaction with the cultural context will be discussed.
Prerequisite: B.A. degree.
Fall or spring, 3 credits, repetitive

SPN 543 20th-Century Spanish Literature
Major literary works within the period will be read, analyzed, and discussed in depth, and their interaction with the cultural context will be discussed.
Prerequisite: B.A. degree.
Fall or spring, 3 credits, repetitive

SPN 552 Colonial Spanish-American Literature
Major author and literary works of the period. Readings will be analyzed and discussed in depth, and their interaction with the cultural context explored.
Prerequisite: B.A. degree.
Fall or spring, 3 credits, repetitive

SPN 562 19th-Century Spanish-American Literature
Major authors and literary works of the period. Readings will be analyzed and discussed in depth, and their interrelation with the cultural context will be discussed.
Prerequisite: B.A. degree.
Fall or spring, 3 credits, repetitive

SPN 569 Spanish-American Modernism
Major authors and literary works of the modernist period (1880-1916) in Spanish America. Readings will be analyzed in depth, and their interrelation with the cultural context discussed. A required course for Ph.D. students (when not offered as a seminar course).
Prerequisite: M.A. and advanced Doctor of Arts (DLS) students.
Fall or spring, 3 credits, repetitive

SPN 571 20th-Century Spanish-American Literature
A course devoted to major authors and literary works of the period. Readings will be analyzed and discussed in depth, and their interrelation with the cultural context discussed.
Prerequisite: B.A. degree.
Fall or spring, 3 credits, repetitive

SPN 580 Poetry Workshop in Spanish
This course is designed to maximize the interchange between faculty teaching the course and graduate student poets who have written in the genre and are already familiar with the theoretical works of Ruben Dario, Octavio Paz, Enrique Lihn, and others. The theoretical and practical study of poetry in Spanish will enhance the development of students' writing skills and skills of critical analysis.
Prerequisite: Permission of department based on student's original works.
Fall and spring, 1 credit, repetitive up to 3 credits

SPN 582 Hispanic Tradition in the United States
A general historical analysis of the influence of Hispanic culture in the United States as a consequence of the continuous interaction between Spanish and English-speaking people. Special attention is given to cultural manifestations in a bicultural setting.
Prerequisite: B.A. degree.
Fall or spring, 3 credits

SPN 583 Spanish-English Contrastive Phonology
A contrastive analysis of the sound system of English and Spanish entailing a phonetic and phonological description of both languages with major emphasis on Spanish; discussion of problem areas in both languages which create linguistic interference among both bilinguals and second language learners; overview of phonetic dialectology throughout the Hispanic world. Course will be in English and/or Spanish.
Prerequisite: B.A. degree.
Fall or spring, 3 credits

SPN 584 Contrastive Spanish-English Morpho Syntax
The grammatical structures of English and Spanish are studied in relation to one another in order to gain insights into their similarities and points of conflict. Contrastive analysis and its tools are important branches of applied linguistics and of great usage for potential foreign-language and bilingual teachers, teachers of English as a second language, and advanced language and linguistics students. English and/or Spanish.
Prerequisite: B.A. degree.
Fall or spring, 3 credits

SPN 585 Caribbean Literature
A course devoted to major writers and works of the Caribbean area. Readings will be analyzed and discussed in depth and in their interrelation with the cultural context. Topics may vary.
Prerequisite: B.A. degree.
Fall or spring, 3 credits, repetitive

SPN 588, 589 Directed Master's Research
For master's thesis only. This course is for students with a terminal master's thesis option. Letter grades.
Prerequisite: Permission of graduate studies director or instructor.
Fall and spring, 1-6 credits, repetitive

SPN 595, 596 Directed Independent Individual Studies
For M.A. and Ph.D. candidates. Requires a written proposal signed by the faculty member involved, prior to registration, and a term paper for the course. A copy of the paper presented will be kept in the departmental files. Limited to specific and justified cases. Requires the approval of the graduate studies director and the departmental chairperson. No more than a total of nine credits may be applied for graduate work.
1-6 credits

SPN 592 Topics Seminars
A seminar course designed primarily for advanced doctoral candidates. The topic will be chosen by the professor from among those topic courses required of all Ph.D. students. A minimum of four 600-level seminars are required of all Ph.D. students.
Prerequisite: Advanced doctoral candidates and/or permission of instructor.
Fall and spring, 3 credits, repetitive

SPN 581 Directed Readings
For the student who has completed all course requirements but has not yet taken the comprehensive exams. Students in this category will not be permitted to take the Directed Doctoral Research course in the same semester that this course is being taken.
Prerequisite: Coursework must be completed except for comprehensive exams.
Fall and spring, 1-9 credits, non-repetitive

SPN 591 Practicum in the Teaching of Spanish Language
Prerequisite: Permission of graduate studies director.
Fall, 3 credits, non-repetitive

SPN 695, 696 Directed Doctoral Research
For students who have completed their Ph.D. course requirements and need to devote their time to preparation of their theses.
Prerequisites: Comprehensive exams completed; permission of instructor.
Fall and spring, 1-9 credits, repetitive

D.A. Courses
The following courses are available only to candidates in the Doctor of Arts program:

DLS 601 Internship in Foreign Languages: Spanish
Students in the Doctor of Arts program will assist an instructor as an aide in a literature, culture, or language course on the undergraduate level.
Fall and spring, 1-3 credits

DLS 602 Internship in Foreign Languages: Spanish
Students in the Doctor of Arts program will teach one to three courses at the high school, junior college, or college level under the supervision of a master teacher.
Fall and spring, 3 credits

DLS 699 Doctoral Research in Foreign Languages: Spanish
Independent research for the Doctor of Arts degree. Open only to candidates for the Doctor of Arts who have passed the preliminary examination.
Fall and spring, 1-6 credits, repetitive
Music
(MUS)

Chairperson: Richard Kramer
Fine Arts Center 3307 (516) 632-7330
Graduate Studies Director: David Lawton
Fine Arts Center 3310 (516) 632-7330

Degree Requirements
Requirements for the
M.A. Degree, Graduate Studies
in Music History

A. Course Requirements
Thirty graduate credit hours (exclusive of those in MUS 501 Compositional Skills of Tonal Music and MUS 591 Practicum in Teaching) chosen in consultation with the student's advisor. The program must include:

1. MUS 502 Proseminar in Tonal Analysis, to be taken during the spring semester of the first year of study. Students who are well prepared in analysis may be exempt from this requirement by examination.
2. MUS 503 Music in the 20th Century.
3. At least two courses from the group MUS 543-555 (Special Topics Courses).

If a course in a department other than Music is taken toward the degree, approval by the graduate studies committee must be obtained.

B. Foreign Languages
A reading knowledge of French and German is required. The German examination must be taken at the beginning of the first semester of study. Both examinations must have been taken by the end of the second semester.

C. Comprehensive Examinations
Written and oral examinations in the history of music and in the analysis of preassigned compositions.

D. Research Paper
A substantial essay, normally one which the student has written as part of the coursework, is required. The paper should be submitted no later than the third week of the semester in which the student expects to receive the degree.

Requirements for the M.A. Degree, Graduate Studies
in Composition

A. Course Requirements
Thirty graduate credit hours (exclusive of those in MUS 501 Compositional Skills of Tonal Music and MUS 591 Practicum in Teaching) chosen in consultation with the student's advisor. The program must include:

1. MUS 502 Proseminar in Tonal Analysis, to be taken during the spring semester of the first year of study. Students who are well prepared in analysis may be exempt from this requirement by examination.
2. Seminars in Music Theory: three courses from the group MUS 531-534
3. MUS 559 Topics in Analysis (two semesters)
4. One course from the group MUS 539-555 (Special Topics Courses)
5. One of the following: MUS 511 Compositional Techniques of the 20th Century
MUS 516 Electronic Music Workshop
MUS 521 Composition in Traditional Styles

If a course in a department other than Music is taken toward the degree, approval by the graduate studies committee must be obtained.

B. Foreign Language
A reading knowledge of French, German, or Italian is required. The examination must be taken at the beginning of the first semester of study.

C. Comprehensive Examination
Written examination in the analysis of preassigned compositions is required.

D. Compositions
Students must satisfy the departmental requirement that they have written compositions of sufficient quality and variety during the period of study after admission to the Graduate School. Fair copies of all such
works must be submitted to the graduate studies committee as they are completed. The last day for graduate students to submit theses and dissertations, as specified in the academic calendar, will be the final deadline for all works to be submitted.

Requirements for the M.M. Degree

A. Course Requirements

Thirty graduate credit hours (exclusive of those in MUS 501 Compositional Skills of Tonal Music and MUS 591 Practicum in Teaching) chosen in consultation with the student’s advisor. Up to 15 credits in individual study of the major instrument or voice may be counted toward the degree. None of the remaining 15 degree credits may be in individual study of another instrument or voice.

The program must include at least one course in music history (MUS 503 or MUS 507) and one course in music theory (MUS 502, 504, or 508). Students who can demonstrate adequate preparation may take more advanced courses to fulfill this requirement.

Students who play orchestral instruments are required to enroll in MUS 565 Graduate Orchestra in every semester of full-time residence. Under special circumstances a student may petition to have this requirement waived on a per-concert basis; a memorandum outlining policies and procedures for such a waiver is available from the Music Department’s Graduate Office. Students in voice are required to enroll in MUS 566 Camerata Singers for two semesters. This requirement may be waived at the request of either the conductor or the major teacher. Participation in the accompaniment pool is required of all pianists and harpsichordists during each semester of full-time residence. Students in harpsichord are expected to participate in the Collegium Musicum for two semesters. All students except those in the conducting programs must be enrolled in MUS 571 during each semester of full-time residence.

If a course in a department other than Music is taken toward the degree, approval by the graduate studies committee must be obtained.

B. Ear Training

Satisfactory performance on the entrance examination in ear training is required. Students who do not pass the examination are required to take MUS 221, section 2 during their first year of study, and must achieve a grade of B or higher in the course to satisfy the requirement.

C. Piano Proficiency

Students in voice are required to take the piano proficiency examination upon entering the program. Those who do not pass the examination must take appropriate courses and pass the examination before the degree will be granted.

D. Jury Examinations

These are offered each semester.
1. Students must take one jury examination during each academic year.
2. Students must take and pass the jury examination in the semester prior to the one in which the degree recital (see E, below) is given.
3. For students in harpsichord, the examinations will include continuo realization.

E. Foreign Language

A reading knowledge of French or German is required of students in harpsichord. Entering students in voice are expected to have a basic proficiency equivalent of one year each of Italian, French, and German. Deficiencies must be remedied before the degree will be granted.

F. Public Recital

Requirements for the Doctor of Musical Arts Degree, Contract toward Candidacy

A plan of study in the form of a working contract toward candidacy will be drawn up jointly by the student and a directing committee early in the student’s first semester. The directing committee will consist of the student’s advisor and a member of the academic faculty, to be appointed by the graduate studies director. The committee may include additional faculty members from within or outside the department if appropriate. Final approval of the contract, and of any revisions that may be necessary, rests with the graduate studies committee.

The design of the program is to be developed around the requirements given below, and the contract should specify such terms as the core of courses to be taken; the length of full-time residence; and the schedule and substance of various recitals, essays, and examinations. The term of the contract should normally be completed after two years of full-time residence.

A. Work in the Student’s Area of Specialization

Progress during residence in the program will be demonstrated to the directing committee through the presentation of four recitals, not including the doctoral degree recital, showing mastery of a broad range of musical styles. Two of these must be solo recitals, unless otherwise specified by the directing committee. Students who propose to work as well in a secondary area of specialization should see section H below.

B. Public Lecture-Recital

See the description of MUS 696.

C. Essays

Two papers, one on an analytical topic and one on a historical topic, are required. These essays may be on performance-oriented subjects. Each must grow out of work in a separate graduate music course.

D. Work in the Area of 20th-Century Music

Either a substantial portion of one of the recitals, described above in section A, or the lecture-recital, section B, must be devoted to 20th-century music. Participation in MUS 611 resulting in a significant performance may satisfy this requirement in part.

E. Foreign Language

A reading knowledge of French, German, or Italian is required. Students in harpsichord must read both French and German. Students in voice must pass reading examinations in any two of the following languages: Italian, French, German, or Russian, and must demonstrate singing competence in Italian, French, and German. The contract toward candidacy may specify further language proficiency depending upon the proposed plan of study.

F. Teaching

A minimum of two semester courses, either or both of which may comprise individual lessons, ensemble coaching, or classroom teaching, is required.

G. Orchestra/Accompaniment

Students who play orchestral instruments are required to enroll in MUS 565 Graduate Orchestra in every semester of full-time residence. Under special circumstances, a student may petition to have this requirement waived on a per-concert basis; a memorandum outlining policies and procedures for such a waiver is available from the Music Department’s Graduate Office. Students in voice are required to enroll in MUS 566 Camerata Singers for two semesters. This requirement may be waived at the request of either the conductor or the major teacher. Pianists and harpsichordists are required to participate in the accompaniment pool during each semester of full-time residency.

H. Secondary Area of Specialization

Students who propose to do advanced work in composition, history, or theory as an integral part of the program must do one or a combination of the following:
1. Present a number of musical compositions demonstrating fluency in working with a variety of contemporary performance media.

2. Present a number of essays demonstrating proficiency in various aspects of musicological research, theoretical studies, analysis, or criticism. The essays may have been prepared as coursework.

I. Doctoral Jury Examinations

One jury will be played at the end of the first full year of residency. A second, 30-minute jury examination will be taken at the end of the period of residency covered under the contract toward candidacy. Both juries must be passed as a condition for advancement to candidacy.

J. First-Year Academic Review

In order to be in good standing, D.M.A. students must have taken one of the two academic courses required (History or Theory) by the end of the first year of the program, and must have taken the foreign language proficiency exam by the beginning of the second semester. The director of graduate studies will monitor the academic progress of D.M.A. students by asking all academic advisors to submit contract checklists in February of each year.

K. Advancement to Candidacy

Upon completion of the above requirements (A-I), the student may be advanced to candidacy. Advancement to candidacy is granted by the Graduate School upon recommendation from the departmental graduate studies director.

L. Doctoral Degree Recital

Examination

After being advanced to candidacy, the student must:

1. Submit a program of the proposed doctoral degree recital, bearing the signature of the major teacher, to the director of graduate studies. The program must not include works previously performed to satisfy other graduate degree requirements.

2. Submit a doctoral examination prospectus that focuses on significant features and interpretative aspects of the works to be performed. The prospectus will serve as the basis of the doctoral examination.

3. Appear before an examining committee to demonstrate mastery of the doctoral degree recital program and of areas pertinent to the works to be performed. The doctoral degree recital examination normally takes place within one year after advancement to candidacy.

M. Doctoral Degree Recital

The doctoral degree recital may be performed after the degree recital examination has been passed. It must demonstrate a distinguished, professional level of performance. A recording of this recital, along with program and notes, is to be deposited in the university library.

Requirements for the Doctor of Philosophy Degree, Contract toward Candidacy

A plan of study in the form of a working contract toward candidacy will be drawn up jointly by the student and a directing committee early in the student's first semester. The directing committee will consist of the student's advisor and at least two other faculty members. The graduate studies director will appoint the directing committee and will designate its chairperson, who shall not be the student's advisor. The committee may include faculty members from outside the department when that is appropriate. Final approval of the contract, and of any revisions that may be necessary, rests with the graduate studies committee.

The design of the program is to be developed around the requirements given below, and the contract should specify such terms as the core of courses to be taken, the length of full-time residence, and the schedule and subject areas of various examinations including the preliminary examination. The terms of the contract should be completed within one or two years, depending upon the scope of the program. Successful completion of relevant master's requirements is assumed for the Ph.D. degree; see Admission to the Ph.D. Program, above.

A. Work in the Student's Area(s) of Specialization

Progress during residence in the program will be demonstrated to the directing committee in one or a combination of the following ways:

1. The presentation of a number of musical compositions demonstrating fluency in working with a variety of contemporary performance media.

2. The presentation of a number of essays demonstrating proficiency in various aspects of musicological research, theoretical studies, analysis, or criticism. The essays may have been prepared as coursework.

Students who propose to do work in performance as an integral part of the program must, in addition, present at least two recitals showing mastery of a broad range of musical styles.

B. Work in the Area of 20th-Century Music

Competence is to be demonstrated to the directing committee through the following:

1. An essay dealing with 20th-century music from a historical, theoretical, critical, or analytical point of view.

2. A public lecture or colloquium on a topic of significant interest in 20th-century music. See the description of MUS 696.

C. Foreign Language

Reading knowledge of German and French for students in history or theory is required; reading knowledge of French, German, or Italian for composition students is required. (See pertinent M.A. language requirements, above.) The contract toward candidacy may specify further language proficiency depending on the area of the dissertation.

D. Teaching

A minimum of two semester courses, at least one of which shall be an introductory college course in musicianship, theory, or literature, is required. Students must also participate in the seminar on the teaching of music for a minimum of one semester and must present to the seminar at least one project or report.

E. Advancement to Candidacy

After completing the terms of the contract, a student is eligible for advancement to candidacy. To be advanced to Ph.D. candidacy, the student must:

1. Submit a prospectus outlining the nature and aims of the dissertation.

2. Pass a preliminary examination that will demonstrate preparation in his/her special competence, normally the area of the dissertation.

F. Dissertation

The dissertation shall be a significant original work of scholarship or composition. Approval of the dissertation in scholarship will rest upon a formal oral defense to be conducted by the dissertation committee. Approval of the dissertation in composition rests with the dissertation committee. The composer will present a public colloquium on the dissertation work(s).

Courses

MUS 500 Introduction to Music Research
Music bibliography, research techniques, and editorial procedures. Students will write several short papers covering a broad spectrum of historical periods and repertories. 3 credits.

MUS 501 Compositional Skills of Tonal Music
An intensive course in chorale harmonization and tonal counterpoint. (Enrollment limited to 12. MUS 501 may not be included in the courses taken in fulfillment of degree requirements.) Fall, 3 credits.

54
MUS 502 Preseminar in Tonal Analysis
The application of various techniques of analysis to tonal works. Rhythmic, harmonic, linear, thematic, and other elements of musical structure will be considered. Preparation equivalent to MUS 501 is assumed.
Spring, 3 credits

MUS 503 Music in the 20th Century
An intensive course in 20th-century musical styles, focusing on historical periods. Seminar reports and research papers on works of major significance. Fall, 3 credits

MUS 504 Analysis of 20th-Century Music
Detailed analyses of various works which are representative of the significant compositional systems of recent music.
Fall, 3 credits

MUS 507 Studies in Music History
Concentrated study of the works of a single composer or of repertories that comprehend single compositional tendencies in Western music. Various topics are offered each semester.
Fall and spring, 3 credits, each semester (See note below MUS 509)

MUS 508 Studies in Composition and Theory
Study of contemporary compositional techniques or of traditional writing styles, including both analysis and exercises in writing. Various specific topics offered each semester.
Fall and spring, 1-3 credits, variable (See note below MUS 509)

MUS 509 Performance Studies
This course provides the opportunity for a student who is not in a performance degree program, but who can demonstrate graduate-level performance ability, to pursue performance studies without investing the time and credit required of M.M./D.M.A. students. The course is not open to M.M./D.M.A. students, except for conducting students who can demonstrate graduate-level ability in an instrument or voice.
Fall and spring, 2-3 credits

MUS 511 Compositional Techniques of the 20th Century
A study, by means of practical exercises in writing, of some of the important techniques of the past century in the organization non-organization of pitch, rhythm, line, motive, and form.
Fall, 3 credits

MUS 515 The Fundamentals of Electronic Music
A short survey of the history and literature of the medium will be followed by study of the pertinent background in theoretical acoustics and practical engineering. Students will then be instructed in the basic techniques of electronic sound production and modification.
Fall, 3 credits

MUS 516 Electronic Music Workshop
Individual short experimental works on specific assignments. Uses of electronic music equipment.
Prerequisite: MUS 515 or the equivalent
Spring, 3 credits

MUS 521 Composition in Traditional Styles
A study of one of the established disciplines such as fugue, homorhonic forms, or composition in the sacred style of the 16th century. The content of the course will be announced each time it is offered.
3 credits

MUS 523 Advanced Composition
Individual projects for graduate students in composition. Fall and spring, 3 credits each semester

MUS 531 Seminar in Music Theory: Compositional Theory Before 1700
Studies in the writings of theorists from the Middle Ages through the 17th century in the context of contemporary repertories. Topics, varying from semester to semester, will include the following areas of investigation: modal theory as model for modal composition, and the efforts to adapt modal theory to polyphonic practice; the problems of musica ficta as symptoms of the confrontation of modality and the melodic dimension with tonality and the harmonic dimension; diatonic and counterpoint.
Fall, 3 credits

MUS 532 Seminar in Music Theory: Rhythm and its Notation
Investigations, with the aid of theoretical writings ancient and recent, and through musical analyses, into the nature of the rhythmic impulses; studies in the efforts throughout musical history to make rhythm as performance competence and as compositional parameter; studies in the relation of rhythm and metronome; and as immersed in it; and of the basic problems on these topics, from Rameau and the theorists of the 18th century through Schenker and the commentaries on his work.
3 credits

MUS 533 Seminar in Music Theory: Topics in Tonal Theory
Studies in the problems of such concepts as root harmonic syntax; tonality; consonance and dissonance, as abstractable from musical time and as immersed in it; and of the basic writings on these. Fall, 3 credits

MUS 534 Seminar in Music Theory: Topics in 20th-Century Topics
Studies in the formation of systematic theories pertinent to various idioms from C. Debussy to the present. The following would be representative areas: attempts to extend prolongational (Schenkerian) theory beyond 'tonality'; attempts, Forte in particular, to systematize a theoretical basis for pitch-structure in 'atonal' music; classical 12-tone theory; rhythm; 
3 credits

MUS 535 Lecture-Workshop in the Performance of Baroque Music
An examination of problems confronting the performer of music from the period ca. 1600-1750, from both musico logical and practical points of view. The class will meet in lecture for two hours each week with a third hour devoted to the coaching of a rehearsal or performance of music prepared by members of the class.
3 credits

MUS 537 Seminar in Analysis and Performance
A study of the relationship of technical aspects of performance such as tempo, phrasing, articulation, and dynamics, to conceptual problems such as rhythmic and metric levels, tonal structure, and serial organization, based upon the analytical and performance of representative works and chamber works from the 18th through the 20th century.
3 credits

MUS 538 Phenomenological Approaches to Music Analysis
Concepts from phenomenological philosophy will be used as a basis for the study of music from various periods and cultures, with an emphasis on the influence of music in the Western classical tradition. Readings include Heidegger, Husserl, and later writings in phenomenology; philosophical spaces of time and space; and music theoretic studies by Clifton, J. Kramer, Lewin, and others.
3 credits

MUS 539 Contemporary Criticism and Analysis in Music, Literature, and Art
The methodology of contemporary criticism. A discussion of theories of form and style, and the relations and cross-currents among contemporary criticisms in different media. Formalist theories (Schenker in music, Riegl and Woelflin in art), statistical analysis, sociological criticism and Marxism (Adorno). 3 credits

MUS 540 Studies in Cultural Historiography
This course is intended to promote the student's knowledge and reflection about the history of the arts as history. It is organized on the following topics: origins and philosophical foundations of the modern historical consciousness; the nature of historical knowledge and explanation; historiographic models; and origins, philosophical foundations, and genres of historical musicology.
3 credits

SPECIAL TOPICS COURSES

MUS 543 Topics in Medieval Music
3 credits

MUS 545 Topics in Renaissance Music
3 credits

MUS 547 Topics in Baroque Music
3 credits

MUS 549 Topics in 18th-Century Music
3 credits

MUS 551 Topics in 19th-Century Music
3 credits

MUS 555 Topics in 20th-Century Music
3 credits

MUS 559 Topics in Analysis
3 credits

MUS 560 Score Reading
Intensive drill in score reading. Singing, composing, and playing in open score with movable clefs. Students must have basic proficiency at the keyboard. Limited to eight students. Priority given to students in the conducting program.
3 credits

MUS 561 Orchestral Conducting
Advanced training in the preparation and conducting of orchestral scores from the standard repertory. Students will study the works in a seminar, and then conduct them in regular supervised readings with the Graduate Orchestra. Open only to students in the graduate conducting program.
Fall and spring, 3 credits each semester

MUS 563 Advanced Choral Conducting A
Advanced training in preparing and conducting choral works. Students will attend a seminar in

55
score study, receive individual private instruction, and be expected to participate in the rehearsing of the University Chorus, the University Chorale, and the Chamber Singers. Open only to students enrolled in graduate conducting programs.

Fall and spring, 3-6 credits each semester

MUS 554 Advanced Choral Conducting B
Advanced training in preparing and conducting choral works. Not open to students enrolled in the graduate conducting programs.

Fall and spring, 3 credits each semester

MUS 555 Graduate Orchestra
Study and performance of orchestral works from the baroque period to the present. Weekly readings of important works from the standard repertory.

Fall and spring, 1-2 credits, variable

MUS 556 Camerata Singers
Study and performance of choral works for chamber chorus from all periods of music history. May be repeated.

Fall and spring, 1 credit each semester

MUS 557 Master Class in Orchestral Repertory
Study of orchestral parts for sections (brass, strings, woodwinds) or for individual instruments. The course will emphasize overall ensemble skills and audition preparation. Different sections directed toward specific groups. See the course listing for offerings in any particular semester.

2 credits

MUS 559 Performance Problems in 20th-Century Music
A study of performance skills required in new music with emphasis on polyrhythms, compositional techniques in control of tone color and dynamics, and the understanding of new methods of notation. Exercises and the study of selected 20th-century works.

Fall, 2 credits

MUS 570 20th-Century Conducted Ensemble
Works to be studied will range from five to 15 players. Representative composers would be Boulez, Carter, Stockhausen, Stravinsky, Varése, and Webern. Performance of the works will be a normal part of the course. Instrumental students will be conducted by the instructor for one and one-half hours per week, and by the student conductors for one hour per week. Conducting students will meet with the instructor alone for one and one-half hours per week; besides working with instrumentalists, the instructor will observe the sessions conducted by the instructor. Enrollment of conducting students will be limited to three.

Prerequisite: MUS 569 or the equivalent

Spring, 3 credits for conducting students, 2 credits for instrumentalists

MUS 571 Advanced Instruction in Instrument or Voice
Individual guidance in technique and repertory with 30 practice hours required each week. Each student is required to perform at least one solo piece per semester, unless excused by the instructor in a written note to the department's graduate studies committee.

Fall and spring, 2-6 credits each semester

MUS 573 Chamber Music
Chamber ensembles such as the string quartet, wind quintet, solo vocal ensemble, two-piano team, and other special groups meet each under the direction of a member of the performance faculty, for the study of works from the repertories of the respective groups, with particular attention given to the music of the 20th century.

Required: presence at a weekly coaching session, at least three hours per week of uncoached rehearsal, and at least one performance per semester.

Fall and spring, 2 credits

MUS 574 Master Class in Chamber Music
Advanced study of the repertories for various chamber ensembles. Each student will be limited to three ensembles, to be chosen by the instructor of the section prior to the beginning of the semester. Enrollment by groups only.

2 credits

MUS 575 Master Class in Solo Repertory for Instrument or Voice
Performance techniques and problems in works for instrument or voice, drawn from all historical periods. The instructor will be a teacher of the specific instrument in each case, except that his/her section may be open to students of certain other instruments with his/her permission. Not offered each semester in every instrument.

Fall and spring, 2 credits each semester

MUS 577 Master Class in Performance Pedagogy
Guidance and supervision in the teaching of an instrument or voice.

2 credits

MUS 579 Opera Workshop
Study and performance of scenes or complete operas from the standard and 20th-century repertories. An interdisciplinary approach involving the Departments of Music and Theatre Arts.

Fall and spring, 2 credits, variable

MUS 581 20th-Century Repertory for Instrument or Voice
A study of the solo works of the 20th century, with emphasis on performance techniques and problems. The instructor will be a teacher of the specific instrument in each case, except that his/her section may be open to students of certain other instruments with his/her permission. Not offered each semester in every instrument.

Fall and spring, 2 credits each semester

MUS 583 Continuo Realization
Practical and theoretical instruction in figured bass realization, based on the study of vocal and instrumental scores from 1600-1750. Required of students in harpsichord. Open, with consent of the instructor, to other qualified students who have some knowledge of figured bass realization.

2 credits

MUS 585 Renaissance and Baroque Brass Performance Practice
Study and survey of original and transcribed Renaissance works, and of various baroque works, for brasses. Investigation of styles and techniques of Renaissance ornamentation using Canteloube's Petrangele (1563) as text. Investigation of baroque ornamentation styles and symbols.

Fall, 2 credits

MUS 591 Practicum in Teaching
Instruction in the conduct of one class under the supervision of the faculty. (MUS 591 may not be included in the courses taken in fulfillment of degree requirements.)

Fall and spring, 1-3 credits each semester

MUS 592 Seminar on the Teaching of Music
Discussion of fundamental problems in teaching music. Topics may include the explanation of musical processes, communication to non-professionals, assimilation of aspects of performance, theory, history, or analysis with one another. Required of all students who teach one of the introductory undergraduate courses in music theory, or who teach music education courses.

Fall, 1 credit

MUS 595 Chamber Players
The Graduate String Quartet, the Graduate Brass Quintet, the Graduate Wind Quintet and the Graduate Piano Trio, specially appointed groups, work under the direction of a member of the performance faculty and present concerts and workshops at the university and elsewhere.

Fall and spring, 3 credits each semester

MUS 599 Independent Study
Individual study under the guidance of a faculty member. Each student must submit to the graduate studies committee of the department a written prospectus of the work he/she intends to pursue, with the amount of credit proposed, together with the written endorsement of the prospective instructor. Approval of the graduate studies committee is required; hence this material should be submitted as soon as possible, and in any case within the first two weeks of the semester (or the first week of a summer session). Fall and spring, variable credit

MUS 602 Music and Other Disciplines
An interdisciplinary seminar which will be offered from time to time with members of other graduate departments, on topics to vary from semester to semester.

3 credits

MUS 611 Workshop in Composition and Performance
Student composers and student performers will be under the joint supervision of the composition faculty and a member of the performance faculty. The composer will submit viable examples to be performed and discussed in class that confront specified problems in performance and composition. The course can be repeated once for credit toward the degree.

Spring, 3 credits

MUS 615 Seminar in Electronic Music Composition
Individual compositions, of substantial proportions, in electronic or concrete music media. The course may be repeated once for credit.

Fall and spring, 1-12 credits each semester, variable

MUS 623 Directed Study in Conducting
Intended for doctoral students in conducting.

Fall and spring, 1-12 credits each semester, variable

MUS 661 Directed Study in Conducting
Intended for doctoral students in conducting.

Fall and spring, 1-12 credits each semester, variable

MUS 671 Directed Study in Instrumental and Vocal Performance
Intended for doctoral students in instrumental and vocal performance.

Fall and spring, 1-12 credits each semester, variable

MUS 696 Doctoral Colloquium
Students are required to enroll in MUS 696 in a semester prior to the one in which the Ph.D. or D.M.A. degree is to be awarded. The colloquium is required for all doctoral candidates in composition. Each student must enroll in the colloquium (or the first week of a summer session).

Fall and spring, 1 credit

MUS 697 Directed Reading
Intended for preparation for the preliminary examination.

Fall and spring, 1-12 credits each semester, variable

MUS 698 Directed Dissertation Research
Intended for work for the dissertation. Fall and spring, 1-12 credits each semester, variable
# Philosophy (PHI)

Chairperson: Donn Welton
Harriman Hall 209 (516) 632-7590

Doctoral Program Director: Mary C. Rawlinson
Harriman Hall 217 (516) 632-7580

Master's Program Director: Marshall Spector
Harriman Hall 219 (516) 632-7580

## Degree Requirements

### Requirements for the M.A. Degree, Graduate Studies in Philosophical Perspectives (MA/PP)

In addition to the minimum Graduate School requirements, the following are required:

**A. Formal Course Requirements**

A student preparing for the degree of Master of Arts in Philosophy with Graduate Studies in Philosophical Perspectives is required to take a total of 10 courses amounting to 30 graduate credit hours, as listed below:

1. Two three-credit courses (PHI 510-511), Resources in the History of Philosophy
2. Two three-credit courses (PHI 515-516), Resources in Contemporary Philosophy
3. One three-credit course (PHI 518-519) in the detailed examination of the work of a single philosopher
4. Five three-credit courses in the MA/PP offerings.

These distribution requirements may be applied with some flexibility to meet the needs of individual students, with the approval of the director of the program.

Reading knowledge of a foreign language, while desirable, is neither required nor presumed.

**B. The M.A. Essay**

The essay is a research paper in which the student exhibits an ability to locate, comprehend, and articulate a concept or theme that bears upon one or another contemporary problem. The paper is usually begun under the direction of the instructor in one of the MA/PP offerings and will eventually be presented to that instructor and one other faculty member upon completion.

Other options in satisfying this degree requirement are available to students, upon approval by the MA/PP program committee.

**1. The M.A. Practicum**

The Practicum is for those students who are teaching in high school and who can obtain permission to introduce a philosophy course into the curriculum, under the direction of a faculty member in the Department of Philosophy. The student will be required to present course plans, bibliographies and other evidence of his/her academic readiness prior to the teaching of the course, to the faculty advisor and to the MA/PP program committee for their approval. During the course the construction and grading of exams and papers will be supervised and several classes will be visited. Overall evaluation will take place at the conclusion of the course and upon submission of a report written by the student.

**2. Fieldwork**

A student, with the direction of two faculty members (as advisors), chooses a problem related to the perspectives on moral and ethical issues or public issues and perspectives that he/she wishes to investigate by going into the community (e.g., hospitals, government agencies, schools, etc.). A written plan of the project will be submitted for review and approval by the advisors and the MA/PP program committee. Overall evaluation will take place at the conclusion of the study and upon submission of a written report by the student.

**C. Performance**

An average grade of B is the minimum, but no more than six credits of Cs will be permitted to count for credit toward the degree. Any student who accumulates 12 credits of C grades will be dropped from the program.

**D. Transfer Credits**

A maximum of six hours of post-baccalaureate credit in philosophy from other institutions may be transferred toward the M.A. in Philosophy (Philosophical Perspectives). The transference of credit will not be automatic, but will depend upon the suitability of the courses to the goals of MA/PP and upon the grades received in the courses. A maximum of six credits of CED courses in philosophy earned in Stony Brook's MA/LS program are transferrable, subject only to the performance and distribution regulations mentioned above.

## Requirements for the Ph.D. Degree in Philosophy

The doctoral program is designed to be completed in four years of full-time work. The Graduate School regulations prescribe a minimum of two semesters of full-time enrollment. In addition to the minimum degree requirements of the Graduate School, the following are required:

**A. Seminars**

1. Two seminars in the history of philosophy from among courses concentrating on the thought of an individual thinker (Plato, Aristotle, Kant), of a period (19th-century thought), or an identifiable movement (rationalists or empiricists).
2. Two seminars on problems or areas: one from each of the following groups:
   - **Group A:**
     - PHI 630 Philosophy of Science and Logic
     - PHI 631 Metaphysics
     - PHI 632 Epistemology
     - PHI 633 Philosophy of Mind
   - **Group B:**
     - PHI 634 Ethics
     - PHI 635 Social and Political Philosophy
     - PHI 637 Aesthetics and Rhetoric
3. Three style seminars, one in each of the three contemporary modes of philosophizing: analytic, continental, and systematic. These seminars (PHI 650, 651, and 652) will explore the methods, presuppositions, and operational modes of the style involved. Advanced style seminars and an interstyle seminar will be offered regularly, one of which is strongly recommended.

4. Two interface seminars in interdisciplinary areas between philosophy and another discipline: natural science, social science, humanities. These seminars are usually taught by philosophy faculty members knowledgeable about fields outside philosophy along with faculty members from the relevant disciplines.

5. A practicum in the teaching of philosophy. Supervised Teaching, along with additional teaching experience in the undergraduate program.

6. Two additional elected seminars. Note: An overall average grade of B or better is required, with no more than six credits of C counting toward the degree.

**B. General**

1. To pass an exam in the History of Philosophy by the end of the second year;
2. To have accepted a philosophical style essay;
3. To have accepted an interface essay. The graduate studies director will guide students in planning their program of studies.

**C. Ph.D. Candidacy**

Official Ph.D. candidacy is attained when, in addition to the requirements listed above, a student fulfills the following competency requirements:

1. Competence in symbolic logic. This means sufficient knowledge of concepts and notations of first-order logic for understanding and applying to problems in philosophy. A grade of B or better in an undergraduate symbolic logic course is normally adequate evidence of competence.
2. Competence in a foreign language. This is shown by translating a previously untranslated philosophical article (or the equivalent) or by writing a research paper including a translation of substantial philosophical passages.
3. Competence to undertake dissertation project. This is shown by (a) a paper (10-15 pages) outlining projected study, expected findings, and relevant arguments and evidence (e.g., bibliography), and (b) a development of the projected study before a faculty examining committee.

Upon the recommendation of the graduate faculty that the dissertation project be initiated, the student becomes a candidate for the Ph.D.

**D. Dissertation**

After advancement to candidacy, the student will concentrate on a dissertation (the written results of specialized study and research) under the supervision of a dissertation committee. After the dissertation is completed, it is read by a committee of four members, consisting of the director, two other members of the philosophy faculty, and one faculty member from outside the department who has specialized in related areas. Before final approval can be granted, the student must present the results of the dissertation research at an oral examination convened for that purpose by the department and open to interested faculty members and graduate students. If the dissertation defense is successful, the candidate is recommended to the university for the Doctor of Philosophy degree.

**M.A. Degree Requirement**

Doctoral students may be awarded an M.A. degree upon completion of items 1 through 4 of the Ph.D. seminar requirement, plus one additional elected seminar (for a total of 30 graduate credits of graded coursework), and two of the three projects listed above, Section B, as general requirements. (This M.A. degree is quite distinct from the Master of Arts, Graduate Studies in Philosophical Perspectives described above.)

**Courses**

Detailed course descriptions for both the master's and doctoral programs are available from the Philosophy Department Office each semester.

**MASTER'S PROGRAM IN PHILOSOPHICAL PERSPECTIVES**

All courses are for 3 credits unless otherwise noted.

PHI 510, 511 Resources in the History of Philosophy I, II
PHI 515, 516 Resources in Contemporary Philosophy I, II
PHI 518, 519 Individual Thinkers in the History of Philosophy

**I. Moral and Ethical Perspectives**

PHI 521 Contemporary Moral Issues
PHI 522 Ethical Issues
PHI 523 Moral Theories of the Modern World
PHI 524 Guilt and Responsibility

**II. Public Issues and Perspectives**

PHI 532 Freedom, Consent, and Values

**PHI 533 Community**

**PHI 534 Philosophy of Law**

**PHI 535 Political Philosophy**

**PHI 536 Marxism and Communism**

**PHI 537 Philosophy of Technology**

**PHI 538 Philosophy of Medicine**

**PHI 539 Perspectives on Feminism**

**PHI 540 Perspectives on the Environment**

**III. Perspectives on Individual Self and Human Development**

**PHI 551 Life Histories**

**PHI 552 Parents and Children**

**PHI 553 Philosophy of Education**

**PHI 554 Perspectives on Death and Dying**

**IV. Perspectives on Inquiry, Method, and the Sciences**

**PHI 561 Structure of Inquiry**

**PHI 562 Logic**

**PHI 563 Philosophy of Language**

**PHI 564 Perspectives on Communication**

**V. Perspectives on Philosophic Traditions and Historical Themes**

**PHI 571 American Philosophy**

**PHI 572 Oriental Philosophy**

**PHI 573 Philosophies of History**

**PHI 574 Myth**

**PHI 575 Philosophy of Religion**

**VI. Perspectives on Art**

**PHI 581 Philosophy of Literature**

**PHI 582 Philosophy of Art**

**PHI 590, 591 Directed Readings Variable credit**

**PHI 595, 596 Directed Research Variable credit**

Ordinarily, students working on their master's essay will register for this course.

**DOCTORAL PROGRAM IN PHILOSOPHY**

All courses are for 3 credits unless otherwise noted.

**I. Area Courses**

**PHI 600 Ancient Philosophy**

**PHI 601 Medieval Philosophy**

**PHI 602 Modern Philosophy**

**PHI 630 Philosophy of Science and Logic**

**PHI 631 Metaphysics and Systematic Philosophy**

**PHI 632 Epistemology**

**PHI 633 Philosophy of Mind**

**PHI 634 Ethics**

**PHI 635 Social and Political Philosophy**

**PHI 637 Aesthetics and Rhetoric**

**PHI 638 Oriental Philosophy**
II. Proseminars
PHI 650 Analytic Philosophies
PHI 651 Phenomenological-Existential Philosophies
PHI 652 Contemporary Systematic Philosophies

III. Style Seminars
PHI 660 Style Seminar: Analysis
PHI 661 Style Seminar: Phenomenology and Existentialism
PHI 662 Style Seminar: Systematic Philosophies

IV. Interdisciplinary Seminars
PHI 610 Interface Seminar: Philosophy—Natural Science
PHI 611 Interface Seminar: Philosophy—Social Science
PHI 612 Interface Seminar: Philosophy—Humanities

V. Independent and Directed Studies
PHI 620 Advanced Problems in Philosophy
Variable and repetitive credit
PHI 621 Independent Study
Variable and repetitive credit
PHI 622 Supervised Teaching
3 credits, repetitive
PHI 690 Dissertation
Variable and repetitive credit
Theatre Arts (THR, DRM)

Chairperson: Farley Richmond
Fine Arts Center 3046 (516) 632-7300

Degree Requirements

Requirements for the M.A. Degree in Theatre Arts

In addition to the minimum Graduate School requirements, the following are required:

A. Courses
Course requirements will be determined by a committee of faculty in consultation with the candidate. A minimum of 72 credits is required for graduation.

B. Examination
A final general examination assaying the student’s knowledge.

C. Foreign Language
Proficiency in a foreign language must be demonstrated by examination.

D. Teaching Experience
Teaching for at least one semester at the university level is required of all graduate students.

E. Master’s Thesis
The master’s thesis must be successfully completed under the direction of a faculty advisor.

F. Residency Requirement
This program is normally completed in one to two years of full-time residency. Students may be enrolled in the M.A. program on a full-time or part-time basis.

G. Time Limitation
Depending on the student’s first-time, matriculated enrollment in the Graduate School, full-time students must complete all degree requirements within three years, part-time students in five years.

Requirements for the M.F.A. Degree in Dramaturgy

In addition to the minimum Graduate School requirements, the following are required:

A. Courses
Course requirements will be determined by a committee of faculty in consultation with the candidate. A minimum of 72 credits is required for graduation.

B. Examination
A general examination assaying the student’s knowledge must be passed at the end of the first year of residency.

C. Projects
Projects in dramaturgy are required in all three years of study.

D. Foreign Language
Proficiency in a foreign language must be demonstrated by examination.

E. Teaching Experience
Teaching for at least one semester at the university level is required of all graduate students.

F. Residence Requirement
This program is normally completed in three years of full-time residency. Normally, the last semester is spent in a professional internship program.

G. Time Limitation
The M.F.A. program is normally completed in three years. The time limit for completion of the M.F.A. program, given unusual circumstances, is six years.

Courses

THR 500 Introduction to Graduate Studies
An introduction to the methodology of research and bibliography.
Prerequisite: Permission of the instructor
Fall, 2 credits

THR 501 Studies in Theatre History
An intensive study of selected periods chosen so that they raise a variety of issues and focus on a range of countries and centuries (e.g., 17th-century France, 18th-century England, early 20th-century Russia) to supplement rather than repeat areas of study already undertaken by the student. Emphasis will be on production and performance.
Prerequisite: Permission of the instructor
Fall or spring, 3 credits

THR 502 The History, Theory, and Practice of Acting
An examination of the principles of acting, with special attention to its history and the work of leading actors and theorists. Seminar work is supplemented by a practicum, where students are engaged in various aspects of the craft. Students will observe the work of skilled professional actors in rehearsals, workshops, and performances.
Prerequisite: Permission of the instructor
Fall, 3 credits

THR 503 Studies in Dramatic Literature: Theory, Criticism, and History
Major dramatic texts will be chosen for detailed study with emphasis on the playwright’s style and on the playwright’s relation to the dramatic tradition and to the public. These major texts will then be considered in the light of a range of approaches to theatre criticism to illuminate their place in their own time, in our time, and in a historical context.
Prerequisite: Permission of the instructor
Spring, 3 credits

THR 504 Playwriting: Tradition and Practice
A seminar devoted to a study of the tradition and practice of playwriting. The dynamics of dramatic construction — including narrative argument, formal structure, dialogue, and documentary and fictional source material — will be explored. The presentation of students’ own plays in readings and workshop productions will enable them to study drama as a dynamic art rather than as one that exists only on paper.
Prerequisite: Permission of the instructor
Spring, 3 credits

THR 505 The Organization and Development of Contemporary Theatre
A study of contemporary theatre and drama in the U.S. and abroad with special reference to methods of production, styles of performance, and varieties of produced works. The aim of this course is to illustrate the range of theatre and dramatic form — from off-off-Broadway to fringe theatre to regional theatre to the West End — viable today.
Prerequisite: Permission of the instructor
Spring, 3 credits

THR 507 Introduction to Dramaturgy
A historical orientation to the theory and practice of dramaturgy in Europe and the United States.
Prerequisite: Permission of the instructor
Fall, 3 credits

THR 508 Design/Tech: Theory and Practice
Study in the development and execution of the visual presentation of professional theatre. The student’s time is divided between an in-depth analysis of the design and technical process in a seminar setting and the experience of working with theatre professionals developing practical skills.
Prerequisites: Permission of the instructor
Summer, spring, 3 credits

THR 509 Alternative Theatre in New York
A workshop-seminar on contemporary American alternative performance forms beyond mainstream theatre. Emphasis on the development
of critical perspectives, and the writing skills to articulate them, through seminar discussions and practical writing workshops relevant to performances seen on field trips to New York City. The course includes not only avant-garde venues like The Kitchen, P.S. 122, Dance Theatre Workshop, and La Mama, but also popular entertainments such as street fairs and parades.

Prerequisite: Permission of the instructor
Fall or spring, 3 credits

THR 510 Mainstream Theatre in New York
A workshop seminar on mainstream American theatre. Emphasis will be placed on the trends prevalent in mainstream theatre. How cinema has influenced the play form in the latter half of the 20th century, and the drawbacks and the virtues of this influence. The study of the criticism of mainstream theatre through study of the criticism in newspapers and periodicals, as well as the honing of the student's skills in criticism of the various arts that comprise a theatre event, relevant to performances seen on field trips to New York City.

Prerequisite: Permission of the instructor
Fall or spring, 3 credits

THR 520 Dramaturgy: Script Preparation
A practical and theoretical approach to the contributions of the dramaturg. This course includes both a seminar and a practicum where work on actual on-campus productions will take place.

Prerequisite: Permission of the instructor
Fall, spring, or summer, 3 credits

THR 521 Lighting and Sound Design and Control
A practical introduction to the tradition and craft of lighting and sound design. The course has both a seminar component and a practicum where work on actual campus productions will take place.

Prerequisite: Permission of the instructor
Fall, spring, or summer, 3 credits

THR 522 Costumes, Manners, and Properties: Tradition and Style
An examination of costume design and stage properties in the context of theatre history and contemporary methods. Techniques to be considered include masks, disguises, and transformations. Theoretical approaches studied will be tested.

Prerequisite: Permission of the instructor
Fall, spring, or summer, 3 credits

THR 540 Topics in Literature for the Stage
Topics may include an examination of various genres, styles, and moods, focusing on staging, including drama, poetry, narrative, and collage.

Prerequisite: Permission of the instructor
Fall or spring, 3 credits

THR 550 Teaching Seminar
Supervised student teaching of undergraduate courses accompanied by a seminar in methods and strategies of teaching theatre arts at the university level. May be repeated for a total of 3 credits.

Prerequisite: Admission to the M.A. or M.F.A. program
Fall or spring, 1 credit

THR 551 Practicum in Acting
Independent supervised tutorial with practical work. Requirements include the submission of final report and reading list. Students applying for these practica must submit a study plan in advance.

Prerequisite: Permission of the instructor
Fall, spring, or summer, 3 credits

THR 552 Practicum in Directing
Independent supervised tutorial with practical work. Requirements include the submission of final report and reading list. Students applying for these practica must submit a study plan in advance.

Prerequisite: Permission of the instructor
Fall, spring, or summer, 3 credits

THR 553 Practicum in Stage Design
Independent supervised tutorial with practical work. Requirements include the submission of final report and reading list. Students applying for these practica must submit a study plan in advance.

Prerequisite: Permission of the instructor
Fall, spring, or summer, 3 credits

THR 554 Practicum in Lighting and Sound Design
Independent supervised tutorial with practical work. Requirements include the submission of final report and reading list. Students applying for these practica must submit a study plan in advance.

Prerequisite: Permission of the instructor
Fall, spring, or summer, 3 credits

THR 555 Practicum in Playwriting or Adaptation
Independent supervised tutorial with, optimally, a finished script at the end. Students applying for these practica must submit a study plan in advance. Requirements include the submission of final report and reading list.

Prerequisite: Permission of the instructor
Fall, spring, or summer, 3 credits

THR 556 Practicum in Dramatic Criticism
Independent supervised tutorial with practical work. Requirements include the submission of final report and reading list. Students applying for these practica must submit a study plan in advance.

Prerequisite: Permission of the instructor
Fall, spring, or summer, 3 credits

THR 557 Practicum in Theatre Technology
Independent supervised tutorial with practical work. Requirements include the submission of final report and reading list. Students applying for these practica must submit a study plan in advance.

Prerequisite: Permission of the instructor
Fall, spring, or summer, 3 credits

THR 558 Practicum in Children's Theatre
Independent supervised tutorial with practical work. Requirements include the submission of final report and reading list. Students applying for these practica must submit a study plan in advance.

Prerequisite: Permission of the instructor
Fall, spring, or summer, 3 credits

THR 559 Practicum in Producing
Independent supervised tutorial with practical work. Requirements include the submission of final report and reading list. Students applying for these practica must submit a study plan in advance.

Prerequisite: Permission of the instructor
Fall, spring, or summer, 3 credits

THR 580 Production Seminar
An approach to methods and techniques of directing. Seminar will include collaboration between directors and actors in realizing a script.

Prerequisite: Admission to the second year of the M.F.A. program or permission of the instructor
Fall, 3 credits

THR 581 Directing
An approach to methods and techniques of directing. Seminar will include collaboration between directors and actors in realizing a script.

Prerequisite: Admission to the second year of the M.F.A. program or permission of the instructor
Fall, 3 credits

THR 582 Translations and Adaptations
The course combines studies of existing versions of texts and experiments toward new translations and adaptations. As students learn how to criticize various versions of a single script, they move toward a theory of translation and toward an ability to hold an entire play in their imagination, as does a playwright, during the scripting process.

Prerequisite: Admission to the second year of the M.F.A. program or permission of the instructor
Fall, 3 credits

THR 583 Theatre Architecture and Design
Students will examine the structure, orientation, and major functions of a range of different kinds of theatre buildings and sets, large-scale and small, ancient and modern. Among the topics covered are key artists in the tradition, the physical buildings, auditoria, and the influence of backstage facilities on onstage presentations.

Prerequisite: Admission to the second year of the M.F.A. program or permission of the instructor
Fall, 3 credits

THR 584 Concept and Execution
For each of several major works examined, study focuses on a different aspect of production: casting, design, programming, stage management, directing, producing, technology. The students devise a production plan, organize major productions, and submit a written critical evaluation of the envisioned productions: a producer's report.

Prerequisite: Admission to the second year of the M.F.A. program or permission of the instructor
Spring, 3 credits

THR 585 Practicum in Stage Management
Independent supervised tutorial with practical work. Requirements include the submission of final report and reading list. Students applying for these practica must submit a study plan in advance.

Prerequisite: Permission of the instructor
Fall, spring, or summer, 3 credits

THR 586 Practicum in Costume Design
Independent supervised tutorial with practical work. Requirements include the submission of final report and reading list. Students applying for these practica must submit a study plan in advance.

Prerequisite: Permission of the instructor
Fall, spring, or summer, 3 credits

THR 587 Practicum in Lighting and Sound Design
Independent supervised tutorial with practical work. Requirements include the submission of final report and reading list. Students applying for these practica must submit a study plan in advance.

Prerequisite: Permission of the instructor
Fall, spring, or summer, 3 credits

THR 588 Practicum in Film and Television
Independent supervised tutorial with practical work. Requirements include the submission of final report and reading list. Students applying for these practica must submit a study plan in advance.

Prerequisite: Permission of the instructor
Fall, spring, or summer, 3 credits

THR 589 Independent Study
Under the direction of a faculty advisor, the student pursues an area of special interest, either with directed readings or independent study, subject to the approval of the graduate committee.

Fall, spring, or summer, variable and repetitive credit

THR 600 Theatre History II
This is a continuation of THR 501 focusing on another period.

Prerequisite: Admission to the second year of the M.F.A. program or permission of the instructor
Fall, 3 credits

THR 601 Directing
An approach to methods and techniques of directing. Seminar will include collaboration between directors and actors in realizing a script.

Prerequisite: Admission to the second year of the M.F.A. program or permission of the instructor
Fall, 3 credits

THR 602 Translations and Adaptations
The course combines studies of existing versions of texts and experiments toward new translations and adaptations. As students learn how to criticize various versions of a single script, they move toward a theory of translation and toward an ability to hold an entire play in their imagination, as does a playwright, during the scripting process.

Prerequisite: Admission to the second year of the M.F.A. program or permission of the instructor
Fall, 3 credits

THR 603 Theatre Architecture and Design
Students will examine the structure, orientation, and major functions of a range of different kinds of theatre buildings and sets, large-scale and small, ancient and modern. Among the topics covered are key artists in the tradition, the physical buildings, auditoria, and the influence of backstage facilities on onstage presentations.

Prerequisite: Admission to the second year of the M.F.A. program or permission of the instructor
Fall, 3 credits

THR 604 Concept and Execution
For each of several major works examined, study focuses on a different aspect of production: casting, design, programming, stage management, directing, producing, technology. The students devise a production plan, organize major productions, and submit a written critical evaluation of the envisioned productions: a producer's report.

Prerequisite: Admission to the second year of the M.F.A. program or permission of the instructor
Spring, 3 credits

THR 620 Music and Theatre
Students explore the importance of music to theatrical presentations of different periods and kinds. Topics may include masques, the supporting role of music in classical theatre, the use of music for theatrical effect, music in the interval, opera, and musical comedy.

Prerequisite: Admission to the second year of the M.F.A. program or permission of the instructor
Fall, 3 credits

THR 622 Finance, Audience Development, and Management
A study of the ways and means of producing and financing theatre and developing an audience. Various theatre organizations will be studied as models.

Prerequisite: Admission to the second year of the M.F.A. program or permission of the instructor
Spring, 3 credits
THR 650 The Profession of the Dramatist
The work of playwrights from different periods will be examined in terms of critical theory, structure, and theatrical practice. For example, the works of Aeschylus, Moliere, and Shaw would be compared from a theatrical perspective. 
Prerequisite: Admission to the third year of the M.F.A. program or permission of the instructor
Fall, 3 credits

THR 651 Shakespeare’s Theatre
Advanced study of the Elizabethan theatre and Shakespeare’s plays then and now. In addition to a critical reading of texts and criticism, the course will consider how Shakespeare’s plays echo the concerns of various periods in which they have been produced. A special emphasis will be placed on actors’ choices in the text. 
Prerequisite: Admission to the third year of the M.F.A. program or permission of the instructor
Fall, 3 credits

THR 652 Theatre and the Media
A study of the electronic media and their present and potential relationship to the theatre. Special attention will be given to the methods of adapting stage work for other media. Both research in theory and practical work in adaptation will be required. 
Prerequisite: Admission to the third year of the M.F.A. program or permission of the instructor
Fall, 3 credits

THR 653 Dramaturg’s Practicum
Advanced students in the program will function as dramaturgs for campus productions. Their functions will include work with the director, research, programs, questions of casting, post-performance discussions, and possibly translation or adaptation of texts. 
Prerequisite: Successful completion of the first two years of M.F.A. coursework or permission of the instructor
Fall, spring, or summer, 3 credits

THR 654 Professional Internship
The M.F.A. third-year internship is normally either (1) as a dramaturg with a professional theatre in the U.S. or abroad or (2) as a critic with a performing arts publication. The internship includes a critical journal that records, analyzes, and evaluates the work on production or criticism done during the internship. Internship proposals must include a detailed study project with an on-site supervisor and a campus mentor, and must be approved by the graduate committee. 
Prerequisites: Successful completion of all coursework leading to the M.F.A. and permission of the graduate studies director
Spring, 6 credits
Division of Physical Sciences and Mathematics

Dean Ronald Douglas
Library 2340
(516) 632-6993

The Departments of Chemistry, Earth and Space Sciences, Physics, and Mathematics constitute the Division of Physical Sciences and Mathematics. With a faculty of about 140, full-time graduate students numbering 400, postdoctoral research associates numbering about 60, numerous scientific visitors, and external research fund expenditures of more than thirteen million dollars per year, the Division has a wide range of vigorous research programs. In addition to the formal course offerings described in the following departmental sections, a multitude of seminars and talks are given by distinguished visitors. Detailed information about special research programs and facilities is provided in the following sections.
Degree Requirements

Requirements for the M.S. Degree in Chemistry

A. Successful completion of an approved course of study comprising at least 30 credits of graduate coursework.

B. Successful completion of the CHE 532 seminar and six courses made up from any of the following groups: CHE 501 through 530, 557 through 589, 601 through 604, 623 through 683, and approved courses from other departments or from the CED program.

C. Successful completion of the CHE 590 term paper or research, thesis, and thesis defense.

Requirements for the Ph.D. Degree in Chemistry

A. Courses

Successful completion of an approved course of study comprising at least six formal graduate courses of which four are selected from CHE 501 through 530, in addition to CHE 534, 532, and two semesters of CHE 610, CHE 611, or the equivalent is required. Continuation in the Ph.D. program is based, in part, on achievement in four 500-level chemistry courses to be taken during the student's first year. In consultation with faculty advisors each student selects a course of study to acquire a good background for research in the area of chemistry chosen.

B. Language

Reading proficiency in German, French or Russian is required.

C. Advancement-to-Candidacy (Preliminary) Examination

A student is advanced to candidacy for the Ph.D. degree when all degree requirements except the dissertation have been completed. A special committee is designated for each student to aid in progress toward this step. The committee is charged with advising the student and administering the advancement-to-candidacy (preliminary) examination.

D. Presentation of a Department Seminar

E. Research, Dissertation, Dissertation Defense, and Departmental Colloquium

Each student selects a research advisor from among the faculty members at some time after the middle of the first semester and usually before the middle of the second semester. The research advisor also serves on the advancement-to-candidacy committee.

Specific inquiries from prospective graduate students regarding research opportunities are welcomed and should be addressed to the chairperson. The Graduate Programs in Chemistry brochure states in some detail the varied research interests of the chemistry faculty and is available from the department.

F. Residence

A one-year residence is required.

Requirements for the Ph.D. Degree, Concentration in Chemical Physics

A field of concentration in chemical physics is provided for students whose interests lie in both chemistry and physics. A graduate student who is admitted to either the chemistry or physics department may elect this course of study with the consent of the department chairperson. A chemistry student who is admitted to the chemistry or physics department may elect this course of study with the consent of the department chairperson. A chemistry student chooses the course of study to obtain more extensive training in physics than is normally required by chemistry departments. A physics student who is admitted to the chemistry or physics department may elect this course of study with the consent of the department chairperson. A physics student chooses the course of study to obtain more extensive training in physics than is normally required by chemistry departments. A physics student who is admitted to the chemistry or physics department may elect this course of study with the consent of the department chairperson.

A prerequisite for the Chemical Physics program is undergraduate training in classical mechanics and electromagnetic theory at or above the level of PHY 301 (Electromagnetic Theory) and PHY 303 (Mechanics). Students in the Chemical Physics program must take these courses unless they receive waivers from the graduate advisement committee.

B. Advancement-to-Candidacy (Preliminary) Examination

In some cases a hybrid of the chemistry and physics requirements may be used.

Requirements for the Ph.D. Degree, Concentration in Chemical Biology

The field of concentration in chemical biology is a course option for students whose interests lie in both chemistry and biology. A graduate student who is admitted to the Chemistry Department or another appropriate department may elect this field of concentration with the consent of the chairperson. The course of study can provide more extensive training in biology than
CHE 511 Structural Inorganic Chemistry
Properties and reactions of inorganic compounds are considered from the viewpoints of molecular and electronic structure. The modern bonding theories used in inorganic chemistry, including molecular orbital, valence bond, and ligand field theories, are developed using symmetry and group theory. Selected main group, transition metal, and organometallic compounds are discussed. An introduction to crystallography and solid-state structure will be included. Fall, 3 credits

CHE 514 Transition Metal Chemistry
A survey course with an emphasis on the transition metals. Reaction mechanisms, synthesis, and structure will be covered. Specific areas of concern will include coordination chemistry, organometallic chemistry, bioinorganic chemistry, and selected topics from solid state and non-transition metal chemistry. Spring, 3 credits

CHE 515 Advanced Inorganic Chemistry
A topical course with an emphasis on the current literature. Subject matter will vary and will be announced in advance. Possible subjects include reaction mechanisms, organometallic chemistry, bioinorganic chemistry, and physical inorganic chemistry. May be repeated as the subject matter varies. Spring, 3 credits

CHE 521 Quantum Chemistry I
Quantum theoretical concepts are discussed. Schrödinger wave mechanics and related mathematical techniques are illustrated by treatment of systems of chemical interest. Designed to form the theoretical basis for the study of chemical bonding, molecular structure, spectroscopy, and molecular collision phenomena. Fall, 3 credits

CHE 522 Quantum Chemistry II
Problems in time-dependent quantum mechanics with the derivation of both approximate and exact solutions. The elements of group theory with applications to atomic, molecular, and solid-state systems. Spring, 3 credits

CHE 523 Chemical Thermodynamics
A rigorous development of the fundamentals of thermodynamics and its application to a number of systems of chemical interest. These systems include electrochemical cells, gases, homogeneous, and heterogeneous equilibrium systems. An introduction to statistical mechanics will also be included. Fall, 3 credits

CHE 524 Magnetic Resonance
This course provides an introduction to fundamental quantum mechanics of the magnetism of spin-1/2 (and higher) particles. It includes a study of the Bloch equations (the responses of the magnetism to continuous wave and pulsed irradiation) and a discussion of the experimental hardware and techniques commonly employed. Topics covered will include the basics of the spin Hamiltonian (chemical shifts, J, dipolar, and quadrupolar couplings), dynamics and relaxation 1D spectroscopy, spin and chemical exchange, lineshapes, spin echo, etc.), 2D spectroscopy (homonuclear and heteronuclear correlation), techniques for studies of solids and liquid crystals (magic angle spinning, cross polarization, nuclear Overhauser effect, magic angle spinning spectra), and the thermodynamics and kinetics of interaction with small molecules and ions. Theory of conformation changes and phases transitions. Spring, 3 credits

CHE 525 Theoretical Chemistry
This course stresses the physical theory underlying chemical phenomena. Special emphasis is given to advanced topics in electronic structure theory, molecular dynamics, condensed matter and surfaces, many-body and quantum ensemble theory, and the interaction of light and molecules. Prerequisite: CHE 521

CHE 526 Chemical Kinetics
An intensive study of rates of chemical reactions and in particular the relationship of kinetic studies to the determination of reaction mechanisms. Experimental methods will be discussed with emphasis on the use of certain techniques. The theoretical treatment will include discussions of the kinetic theory and the transition-state theory approaches to chemical kinetics. 3 credits

CHE 527 Chemical Dynamics
Experimental and theoretical aspects of reaction dynamics. Emphasis on the link between experimental observations and reaction mechanisms. Topics will include kinematics, potential scatterings, differential and integral cross-sections, elastic, inelastic, and reactive collision; angular momentum, and angular distributions. 3 credits

CHE 528 Statistical Mechanics
Statistical theory of equilibrium systems and rate processes. Ensemble theory, spatial and time correlation functions. Model systems and methods of estimating their properties. Designed to enable the student to use the current literature dealing with application of statistical mechanics to problems in chemistry. 3 credits

CHE 529 Nuclear Chemistry
Topics include the properties of radioactive substances and their use in the study of chemical problems; nuclear structure; nuclear reactions; radioactive decay and growth; interactions of radiation with matter; detection and measurement of radiation; application of radioactivity to chemical problems such as kinetics, structure, and analysis; artificially produced elements. 3 credits

CHE 530 Physical Chemistry of Macromolecules
An investigation of the gross and fine structures of macromolecules and molecular aggregates in solution, as revealed by hydrodynamic behavior (e.g., ultracentrifugation, viscosity), light scattering, spectroscopic properties (e.g., ultraviolet and visible absorptions, circular dichroism, Raman, infrared, magnetic resonance spectra), and the thermodynamics and kinetics of interaction with small molecules and ions. Theory of conformation changes and phases transitions. Spring, 3 credits

CHE 531 Departmental Research Seminar
Meetings in which first-year graduate students learn about the research activities of the departmental faculty. Fall, no credit

CHE 532 Literature Seminar
Students select and discuss topics from the current literature. Spring, no credit

CHE 542 Physical Methods in Chemistry
Subject matter and prerequisites will vary and will be announced in advance. Possible subjects include nuclear magnetic resonance (NMR), molecular spectroscopy, and X-ray crystallography. May be repeated as the subject matter varies. Fall, 3 credits

CHE 551 Glass Blowing
Basic scientific glass blowing: basic sealing techniques, Vac Line lay out, set up, and repairs.
T-seals, ring seals, use of cutting machine, hard torch and bench torch, safety with glass. Open to graduate students in the sciences.

Fall, 1-2 credits

CHE 589 Directed Study
Subject matter varies according to needs of student.
Variable and repetitive credit

CHE 590 M.S. Term Paper
Independent study leading to a term paper on a selected topic in chemistry, chemical applications, or chemical pedagogy. Summer, fall, or spring, 3 credits

CHE 591 Chemistry in Society
Will include current trends in chemical research and the influence of chemistry in areas such as the environment and technology. Topics of local interest and the conflicting demands placed on technology will be integrated into the course. 3 credits

CHE 592 Instrumental Methods
An introduction to the principles underlying the operation of modern instruments in chemical research and technology. The lecture material will be supported by experiments performed using instruments available in the Department of Chemistry. 3 credits

CHE 593 Chemical Demonstrations
The design and implementation of demonstrations to illustrate modern concepts of chemistry. 3 credits

CHE 601 Special Topics in Synthetic Organic Chemistry
The subject matter varies depending on interests of students and faculty. Possible topics could include asymmetric synthesis and natural product syntheses. A sound background in organic synthetic methods (e.g., CHE 503) is a prerequisite. Variable and repetitive credit

CHE 602 Special Topics in Physical Organic Chemistry
The subject matter varies depending on interests of students and staff. It may cover such areas as photochemistry, theoretical organic chemistry, and the chemistry of unstable intermediates; the emphasis is on fundamental considerations and recent developments. Variable and repetitive credit

CHE 603 Special Topics in Bioorganic Chemistry
The subject matter varies depending on interests of students and faculty. Possible topics could include asymmetric synthesis, and natural product synthesis. 3 credits, repetitive

CHE 610, 611 Practicum in Teaching
Practice instruction in chemistry at the undergraduate level, carried out under faculty orientation and supervision. A minimum of two semesters of CHE 610 or 611 is required of all candidates for graduate research degrees in chemistry, unless explicitly waived by the chairperson. 610: variable and repetitive credit 611: no credit, repetitive

CHE 619 Critical Readings of Current Topics in Chemistry
Recent research papers from the literature will be analyzed in depth. These papers may originate from the inorganic, organic, physical and/or biochemical literature. The exact topic of the course will be announced in advance. Variable and repetitive credit

CHE 623 Molecular Spectroscopy
A detailed description of the theory and practice of molecular spectroscopy. Topics include the interaction of molecules with electromagnetic radiation and the time evolution of molecular energy states. Prerequisite: CHE 521
3 credits

CHE 625 Molecular Structure and Crystallography
Experimental methods in the determination of molecular structure. The emphasis will be on the determination of structure in the solid state, particularly by X-ray crystallography. Students will complete a single crystal molecular structure determination using modern diffractometer techniques. 3 credits

CHE 641 Organometallic Chemistry
A systematic presentation of the chemistry of organometallic compounds, particularly those of the transition metals. Topics will include structure, bonding, reaction mechanisms, synthesis, and applications in catalysis and in organic synthesis. 3 credits

CHE 682 Special Topics in Inorganic Chemistry
Subject matter varies, depending on interests of students and staff, but will cover recent developments in inorganic chemistry. Variable and repetitive credit

CHE 683 Special Topics in Physical Chemistry
Subject matter varies, depending on interests of students and staff, but will cover recent developments and advanced topics in physical chemistry. Variable and repetitive credit

CHE 693 Physical Chemistry Seminar
1 credit, repetitive

CHE 694 Chemical Biology Seminar
1 credit, repetitive

CHE 695 Inorganic Chemistry Seminar
Discussions of current issues in inorganic chemistry. 1 credit, repetitive

CHE 696 Organic Chemistry Seminar
1 credit, repetitive

CHE 698 Colloquium
Variable credit

CHE 699 Research
Variable and repetitive credit
Degree Requirements (AST)
Requirements for the M.S. Degree — Astronomy
A. Formal Coursework
For the M.S. degree, it is necessary to successfully complete, with a B average, an approved course of study consisting of 24 graduate credits with no more than six credits of Practicum in Teaching and no more than three credits of Research. In addition, the student must successfully complete AST 553, AST 583, AST 584, and at least three credits from AST 501, AST 502, AST 554, or AST 585.

B. Qualifying Examination
Astronomy students must pass a written qualifying exam at the M.S. level. Successful completion of qualifying exams in the Department of Physics also satisfies this requirement.

C. Language
There is no language requirement for the M.S. degree.

D. Departmental Recommendation
When all departmental requirements are completed, the chairperson may recommend to the Vice Provost for Research and Graduate Studies that the Master of Science degree be granted.

E. Residence
There is no residence requirement.

F. Time limit
All requirements for the M.S. degree must be completed within two years of the student's first registration at Stony Brook as a graduate student. For part-time students, this time limit may be waived by the graduate committee.

Requirements for the Ph.D. Degree — Astronomy
In addition to the minimum Graduate School requirements, the following are required:

A. Formal Coursework
Successful completion of an approved course of study is required. A student normally takes nine credit hours per semester, not counting AST 600 Practicum in Teaching.

B. Qualifying Examination
Acceptable performance on the written Ph.D. qualifying exam is required. This exam is normally given at the end of the fourth semester, but may be attempted at the end of the second semester.

C. Preliminary Examination
Successful defense of a thesis proposal is required. The student, in conjunction with a faculty advisor, prepares a written thesis proposal and submits it to a committee of the faculty two weeks in advance of the preliminary examination. The student is expected to complete the proposal by the end of the fifth semester or earlier. The committee will review the written proposal for its suitability as a thesis topic within a week. The preliminary examination consists of an oral presentation of the proposal and oral examination on the proposal and related topics.

The chairperson of the preliminary examination committee will inform the student of the committee's decision and submit a written report of the examination (signed by all committee members) to the graduate committee. If the student does not pass the examination, the preliminary examination committee will recommend further action to the graduate committee. This recommendation will be implemented by the graduate committee, in consultation with the faculty.

D. Language
There is no language requirement for the Ph.D. degree.

E. Advancement to Candidacy
Upon successful completion of the preliminary examination, including any associate qualifications and meeting the requirements of the course of study, the student will be considered for advancement to candidacy. This recommendation is made by the graduate committee, through the department chairperson, to the Vice Provost for Research and Graduate Studies. Candidacy signifies that the student has successfully completed all Graduate School and departmental requirements for the Ph.D. degree except the dissertation.

Degree Requirements (GEO)
Requirements for the M.S. Degree — Geological Sciences
A. Residence
There is no residence requirement.

B. Language
There is no language requirement.

C. Formal Coursework
Successful completion with a B average of an approved course of study consisting of 30 graduate credits with a minimum of 18 academic credits and a thesis. Courses which satisfy the academic credit requirements must be in the approved course of study, must be at the graduate level, and cannot be teaching or research courses.

D. M.S. Thesis Proposal
An M.S. thesis proposal of two to three pages in length is to be submitted to the Graduate Committee and the Advising Committee before the last day of finals at the end of the first year. This proposal will
be evaluated by the three-member faculty committee (two advisors plus one) before the graduate student evaluation, but need not bear faculty signature. Final acceptance of the M.S. thesis proposal will be by faculty signature(s) after the end-of-semester graduate student evaluation.

E. Evaluation of Thesis
The thesis must be approved by an examining committee and defended in an oral defense, part of which includes a public presentation of the results of the M.S. thesis research.

The faculty advisor must certify satisfactory completion of the research before the graduate committee will establish an examining committee. Copies of the thesis shall be submitted to the M.S. examining committee at least one week before a planned M.S. examination. The committee must respond to the student within one week after receipt of the thesis. Only if the committee attests that the thesis is well written, that it shows competent collection and interpretation of data, that it adequately references the pertinent literature, and that it is concise, can a date for the M.S. examination be set. The student is responsible for meeting all requirements of the Graduate School regarding the M.S. thesis.

A final oral thesis defense, required of all M.S. candidates, shall be given after completion of the thesis. The examining committee shall consist of at least three experts in the field who hold Ph.D.s. These generally will be faculty members, but may include research associates or visiting experts. The defense may cover any topic on the student’s approved course of study, but generally focuses on the thesis.

The thesis defense must be administered at least two weeks before the end of classes in the semester during which the degree is to be conferred, and the final thesis must be submitted to the Graduate School no later than six months after the thesis defense.

F. M.S. Degree Without a Thesis
Under unusual circumstances and in consultation with faculty advisors, the M.S. degree may be awarded after 30 graduate academic credits without a thesis.

G. Departmental Recommendation
When all departmental requirements are completed, the chairperson may recommend to the Vice Provost for Research and Graduate Studies that the Master of Science degree be granted.

H. Time limit
All requirements for the M.S. degree must be completed within three years of the student’s first registration at Stony Brook as a graduate student. For part-time students, this time limit may be waived by the graduate committee.

Requirements for the Ph.D. Degree — Geological Sciences

A. General Statement
The Ph.D. preliminary examination is the primary examination before embarking on a Ph.D. thesis. Its main purpose is to identify the research potential of the student and to assess whether this potential is sufficient to obtain a Ph.D. degree. The preliminary examination is a major examination, but it is only part of the evaluative process which recognizes all of the student’s accomplishments from the time that he/she arrives at Stony Brook.

The following elements are important for a Ph.D.:
1. Creativity, originality, and independence in development of research projects and in problem solving
2. Flexibility of thought processes
3. Knowledge of and critical evaluation of the forefront of the science
4. Ability to obtain the skills and specific knowledge to solve particular problems
5. Basic knowledge to support items 1-4
6. Ability to complete research projects and to present results in written papers and oral presentations to the scientific community.

One Ph.D. research proposal will be used to evaluate the student with regard to these criteria.

B. Residence
Two consecutive semesters of full-time graduate study are required.

C. Language
There is no language requirement.

D. Formal Coursework
Successful completion of an approved course of study is necessary. The number of credit hours required is unspecified and will be set according to the student’s background and interests.

For a student entering the Ph.D. track without a M.S. degree, the approved course of study must include two research courses under two different faculty members. These independent research courses must result in research papers to be evaluated by a three-member evaluation committee at the end of the second semester and before the graduate student evaluation.

For a student matriculating at Stony Brook with a M.S. degree, the course of study must include at least one research course resulting in a research paper; the M.S. thesis serves as a second research paper. The research paper and M.S. thesis are to be evaluated at the end of the first semester by a three-member faculty evaluation committee before the graduate student evaluation.

Under unusual circumstances, papers resulting from independent research done during the summer or outside the department may substitute for the above required research papers, with appropriate evaluation by the three-member committee.

E. Preliminary Examination Procedures
Successful defense of one research proposal is required. Geological Sciences graduate students may decide on their own initiative to take the Ph.D. preliminary examination. Such decision will generally be an outgrowth of consultations with advisors, who in turn will monitor the student’s research progress. Typically, the Ph.D. preliminary examination process will begin late in the first year for students entering with a M.S., late in the second year for students entering with a B.S./B.A. and who are bypassing a M.S., and late in the third year for students receiving a M.S. at Stony Brook.

Abstract: The student will submit an abstract of a research proposal to the graduate committee for approval. A single abstract must be endorsed in writing by three Geological Sciences faculty members. Endorsement signifies that the preparation by the student of a written proposal based on the stated topic is acceptable. One or more of the signatories must be identified as a potential sponsor, a designation that signifies a willingness, but not a binding commitment, to supervise the proposed research. This procedure does not commit a student to work with the indicated sponsor(s), but provides the student with an early indication that a potential thesis advisor is available for the proposed research topic.

Preliminary Examination Committee: Upon approval of the abstract, the department chairperson, in consultation with the graduate committee, will nominate the preliminary examination committee and a chairperson for appointment by the Vice Provost for Research and Graduate Studies. The committee will consist of five members, one of whom may be from outside the department. The student will be informed of the membership of the committee.

Research Proposal: Following the approval of the abstract, the student will be instructed to prepare the proposal in depth—a process which normally takes about six weeks. The proposal shall state an idea for research, indicate why it was selected, and outline the procedures to be used to explore and develop it. A proposal must include a list of the principal references used in its preparation. The prepared proposal will be submitted to the members of the examination committee, graduate committee, and other interested faculty members. The
examination committee will judge the proposal for soundness of idea, suitability as a Ph.D. topic, and quality of development. Within one week after receiving the proposal, the examination committee must either (a) approve the proposal and set the time and place for a preliminary examination to be held within one week; (b) inform the student that the proposal is unacceptable as written and request that it be resubmitted within a given time, not greater than four weeks; or (c) reject the proposal, in which case there is no preliminary examination and the student is terminated. If the proposal is accepted, the student will circulate and post a notice of the time and place of the examination and the title of the proposal as soon as possible after acceptance of the proposal by the examination committee.

**Preliminary Examination:** The student will be given time at the examination to set forth briefly the research proposal, after which, in closed session, there will be questions from the committee and other faculty members. The questioning may be extended beyond the specific topics of the proposal to include related subjects. At the end of the defense, the student and all faculty members other than the committee will be excused, unless the committee requests specific information from a faculty member not on the committee. After the defense, the committee will evaluate the proposal with regard to the quality of development and defense and the adequacy of the student's background knowledge. In summary, it will judge whether the student has demonstrated the ability to conceive, plan, and carry out original and significant research. A grade of "pass" from at least three members of the committee shall constitute a successful defense. A student may pass with qualifications which must subsequently be met for a successful defense. The chairperson of the preliminary examination committee will inform the student of the committee's decision and submit a written report of the examination (signed by all committee members) to the graduate committee. If the student does not pass the examination, the examination committee will recommend further action to the graduate committee. This recommendation will be implemented by the graduate committee in consultation with the faculty.

**F. Advancement to Candidacy**

Upon successful completion of the preliminary examination, including any associated qualifications and meeting the requirements of the department and of the course of study, the student will be considered for advancement to candidacy. This recommendation is made by the graduate committee, through the department chairperson to the Vice Provost for Research and Graduate Studies. Candidacy signifies that the student has successfully completed all Graduate School and departmental requirements for the Ph.D. degree except the dissertation.

**G. Dissertation Research**

If the subject of the dissertation research differs from that in the research proposal defended at the preliminary examination, a dissertation statement must be endorsed by two faculty members in addition to the thesis advisor and submitted to the graduate committee. Thereafter, a brief oral report on the dissertation research will be presented yearly to the department until the dissertation is completed, and a brief progress report will be presented to the student's advising committee each semester, as explained in the advising procedures.

**H. Dissertation**

The finished dissertation must be approved by a dissertation examining committee which shall consist of five members of faculty rank, at least one of whom must be from outside the department. The committee and its chairperson shall be appointed by the Vice Provost for Research and Graduate Studies on the recommendation of the department chairperson in consultation with the graduate committee. The committee chairperson must not be the supervisor of the dissertation. The committee must receive the dissertation at least two weeks before the oral defense of the dissertation. Before the oral defense can be held, the majority of the examining committee must certify in writing that the dissertation is ready to be defended. The committee will conduct the oral defense of the dissertation. The presentation will be open to all faculty members and to others by invitation of the student.

**I. Time Limit**

All requirements for the Ph.D. degree must be met within three years of advancement to candidacy. Extension beyond this limit will be at the discretion of the Graduate Committee in consultation with the student's thesis advisor.

**Responsibility**

The student should become thoroughly familiar with these departmental requirements, with the advising and study plan procedures of each concentration, with the graduate degree program, and with the degree requirements of the Graduate School. In addition, the student should make a point of learning the function of the graduate committee and his/her relationship to it. Final responsibility for deadlines and procedures rests solely with the individual student.

**Courses in Astronomy**

**AST 501/502 The Planetary System**

An introduction to our current understanding of the solar system, excluding the sun. Topics will include orbits and bulk properties of the planets, moons, asteroids, and comets; physics and chemistry of comets; bombardment histories; composition, dynamics, structure, and evolution of planetary and satellite atmospheres; dynamics of satellites and rings, including resonance and tidal heating. The latter part of the course will focus on cosmogonic theories, including planetary and satellite accretion; the formation of planetary atmospheres; and the probability that other planetary systems exist.

Prerequisite: Permission of the instructor. Fall, alternate years (501), 3 credits. Spring, alternate years (502), 3 credits.

**AST 543 Laboratory Course in Astronomical Techniques**

A course designed to introduce the theory, design and operation of modern astronomical instrumentation and to familiarize the student with the use of telescopes. Current astronomical techniques will be discussed with emphasis on methods of observational measurements and reduction of data. Will emphasize optical techniques appropriate for wavelengths shorter than one micron. Extensive laboratory and observing exercises may be expected. Spring, alternate years, 4 credits.

**AST 553 Stellar Interiors and Evolution**

The study of the structure and evolution of stars. Topics include the formulation of the equations describing hydrostatic equilibrium and energy transport, the equations of state, nuclear energy generation, sources of opacity. Mode calculations are compared with observation of individual stars and clusters of stars. The stages of evolution covered will include main sequence and pre-main sequence evolution. Post-main sequence evolution through white dwarfs and neutron stars will be described in detail. Fall, alternate years, 3 credits.

**AST 554 Stellar Atmospheres**

The study of the structure of stellar atmospheres and chemical abundance determinations. Topics will include radiative transfer, thermodynamics in the presence of a radiation field, spectral line formation, and temperature, gravity, and composition determination. Departures from hydrostatic equilibrium and plane-parallel symmetry will be discussed including such topics as mass loss in spherically symmetric systems and radiation transport in the presence of magnetic fields. Spring, alternate years, 3 credits.

**AST 583 Interstellar Medium**

A study of the interstellar medium with emphasis on physical processes. Topics include kinetic theory, equation of transfer, spectral lines, non-thermal emission, ionization, effects of dust, formation and spectroscopy of molecular clouds. The components of the interstellar medium and the interactions between them will be discussed in detail, as well as the process of star formation. Fall, alternate years, 3 credits.

**AST 584 Galaxies**

A basic course on the observational and theoretical aspects of the structure, dynamics, and evolution of galaxies: potential theory; stellar orbits; equilibria and stability of collisionless stellar systems; spiral structure, bars, and warps; collisions of stellar systems and in the evolution of clusters of galaxies; dark matter. Approximately one-half of the course is spent on the Milky Way and the other half on other galaxies. Fall, alternate years, 3 credits.

**AST 585 Cosmology and High Energy Astrophysics**

A basic course on cosmology and primarily extragalactic high energy astrophysics: Hubble...
expansion, Friedman universes, age of the universe, microwave background radiation, big-bang nucleosynthesis, inflation growth of gravitational instabilities, correlation functions, local density and velocity perturbations, dark matter, synchrotron radiation, inverse Compton scattering, pulsars, extragalactic radio sources, quasars and active galactic nuclei, black holes.

Fall, alternate years.

AST 597 Methods of Astronomical Research
This course is designed to acquaint beginning graduate students with current research in the department and to develop basic techniques of research in astronomy. Students work directly with one or more faculty members on short research projects that may involve using the astronomical literature, computer programming, or instrumentation in one of the laboratories.

Fall and spring, 1-3 credits

AST 599 Research
Fall and spring, variable and repetitive credit

AST 600 Practicum In Teaching
1-3 credits, repetitive

AST 601 Advanced Topics In Astronomy-Astrophysics
Fall and spring, 3 credits per semester, repetitive

AST 611 Planetary Atmospheres
A survey of current knowledge about the composition, structures, and dynamics of the atmospheres of planets in the solar system. Models for the upper and lower regions and probable evolutionary histories will be discussed. Emphasis will be placed on the most recent results obtained from space craft and ground-based observations. Student participation is encouraged. This course is identical to ESO 581.

Fall, alternate years, 3 credits

AST 612 Seminar in Astronomy-Astrophysics
Designed to treat specific subject areas in depth, either extending material introduced at the 500 level or covering topics not presented there. Topics recently offered or anticipated in the near future include observational cosmology, atomic and molecular processes, planetary atmospheres, interstellar molecules, advanced topics in radiative transfer, interstellar gases, quasars, and galactic nuclei. Two and one-half-hour lectures per week.

3 credits, repetitive, topics to be announced

AST 699 Dissertation Research
Independent study for Ph.D. degree. Open only to candidates for the Ph.D. who have passed the preliminary examination.

Fall and spring, variable and repetitive credit

Courses in Geological Sciences

GEO 505 Experimental Petrology Laboratory
The course is designed to give the student experience in some or all of the following techniques of experimental petrology: evacuated silica-glass tube experiments, one-atmosphere quenching experiments (with and without controlled atmospheres), 1- to 5-kbar hydrothermal systems (using oxygen buffers where necessary), gas-media experiments up to 7 kbar, solid-media piston-cylinder experiments.

Requirements: Completion of a project involving one or more of the above techniques; written report.

Prerequisite: Permission of instructor

Fall, 1 credit

GEO 506 Theoretical Petrology
Theory of phase diagrams, Schreinemaker's Rules, heterogeneous equilibria, experimental systems of petrologic interest, properties of solutions.

Prerequisites: Metamorphic and igneous petrology and physical chemistry or thermodynamics; or permission of instructor

Spring, 3 credits

GEO 507 Petrogenesis
Discussion of the origin and evolutionary history of selected types of igneous and metamorphic rocks by integrating the principles of heterogeneous phase equilibria, trace element and isotopic geochemistry, crystal chemistry, and geologic occurrence.

Fall, 3 credits

GEO 510 The Rock-Forming Minerals
Study of the crystal chemistry, intracrystalline cation distribution (homogeneous equilibria) stability and paragenesis of the rock-forming minerals. Special emphasis will be placed on amphiboles, feldspars, micas, and pyroxenes.

Fall, 3 credits

GEO 511 Advanced Paleontology
An introductory graduate-level course that stresses an integration of practical fields and laboratory study of fossils assemblages with qualitative statistical analyses of data. The actual content of the course varies from year to year; field collection will normally be carried out in the lower or middle Paleozoic of the central Appalachians.

Fall, 3 credits

GEO 518 Carbonate Sediments
An intensive study of the formation, deposition, lithification, and diagenesis of carbonate sediments. Emphasis will be placed on principles of carbonate deposition, facies relationships, and chemistry. Laboratories will emphasize binocular and petrographic analysis of recent and ancient carbonates.

Spring, alternate years, 4 credits

GEO 521 Isotope Geology
Consideration and evaluation of the various decay radiation schemes useful for determining the ages of rocks and minerals. Development of the theoretical background necessary for the application of trace elements and radiogenic isotopes to the study of geologic processes in igneous, metamorphic, and sedimentary systems.

Fall, 3 credits

GEO 522 Planetary Sciences
The chemical, physical, and petrologic properties of meteorites are reviewed. These data and data for the moon and the terrestrial planets are used to form a picture of the origin, chemical evolution, and accretion of planetary material.

Fall, 3 credits

GEO 526 Principles of Chemical Sedimentology
A chemical approach to the study of sediments. Fundamental principles of chemical thermodynamics and kinetics, including isochoke effects as they pertain to low-temperature geochemical processes, are presented and utilized in the discussion of sedimentological processes.

Spring, alternate years, 3 credits

GEO 528 Carbonate Geochemistry
Examination of the mineralogical and chemical characteristics of the rock-forming carbonates with emphasis on stability in the geological environments. Includes study of phase relations; trace and minor element chemistries; and mechanisms of growth, dissolution, and replacement. Use of current research techniques as applied to carbonate minerals.

Fall, alternate years, 3 credits

GEO 531 Crystalline Solids
Principles of symmetry, single crystal, and powder X-ray diffraction techniques and elements of crystal structure determination considered. Use of crystallographic data in the study of mineral systems. Laboratory in diffraction techniques includes extensive use of digital computers.

Fall, alternate years, 3 credits

GEO 532 Solid-State Geochemistry
The application of crystallographic techniques to problems in mineral chemistry. Concepts of the crystallite state, order-disorder, atom radii, chemical bonding, inorganic coordination, point solutions, and physical properties of minerals. Emphasis on silicate and sulfide crystal structures.

Fall, alternate years, 3 credits

GEO 535 Regional Structure and Tectonics
Formation and development of continental crust in Phanerozoic mountain belts. The structure and origin of ocean crust, magmatic arcs, and continental margin sequences are studied using geophysical, geochemical, and geologic data from ancient and modern examples.

Fall, alternate years, 3 credits

GEO 542 Inverse Theory
Introduction to the basic concepts of inverse theory and its application to the study of the internal structure of the earth and related problems.

Fall, alternate years, 3 credits

GEO 544 Restricted Marine Environments
An intensive and interdisciplinary study of restricted marine environments, including anoxic basins and evaporative basins, as they occur in the modern world and as they are represented in the geologic record. The chemical, sedimentologic, and paleoecologic import of these unusual circulation systems will be examined. The course is identical to MAR 544.

Prerequisite: Previous coursework in stratigraphy

Spring, 3 credits

GEO 545 Coastal Sedimentary Environments
Survey of depositional environments from the nearshore continental shelf through the backbarrier estuarine complex. Emphasis will be placed on depositional processes and products within such varied environments as tidal deltas, barrier islands, tidal flats and salt marshes, and river deltas. This course is identical to MAR 545.

Prerequisite: Introductory course in stratigraphy and sedimentation, geological oceanography, or permission of the instructor

Fall, 3 credits

GEO 550 Global Tectonics

Spring, 3 credits

GEO 551 Physics of the Earth I
Study of the internal structure and properties of the Earth as revealed by field and laboratory investigations. Topics to be discussed include the rotation and figure of the Earth, gravity anomalies, solid-earth tides, geomagnetism and paleomagnetism, electromagnetic induction, and heat flow and the Earth's present and past thermal states. May be taken independently of GEO 552.

Fall, 3 credits

GEO 552 Physics of the Earth II
Study of the Earth's structure and properties based on evidence from seismology and high-pressure geophysics. Topics to be discussed include fundamental principles of elastic wave
theory, body, and surface wave propagation in layered media, earthquake source mechanisms, free oscillations of the Earth, and rheological properties of the Earth's interior. May be taken independently of GEO 551.

**GEO 556 Solid-State Geophysics**
Application of lattice dynamics and equations of state of solids to studies in high-pressure, high-temperature geophysics. Reviews experimental data from physical acoustics, static and shock wave compression, and theoretical results from finite strain and atomistic models.

**Prerequisites:** GEO 551 and 552 or permission of instructor

Spring, 3 credits

**GEO 562 Early Diagenesis of Marine Sediments**
The course treats qualitative and quantitative aspects of the early diagenesis of sediments. Topics include diffusion and adsorption of dissolved species; organic matter decomposition and storage; and diagenesis of clay minerals, sulfur compounds; and calcium carbonates. The effects of bioturbation on sediment diagenesis are also discussed. This course is identical to MAR 562.

**Prerequisite:** Permission of instructor

Fall, alternate years, 3 credits

**GEO 563 Sedimentary Petrology**
Sedimentary petrology of terrigenous carbonate and chemical rocks. Subjects will include origin of major rock suites from each of these three groups in terms of both their deposition and diagenesis. The laboratory will focus on thin section and SEM identification of genetically important grain types, textures, and diagenetic fabrics.

**Prerequisite:** Undergraduate course in optical mineralogy or permission of instructor

Fall, alternate years, 4 credits

**GEO 567 Sedimentary Rocks and Crustal Evolution**
An examination of major and trace elements and isotopic composition of terrigenous sedimentary rocks within a framework of tracing the composition and evolution of the continental crust. Emphasis will be placed on interpreting sedimentary compositions in terms of provenance and sedimentary history (e.g., weathering, diagenesis, recycling). Relationships between sediment composition and tectonic setting will also be examined.

Fall, 3 credits

**GEO 570 Earthquake Mechanics**
A survey of fundamental mechanics aspects of earthquake rupture; reviews concepts of fracture mechanics, elastodynamics, and experimental rock mechanics. Topics will include state of stress in the lithosphere, theoretical models of earthquake instability, energetics of faulting, representation of dynamic elastic field generated by earthquakes, and relation of seismic signals to the kinematics and dynamics of seismic source.

**Prerequisites:** GEO 552 or permission of instructor

Spring, alternate years, 3 credits

**GEO 571 Mechanics of Geologic Materials**
Elastic, thermal, and anelastic properties of geological materials. The course emphasizes a thermodynamic characterization of these properties including irreversible thermodynamics and nonhydrostatic thermodynamics. Specific applications to the earth's environment are discussed.

**Prerequisites:** GEO 551, 552 or permission of instructor

Fall, alternate years, 3 credits

**GEO 572 Advanced Seismology**
Course is intended to expose the student to topics that are at the forefront of current seismological research. Examples include wave propagation in heterogeneous media, earthquake source studies, tsunami generation, and seismic network data analysis.

**Prerequisite:** GEO 552

Fall, alternate years, 3 credits

**GEO 599 Research**
Fall and spring, variable and repetitive credit

**GEO 600 Practicum in Teaching**
1-3 credits, repetitive

**GEO 603 Topics in Petrology**
1-3 credits

**GEO 605 Topics in Sedimentary Geology-Paleontology**
1-3 credits

**GEO 609 Topics in Mineralogy and Crystallography**
1-3 credits

**GEO 699 Dissertation Research**
Independent research for Ph.D. degree. Open only to candidates for the Ph.D who have passed the preliminary examination.

Fall and spring, variable and repetitive credit
Mathematics
(MAT)

Chairperson: Irwin Kra
Mathematics Building 5-116 (516) 632-8290
Graduate Studies Director: Bernard Maskit
Mathematics Building 5-112 (516) 632-8282

Degree Requirements

Requirements for the M.A. Degree

In addition to the requirements of the Graduate School, the following are required:

A. 30 credits in graduate courses approved by the department.
B. Passing the comprehensive examination.
C. A nine-credit minor.

For students in the Secondary Teacher Option, the 30-credit requirement is ordinarily satisfied by the following courses: MAT 511 Fundamental Concepts of Mathematics, MAT 512 Algebra for Teachers, MAT 513-514 Analysis for Teachers I-II, MAT 515 Geometry for Teachers, MAT 516 Probability and Statistics for Teachers, MAT 518 Seminar in the Uses of Mathematics, MAT 519 Seminar in Mathematics Teaching, CEN 560 or CEN 561 Introduction to Computing, and a three-credit elective. The comprehensive examination consists of the final examinations in MAT 512, 513, 514, and 515. The minor requirement is met by the three courses MAT 516, MAT 518, and either CEN 560 or CEN 561.

For students in the Professional Option, the courses that satisfy the 30-credit requirement are worked out individually with each student but ordinarily include MAT 530-531 Topology/Geometry I-II, MAT 534-535 Algebra I-II, MAT 542 Complex Analysis I, MAT 544 Analysis, MAT 550 Real Analysis I, and MAT 598 Teaching Practicum. In addition, students preparing for the doctoral program ordinarily take MAT 590 Problem Seminar. The comprehensive examination consists of the final examinations in MAT 530, 531, 534, 535, 542, 544, and 550, or the equivalent. Well prepared students may substitute the passing of equivalent examinations that are offered periodically. The minor program consists of three courses in an allied area such as statistics, computer science or theoretical physics.

Requirements for the Ph.D. Degree

In addition to the requirements of the Graduate School, the following are required:

A. Passing the doctoral comprehensive examination.
B. Passing the doctoral preliminary examination.
C. Demonstrating proficiency in reading mathematics in two of the following: French, German, and Russian.
D. Advancement to candidacy.
E. Writing an acceptable dissertation.
F. Two consecutive semesters of full-time study.

The Doctoral Comprehensive Examination

The examination, which is offered twice a year (at the start and finish of the spring semester), is designed to test mastery of the fundamentals of mathematics. A detailed syllabus for this examination is available upon request. Students who transfer from graduate programs in other universities may, in some cases, be granted exemption from this requirement at the time they are admitted. Otherwise, such students must take the doctoral comprehensive examination at their first opportunity.

The Doctoral Preliminary Examination

This examination is oral. Each student must take this examination no later than two years after passing the comprehensive examination or receiving an exemption therefrom. The chairperson of the examining committee is chosen by the student.

Professional Academic Training Program

All full-time graduate students in mathematics are required to participate in this program. It consists of supervised teaching or tutoring at the lower undergraduate levels.

Courses

CORE COURSES FOR TEACHER OPTION

MAT 511 Fundamental Concepts of Mathematics
Fall, spring, or summer, 3 credits

MAT 512 Algebra for Teachers
Linear algebra, the algebra of polynomials, algebraic properties of the complex numbers, number fields, solutions of equations.
Fall, spring, or summer, 3 credits

MAT 513 Analysis for Teachers I
Topics in differential calculus, its foundations, and its applications. This course is designed for teachers and prospective teachers of advanced-placement calculus.
Fall, spring, or summer, 3 credits

MAT 514 Analysis for Teachers II
Topics in calculus, its foundations, and its applications. Emphasis will be on integration and on numerical techniques. This course is designed for teachers and prospective teachers of advanced-placement calculus.
Fall, spring, or summer, 3 credits

MAT 515 Geometry for Teachers
A re-examination of elementary geometry using concepts from analysis and algebra.
Fall, spring, or summer, 3 credits

MAT 516 Probability and Statistics for Teachers
A priori and empirical probabilities, conditional probability, mean and standard deviation, random variables, financial distributions, continuous distributions, sampling, estimation, decision making.
Fall, spring, or summer, 3 credits

MAT 518 Seminar in the Uses of Mathematics
This seminar will explore the ways in which secondary school and elementary college mathematics is used in such diverse areas as psychology, sociology, political science, economics, business, engineering, physics, chemistry, biology, and medicine. Primarily for secondary school teachers of mathematics.
Fall, spring, or summer, 3 credits

MAT 519 Seminar in Mathematics Teaching
Study of recent curricular and pedagogical developments in secondary school mathematics.
Fall, spring, or summer, 3 credits
MAT 530 Topology/Geometry I
Basic point set topology; connectedness, compactness, continuity, etc. Metric spaces, function spaces, and topological manifolds. Introduction to algebraic topology; fundamental group and covering space, homology, applications. Fall, 3 credits.

MAT 551 Topology/Geometry II
Foundations of differentiable manifolds: differentiable maps, vector fields and flows, differential forms and integration on manifolds, Stokes' theorem, Frobenius theorem, Lie derivatives. Immersions and submersions. Introduction to Lie groups and to the classical groups. Spring, 3 credits.

MAT 534 Algebra I
Linear algebra; fields, vector spaces, dimension, bases, matrices, linear maps, determinants, canonical forms. Multilinear algebra: bilinear forms, Hermitean forms, spectral theorem, symmetric and tensor products, exterior products. Fall, 3 credits.

MAT 535 Algebra II
Groups, normal subgroups, Jordan-Hölder theorem, fundamental theorem of Abelian groups. Rings: ideals and homomorphisms, Euclidean rings, polynomial rings, unique factorization domains. Fields: transcendence, algebraic extensions, primitive elements, fundamental theorem of Galois theory, applications. Fall, 3 credits.

MAT 539 Algebraic Topology
Homology and cohomology groups, homotopy groups, and the Hurewicz theorem, the universal coefficient theorem, cup and cap products, Poincare duality and introduction to spectral sequences. Spring, 3 credits.

MAT 542 Complex Analysis I
Elementary functions, holomorphic functions. Cauchy theorem, power series, classification of isolated singularities, calculus of residues, open mapping theorem, Riemann mapping theorem. Spring, 3 credits.

MAT 543 Complex Analysis II

MAT 544 Analysis

MAT 546 Differential Equations

MAT 550 Real Analysis I
Lebesgue measure and integration, Radon-Nikodym theorem, Lebesgue-Stieljes measures, Fubini and Tonelli theorems, classical Banach spaces. Spring, 3 credits.

MAT 551 Real Analysis II
Banach space, Hilbert space, Hahn-Banach and uniform boundedness theorems, topics in topological vector spaces, distribution theory. Fall, 3 credits.

MAT 566 Differential Topology
Vector bundles, transversality and characteristic classes. Further topics such as embeddings and immersions, intersection theory, surgery, and foliations. Prerequisite: MAT 531. Fall, 3 credits.

MAT 566, 569 Differential Geometry
Connections, curvature, geodesics, parallelism, and completeness. Riemannian manifolds, geometry of sub-manifolds; method of integral formulas; applications to global extrinsic theory. Riemannian curvature Gauss-Bonnet Theorem, Hopf-Rinow Theorem, first and second variation formulas, conjugate points and Jacobi fields, comparison theory. Curvature and fundamental group: spaces of positive and negative curvature, space forms, Lie groups, homogeneous spaces, and symmetric spaces. Prerequisite: MAT 531. Fall and spring, 3 credits each semester.

MAT 580 Combinatorial Analysis
Permutations, combinations; generating functions, linear recurrences; matching theory, Ramsey's theorem, Block designs, orthogonal Latin squares, finite geometries, Extremal problems; chromatic number, probabilistic methods. Fall, 3 credits.

MAT 590 Problem Seminar
Analyze problems and explore supplementary topics related to the core courses in the Professional M.A. Option. Focus on preparing for the doctoral comprehensive examination. Fall and spring, 3 credits each semester.

MAT 598 Teaching Practicum
Seminar and workshop for new teaching assistants. Fall, 3 credits.

INTERMEDIATE COURSES

MAT 602, 603 Topics in Algebra
Typical topics will be drawn from group theory, ring theory, representation theory of groups and algebras, fields and commutative algebra, homological algebra. Fall and spring, 3 credits each semester.

MAT 608, 609 Topics in Number Theory
Typical topics will be drawn from analytic number theory, algebraic number theory, diophantine equations, and transcendental number theory, with indications of methods from algebra, geometry, analysis, and logic. Fall and spring, 3 credits each semester.

MAT 614, 615 Topics in Algebraic Geometry
Typical topics will be drawn from varieties and schemes, algebraic curves, and their arithmetic. Fall and spring, 3 credits each semester.

MAT 620, 621 Topics in Algebraic Topology
Topics will be of current interest such as foliations, surgery groups, group actions on manifolds, and homotopy theory. Fall and spring, 3 credits each semester.

MAT 626, 627 Topics in Complex Analysis
Topics selected from Riemann surfaces, quasiconformal mappings, several complex variables, Fuchsian groups, Kleinian groups, moduli of Riemann surfaces and Kleinian group, analytic spaces, singularities. Fall and spring, 3 credits each semester.

MAT 632, 633 Topics in Differential Equations
Typical topics will be of hyperbolic or elliptic systems, parabolic equations, spectral theory, finite difference equations, Cauchy-Riemann equations and complex vector fields, equations with constant coefficients, solvability of linear equations, Fourier integral operators, non-linear equations. Fall and spring, 3 credits each semester.

MAT 638, 639 Topics in Real Analysis
Topics selected from functional analysis, harmonic analysis, Banach algebras, operator theory. Fall and spring, 3 credits each semester.

MAT 644, 645 Topics in Differential Geometry
Typical topics will be drawn from areas such as comparison theorems, pinching theorems, Morse theory, characteristic classes, minimal varieties, Hodge theory, spectrum of the Laplacian, geometry of general relativity. Fall and spring, 3 credits each semester.

MAT 650, 651 Topics in Combinatorics
Typical topics will be of combinatorics and graph theory, Ramsey theory, extremal problems, and methods of enumeration. Fall and spring, 3 credits each semester.

ADVANCED COURSES

These courses are designed for students doing advanced work, especially in connection with doctoral dissertations. The only prerequisites are consultation with the instructors. The topics will be selected from the area listed under the corresponding intermediate course, and will generally be on a more advanced level. A course will normally begin in the fall and may continue in the spring. Course offerings will depend on student demand and availability of faculty to supervise advanced work in the area. These courses may be taken for repeated credit. Each of these courses carries 3 credits.

MAT 662, 663 Advanced Topics in Algebra
Typical topics will be drawn from group theory, ring theory, representation theory of groups and algebras, fields and commutative algebra, homological algebra. Fall and spring, 3 credits each semester.

MAT 666, 667 Advanced Topics in Algebraic Topology
Typical topics will be drawn from algebraic topology, geometric topology, algebraic K-theory, and homotopy theory. Fall and spring, 3 credits each semester.

MAT 670, 671 Advanced Topics in Complex Analysis
Typical topics will be drawn from complex analysis, geometric function theory, and several complex variables. Fall and spring, 3 credits each semester.

MAT 674, 675 Advanced Topics in Differential Equations
Typical topics will be drawn from partial differential equations, spectral theory, and methods of enumeration. Fall and spring, 3 credits each semester.

MAT 678, 679 Advanced Topics in Real Analysis
Topics will be of current interest such as foliations, surgery groups, group actions on manifolds, and homotopy theory. Fall and spring, 3 credits each semester.

OTHER COURSES

MAT 696 Mathematics Seminar
MAT 697 Mathematics Colloquium
MAT 698 Independent Study
MAT 699 Dissertation Research

Each of the above courses may be taken only with the approval of the graduate studies director. Variable and repetitive credit
Degree Requirements
Requirements for the M.A. Degree in Physics

A. Satisfactory performance in a program of studies (30 graduate credits) approved by the graduate committee. Normally such a program would include PHY 599 Graduate Seminars, Classical Mechanics I, II; Electrodynamics; and Quantum Mechanics I, II.

B. Minimum grade point average of 3.0 in all graduate courses taken at Stony Brook.

C. Passing of the master’s examination.

Requirements for the M.S. Degree, Graduate Studies in Teaching Physics

The Master of Arts (teaching) degree is designed for those students who plan to teach or who are teaching physics at the secondary school level. Work toward this degree will ordinarily involve two semesters of coursework and one semester of a supervised intern experience teaching physics in a secondary school.

A. 30 graduate credits with a minimum grade-point average of 3.0
   1. Nine credit hours of graduate courses in physics.
   2. Six credit hours of physics education courses offered by the Department of Physics.
   3. Six credit hours in appropriate courses in educational psychology, philosophy, or history chosen with the approval of the student’s advisor.
   4. Six credit hours (one semester) of supervised intern experience in secondary school.
   5. Three credit hours of project work (PHY 580) on a topic in physics associated with classroom teaching at the secondary level. This will generally be an experimental topic. All candidates will be required to demonstrate proficiency in laboratory techniques associated with the teaching of secondary school physics.

B. Successful performance on an oral examination in which the candidate demonstrates proficiency in explaining physics at a level appropriate for secondary school students.

C. Passing of a comprehensive written examination in physics.

Credit for previous work: Students who already have provisional teaching certification or who have taken the required courses in education or the teaching internship may substitute appropriate additional courses in science, mathematics, education, or history and philosophy of science with the approval of their advisor. These course requirements will not automatically be waived, however. Credit for such courses or work done elsewhere may depend upon demonstrated proficiency.

Requirements for the M.S. Degree, Graduate Studies in Scientific Instrumentation

A candidate for the master’s degree with concentration in instrumentation will be required to demonstrate a certain level of knowledge of physics (by written and/or oral examination), to spend at least one semester as a teaching assistant in an undergraduate laboratory, to take certain required and elective courses, and to complete both a major and minor project. The curriculum is designed to meet the needs of students learning about the design, construction, and testing of sophisticated instrument systems. The degree holder will not be a super technician but a professional scientist trained in both physics and measurement techniques.

A. A student shall demonstrate proficiency in undergraduate physics at the level of the present courses PHY 335, 405, 431, and 472. This can be done 1) by acceptance by the Master’s in Scientific Instrumentation Committee of courses taken as an undergraduate, 2) by written examination, or 3) by passing the courses appropriate to a student’s deficiencies.

B. Thirty credits (minimum) of graduate courses, (500 level or above), including a minor project and a master’s thesis. This thesis must describe a major piece of work in scientific instrumentation, and must be in a form acceptable to the graduate school. It need not be original research in the same sense as a Ph.D. thesis, but it should be the result of an effort consistent with a full year of full-time work. The thesis should present an improvement of the state of the art in some area, the development of a sophisticated and/or automated apparatus, or some other significant laboratory project and be defended before a committee of the faculty.

C. Teaching assistant in an undergraduate laboratory for at least one semester.

D. Students shall acquire those technical skills deemed necessary by their thesis supervisors. These must include, but are not limited to, machining capability and computer literacy.

Each student will be assigned an advisor and a committee of two additional faculty members, and will be required to meet frequently with them. It is expected that very frequent communication among all the faculty and students involved will foster spirit, expose problems, and generally contribute to success.

Requirements for the Ph.D. Degree

A. Satisfactory completion of an approved program of courses, with a minimum cumulative grade point average of 3.0.

B. Completion of required courses: Each of the courses listed below must be passed with a grade of A or B.
   1. Two semesters of PHY 599 Graduate Seminars. This course is normally taken during the first year of graduate study, with each student registering in Section 1 during one of the semesters and in Section 2 during the other.
   2. PHY 515 Methods of Experimental Research. This course, given every semester, must be taken not later than the fourth semester of residence.
3. Two advanced courses, each in an area outside of that of the student's thesis research, chosen from a list of courses approved for this purpose. 

C. Passing of the preliminary examination, which consists of two parts: (a) a written comprehensive examination and (b) an oral examination on a broad range of topics relevant to the student's intended area of thesis research. The written examination, given at the beginning of each semester, must be passed no later than the beginning of the fourth semester of graduate study. The oral examination must be passed before the end of the second academic year.

D. Acceptance of graduate student by an advisor for thesis work.

E. Advancement to candidacy for the Ph.D.: The department's recommendation to the Graduate School for advancement to candidacy is based on the satisfactory completion of all requirements listed above.

F. Research, dissertation, and passing the dissertation examination.

G. Teaching experience at least equivalent to that obtained in a one-year appointment as a teaching assistant.

H. One year of residence.

Courses

PHY 501 Classical Mechanics
Lagrangian and Hamiltonian formulations, variational principles, Hamilton-Jacobi theory, mechanics of fields, special relativity. 
3 credits each semester

PHY 503, 504 Methods of Mathematical Physics I, II
A selection of mathematical techniques useful for physicists. Topics will be selected from the following: asymptotic analysis, perturbation theory, boundary layer techniques, chaotic systems, differential equations, special functions, boundary value problems, Green's functions, integral transforms, integral equations, probability. This course should be taken only by entering graduate students who have a deficiency in this area. 
3 credits each semester

PHY 505, 506 Classical Electrodynamics
Electrostatics and magnetostatics with emphasis on the solution of boundary value problems through the use of eigenfunction expansions and Green's functions; dielectrics, magnetic materials, Maxwell's equations, electromagnetic waves, wave guides, diffraction, plasma physics, special relativity, relativistic particle kinematics and dynamics, energy loss and scattering of charged particles in matter, radiation, multiple fields, spin resonance, and superconductivity. 
3 credits each semester

PHY 511, 512 Quantum Mechanics I, II
Topics include basic quantum physics and mathematical apparatus; angular momentum; symmetries; semiclassical theory of radiation; Dirac's equation; numerous concrete applications to atoms, nuclei, etc. 
3 credits each semester

PHY 515, 516 Methods of Experimental Research
A laboratory-lecture course designed to help start beginning graduate students on a path toward independent, professional research. A number of historically important experiments are studied and performed with the aid of modern instrumentation. As they progress, students are encouraged to pursue independent projects in which there are no rigidly fixed formats or procedures. Primary emphasis is given to development of experimental skills and on professionally acceptable analysis and presentation of results, both in written and oral form. Projects are typically chosen from such fields as atomic and nuclear spectroscopy, particle physics, solid state and low temperature physics, optics, and electromagnetism. Two-hour laboratory sessions per week.
3 credits each semester

PHY 525 Current Research Instruments
In a series of distinct units, various members of the experimental research faculty will describe the nature of their work, explain the major principles of their laboratory instruments, discuss how these instrument systems function, and conduct tours of their laboratories showing the apparatus in action. The student will become familiar with most of the experimental research instrumentation in the department. 
Fall, 3 credits

PHY 540 Statistical Mechanics
Brief review of thermodynamics. Thermal equilibrium ensembles for classical and quantum systems. Approaches to systems at which the Hamiltonian is separable. Approximate treatment of nonseparable Hamiltonians. 
3 credits

PHY 541 Advanced Statistical Mechanics
Topics will be selected from high-temperature properties, low-temperature properties: elementary theory of quantum fluids, model calculations; phase transitions: transfer matrix, Ising and ferromagnetic models; introduction to fluctuation and nonequilibrium phenomena. 
3 credits

PHY 551 Nuclear Physics I
Basic properties of nuclei, radioactivity, and electromagnetic properties, experimental techniques, and nuclear models. 
3 credits

PHY 552 Nuclear Physics II
Topics include nuclear forces, microscopic and phenomenological effective interactions, theoretical and experimental aspects of nuclear reactions, nuclear beta decay. 
3 credits

PHY 555, 556 Solid-State Physics I, II
The first part of the course is primarily devoted to single particle properties of solids. Topics covered include symmetries of solids, energy band theory, transport properties, and phonons. It also includes an elementary discussion of cooperative phenomena, such as magnetism and superconductivity. In the second semester, the collective properties of strongly interacting condensed matter systems are addressed. Although the choices of topics may vary, they usually include the following: many-body perturbation theory applied to condensed matter systems. Fermi liquid theory, an advanced discussion of electron-phonon interaction, superconductivity, disordered systems, critical phenomena, and renormalization group. 
3 credits each semester

PHY 557 Elementary Particle Physics
3 credits

PHY 565, 566 Quantum Electrodynamics I, II
Applications of quantum field theory to interactions between elementary particles. Topics will be chosen from perturbative quantum chromodynamics, the standard electroweak model, lattice field theory, grand unified models, supersymmetry and current research problems. 
3 credits

PHY 581 Astrophysics
An introduction to some areas of astrophysics. Topics to be selected from: stellar structure and evolution, interstellar matter, planetary atmospheres, galactic dynamics, high energy astrophysics and cosmology, laboratory astronomical techniques. 
3 credits

PHY 595 Master's Degree Thesis Research
Independent research for master's degree students. Open only to those approved by the individual faculty for thesis work. Each semester, 1-12 credits, variable and repetitive.

PHY 599 Graduate Seminars I, II
Special research topics centered on monographs, conference proceedings, or journal articles. Topics include solid state physics, elementary particles, atomic physics and quantum electronics, and nuclear physics. Both semesters are required for all first-year graduate students. 
1 credit each semester

PHY 600 Practicum in Teaching
2 credits, repetitive.

PHY 610, 611 Quantum Field Theory I, II
Field quantization: interacting fields, S-matrix theory, Feynman diagrams, charge and mass renormalization, dispersion relations, general field theory. 
3 credits each semester

PHY 612 Theoretical Particle Physics
Applications of quantum field theory to interactions between elementary particles. Topics to be chosen from perturbative quantum chromodynamics, the standard electroweak model, lattice field theory, grand unified models, supersymmetry and current research problems. 
3 credits

PHY 620 Relativity
General theory of relativity, cosmology. 
3 credits

SEMINARS
Each semester several seminars for advanced graduate students will be offered. These courses are intended primarily for students doing research in the area, although other students may enroll with permission of the faculty seminar leaders. Each seminar carries one credit, with repetitive credit permitted.
PHY 670 Seminar in Theoretical Physics
PHY 672 Seminar in Elementary Particle Physics
PHY 674 Seminar in Nuclear Physics
PHY 678 Seminar in Solid State Physics

SPECIAL TOPICS COURSES

The subject matter of each special topics course varies from semester to semester, depending on the interests of students and staff. Advanced topics will be discussed, particularly those that are of current interest. Each course carries three credits, with repetitive credit permitted.

PHY 680 Special Topics in Theoretical Physics
PHY 681 Special Topics in Statistical Mechanics
PHY 682 Special Topics in Solid State Physics
PHY 683 Special Topics in Radiation Physics
PHY 684 Special Topics in Nuclear Physics
PHY 685 Special Topics in Mathematical Physics
PHY 686 Special Topics in Elementary Particles
PHY 688 Special Topics in Astrophysics
PHY 690 Special Topics in Quantum Electronics
PHY 698 Colloquium
1 credit
PHY 699 Dissertation Research
Independent research for Ph.D. degree candidates. Open only to students who have passed the Ph.D. preliminary examination. Each semester, variable and repetitive credit
Division of Social and Behavioral Sciences

Dean Egon Neuberger
Library 2340 (516) 632-6991

The Departments of Anthropology, Economics, History, Linguistics, Political Science, Psychology, and Sociology, and the programs in Africana Studies and Social Sciences Interdisciplinary (with programs in Women’s Studies, Child and Family Studies, and Secondary Education) constitute the Division of Social and Behavioral Sciences. Six of the departments offer high quality Ph.D. programs, and Linguistics, which now offers an excellent D.A. Program, is scheduled to offer a Ph.D., as well. Proposals for graduate certificates in Africana Studies, Child and Family studies, and Women’s Studies are now in preparation, and most departments and programs offer graduate courses through the School of Continuing Education. Approximately 170 professors, many of them with national and international distinction, and a number of visiting faculty from leading universities in many countries serve in the seven graduate departments. More than 340 full-time Ph.D. students from around the world have come to Stony Brook to study with the distinguished faculty in the Division. Several departments in the Division have been ranked very high by national surveys of departmental quality and all of them have exciting and broad-ranging research programs involving graduate students. Each department has a large number of professional colloquia, talks by distinguished visitors and opportunities for independent study by graduate students.
Degree Requirements
Requirements for the M.A. in Anthropology and M.A. in Anthropology with Concentration in Applied Anthropology

In addition to the requirements of the Graduate School, the following are required:

A. Completion of a minimum of 30 graduate credits, maintaining a 3.0 average.
B. A course of study planned and carried out with the approval of the student's M.A. guidance committee. This may require examinations, library research, laboratory study, and/or fieldwork as the basis of the M.A. thesis, which must be accepted by a committee appointed by the department. No final defense is required.
C. One-year minimum residence.

Requirements for the Ph.D. Degree in Anthropological Sciences

A. Completion of a minimum of 48 graduate credits, maintaining a minimum of 3.0 average.
B. The qualifying examination taken after one year of study, and passed at an appropriate level.
C. A course of study planned and carried out under the direction of the student's guidance committee. This may require courses in methods, other subjects, library research, essays, fieldwork, and laboratory study.
D. Passing the foreign language requirement, and statistics and computer competence.
E. Teaching requirement for all students.
F. Preparation of dissertation research proposal.
G. Passing the preliminary examination and advancement to candidacy (may be awarded M.A. at this point).
H. Fieldwork or other dissertation research.
I. Written dissertation and defense.
J. Time limit: The candidate must satisfy all requirements for the Ph.D. degree within seven years after completing 24 credit hours of graduate courses at the State University of New York at Stony Brook department or program in which the candidate is to receive his/her degree.

First-Year Program

Every year the following introductory courses are offered:

Fall
- ANT 515: Theory/Method Archaeology
- ANT 530: Physical Anthropology

Spring
- ANT 520: Principles of Social/Cultural Anthropology

When a student has completed this first-year program a qualifying examination is given by a faculty committee. After successfully completing this, a student begins an individual course of study under the direction of a guidance committee. This includes participation in seminars and independent study courses, specialization in one or more subdisciplines, and preparation for dissertation research. The second-year program includes studies in methods and techniques appropriate to the student's field of interest. The guidance committee plans a course of study that may include computer competence, statistics, research methods, languages, and other fields as appropriate. Under guidance committee direction, students prepare essays in two or more subjects and areas and prepare a dissertation research proposal. An oral Ph.D. preliminary examination is required for advancement to candidacy. When this is successfully passed, the student may be awarded an M.A. degree and proceed to dissertation research. Dissertation writing and examination are supervised by a faculty committee that includes one member outside of the doctoral program in anthropological sciences faculty.

Courses

ANT 500 Social and Cultural Anthropology
Study of the forms of social organizations: family, kinship, economic, political, and religious, as found among simple and complex societies. A basic graduate-level course designed for students whose previous background is in other fields. Variable and repetitive credit

ANT 501 Development of Anthropological Theory
Survey of the development of anthropological theory from the 19th century to the present. 4 credits

ANT 503 Evolution of the State
The theories of a number of seminal thinkers in social history, political theory, economics, sociology, and anthropology are tested against the empirical results of contemporary anthropological research, both archaeological and ethnographic. Emphasis is Asia and Africa, but New World materials are also introduced for purposes of comparison. 3 credits

ANT 504 Development Anthropology
An examination of the processes of social and cultural change, especially as they affect the peoples of emergent and modernizing nations. Theories of development, change, and modernization; historical case studies; and contemporary political and economic problems are discussed. 3 credits, repetitive

ANT 505 Anthropological Method
A course for advanced graduate students that examines the scientific foundations of anthropological explanation, methods of research, analysis of data, and the preparation of research proposals. Fieldwork techniques include observation, recording, interviewing, texts, life histories, genealogies, and censuses. Prerequisite: One year of graduate study. 3 credits
ANT 506 Readings and Research in African Ethnology
Intensive readings in research in select problems of African ethnology. Particular attention is given to aspects of social and ecological anthropology as well as culture history.
3 credits, repetitive

ANT 507 Middle Eastern Anthropology
Emphasis on Islam and Arab unity as a way to understanding continuity and change in modern Middle East. Topics include ethnic and religious minorities, state/local relations, nomads, agriculturalists, and town dwellers. The course is taught within a historical framework.
3 credits, repetitive

ANT 508 Seminar in Latin American Cultures
Research and discussion about selected topics in the culture and social structure of Indian and peasant communities in America.
3 credits, repetitive

ANT 509 Seminar in European Ethnography
Seminar investigation and discussion of selected topics and problems concerning European societies and cultures. The perspective of culture history is employed as well as that of current fieldwork.
3 credits, repetitive

ANT 510 Studies in Asian and Pacific Ethnography
Readings in the culture and societies of Asia and the Pacific. The field of a selected area, e.g., Indonesia, China, South Asia, Polynesia; and/or a cultural field of study, e.g., nonliterate peoples, complex institutions, religions, will be the special topic of concentration offered.
3 credits

ANT 512 Comparative Civilizations
A comparative study of the processes of socio-cultural evolution from the beginnings of sedentary life to the achievement of early civilization in the Near East, Egypt, the Indus Valley, China, Mesoamerica, and the Andean area. The seminar will focus upon theories of the formation of complex societies and will cover such topics as urbanization, demography, irrigation, craft specialization, militarism, trade and exchange. Prerequisite: Graduate standing or permission of instructor
3 credits

ANT 513 Origins of Agriculture
This course will trace the history of anthropological thought on the origins of agriculture and will assess the evidence for this transformation from the Old and New Worlds. The course will not only explore areas where early agriculture is evidenced, but will also contrast these areas with those where agriculture was a later development. Emphasis will be on the environmental, technological, biological, social, and cultural processes associated with the "Neolithic Revolution." 3 credits

ANT 515 Theory and Method in Archaeology
Theoretical and methodological approaches employed in archaeology. The goals of the course are to provide an historical perspective on the growth of theory and method in archaeology and to examine in detail some of the pertinent research topics being studied today.
4 credits

ANT 520 Principles of Social and Cultural Anthropology
Concepts and principles of social and cultural anthropology: historical background, structure and function, social processes, transactions, culture and communication, continuity and change, topics and problems of contemporary interest.
Some ethnographic monographs are discussed in terms of their relevance for the general concepts and principles treated in the seminar.
4 credits

ANT 522 Male-Female Roles in Cross-Cultural Perspective
Theory concerning how gender differences and the subordination of women emerged in simple and complex societies. Women in the development process, and women's changing work and position in contemporary societies.
3 credits

ANT 526 Anthropological Geography: Theory and Applications
Field geographical techniques and skills necessary for anthropologists will be examined from the point of view of ecological evaluations in the progressive formation of cultural landscapes, settlement pattern analyses (zonal and community), cartographic techniques, aerial-photographic analysis, soil typing, determinants for plant and animal communities, and succession principles will be presented in terms of their geomoorphological articulations with cultural ecology. 1-3 credits

ANT 527 Field Methods and Techniques in Archaeology
The course will be held during the summer only. It will consist of field and laboratory work on an aspect of Long Island's archaeological heritage. Students' time will be divided between surveying and excavating in the field and artifact analysis in the laboratory. Such techniques as map and air photo reading, survey instruments, stratigraphy, conservation, typology construction, etc., will be taught. Students will be exposed to the full range of excavation, survey and laboratory methods and techniques. Prerequisite: Graduate standing or permission of instructor
3 credits

ANT 528 Kinship and Social Organization
The significance of kinship systems and their relationship to other social institutions (e.g., political, economic, religious) in selected societies will be examined through the use of ethnographies and theoretical statements by important contributors to the field.
3 credits

ANT 529 Ecology and Social Organization
The relation between societies and their environment: evaluation of resources, technology, land tenure, subsistence economy; kinship and political relations will include food collecting, hunting, agricultural, pastoral and mixed economies.
3 credits

ANT 530 Physical Anthropology
A course in the fundamentals of physical anthropology that will introduce the subject and be the basis for advanced and specialized work.
4 credits

ANT 535 Medical Anthropology
This course examines concepts of health and illness in cross-cultural perspective. Topics include the achievement of health and harmony, disease causation, medical problems, and medical treatment. Physical and psychological state of health and illness are considered, both from an individual and community focus. Issues in modernization and disease in developing and industrial societies will be included. 3 credits

ANT 540 Readings in Ethnography and Ethnology
A survey of the more important and better-documented cultures and societies of selected world ethnographic areas and the implications of data from these for current approaches and problems in ethnology.
3 credits, repetitive

ANT 547 Topics in Primitive Art
Study of the various theoretical approaches to the interpretation of primitive art. Topics will include: structural analysis of art, socioeconomic structures and art, symbolism and art.
3 credits

ANT 550 Readings in Cultural History
Applications of the ecological and sociological approaches to the study of evolutionary process and culture history.
3 credits, repetitive

ANT 551 Economic Anthropology
Economic life of primitive peoples and precapitalist civilizations with emphasis on the integration of the economy with technology and with social and political institutions.
3 credits

ANT 553 Political Anthropology
Political anthropology deals with selected readings illustrating major trends of anthropological political theory, including such studies as leadership, volunteer association, intrastate, intergroup, and agrarian revolutions, and class conflict. A selected number of monographs will be analyzed in detail, and their relation to diverse political models will be explored.
3 credits

ANT 554 The Anthropology of Law
The study of law and conflict resolution in technologically simple and advanced societies. Village social control methods, as well as law in Africa, Middle East, and Asia will be contrasted with United States law systems.
3 credits

ANT 556 Psychological Anthropology
An examination of the relationship between culture and personality, and between intra- and sociocultural dynamics: Freudian and other psychological concepts and theories as they have been used by anthropologists to enrich their study of cultural, social, psychological, economic, religious, and ethnic sociology, e.g., in both simple and complex societies. Both cross-cultural and in-depth single society approaches will be explored. Prerequisite: ANT 501
3 credits

ANT 559 Urban Anthropology
Processes and methods in urbanization of contemporary complex societies from a cross-cultural perspective, with emphasis on organizational structure of groups, social institutions, communities, and other aspects of urban life. Forces causing change in the make-up of rural, urban, and city areas will be examined.
3 credits

ANT 560 Descriptive Linguistics
Focuses on the series, techniques, and methods of linguistic analysis. In this course students learn how to do linguistic analysis, working through problems in a wide variety of the world's languages. It covers the topics of phonology, morphology, syntax, and semantics.
3 credits

ANT 561 Peasant Societies and Cultures
The concept of peasantry will be examined from political, religious, and social class viewpoints as well as from the more traditional economic viewpoint. These agricultural peoples, who are essentially preindustrial and preindustrial, are described and analyzed especially in relation to the national societies of which they form a part.
3 credits

ANT 564 Primate Evolution
The taxonomic relationships of their evolutionary history as documented by their fossil record and...
structural and chemical evidence. Emphasis on primates prior to the origin of the human lineage. Crosslisted with HBA 564.

ANT 565 Human Evolution
A survey of the fossil record of hominid evolution through the Pliocene and Pleistocene with emphasis on the morphological structure and function of locomotor, masticatory, and neutral systems. Includes utilization of comparative anatomical material and extensive cast and slide collections.

4 credits

ANT 571 Syntax
A study of the fundamental notion of grammar and the application of the general method of modern syntax to specific problems. Crosslisted with LIN 521.

3 credits

ANT 572 Phonetics
Articulatory, acoustic, and physiological phonetics with some attention paid to speech perception. Crosslisted with LIN 522.

3 credits

ANT 575 Contrastive Analysis
The course offers a survey of linguistic typology and examines the ways in which linguistic subsystems may legitimately be compared across languages, thus providing a basis for devising strategies for teaching one language to speakers of another language. Crosslisted with LIN 525.

3 credits

ANT 576 Analysis of an Uncommonly Taught Language
Working from primary and secondary sources, students will construct an outline of the phonology, morphology, and syntax of a language previously unknown to them. Crosslisted with LIN 526.

3 credits

ANT 577 Selected Topics in Linguistics
Crosslisted with LIN 532.

3 credits

ANT 578 Language and Cultural Context
Language and its use in cultural context. Topics include: structure of languages, origin and development of human language, relationship of language and culture (ethnolinguistics, sociolinguistics), linguistic and cultural change, language and mind, language acquisition.

4 credits

ANT 600 Practicum in Teaching
Variable and repetitive credit

ANT 602 Research Seminar in Anthropological Theory
Variable and repetitive credit

ANT 610 Individual Research
Research supervised by faculty. Students must have permission of instructor and enroll in appropriate section. Variable and repetitive credit

ANT 611 Research Seminar in Old World Archaeology
This course will present an in-depth analysis of some of the major problems which face archaeologists in the Old World. Emphasis will be on the various theoretical models currently in use to explain these events by archaeologists. Topics might include the food-producing revolution in the Near East and Southeast Asia; the elaboration of the Neolithic way of life that led to the development of civilization; the nature of civilization in the Near East, the Indus Valley, etc.; or a discussion of the non-civilized Bronze Age cultures of Europe, Africa, and Asia. The specific topics may vary from year to year.

3 credits, repetitive

ANT 640 Research Seminar in New World Archaeology
The seminar will stress problems in research methods, culture history, technology, economy, ecology, and interpretation in the indigenous, pre-European New World. Depending upon the professor, either Mesoamerica or the Andean areas will be used as the organizing example. The comparative analysis of institutions within a developmental context will be among the goals of the seminar. The seminar format will require full student participation, including the formal presentation of a research paper.

Prerequisites: Graduate status; permission of instructor

3 credits

ANT 650 Research Seminar in Cultural History
Variable and repetitive credit

ANT 660 Language as an Analytical Tool
Variable and repetitive credit

ANT 670 Special Seminar
Selected topics in cultural and social anthropology. Topics covered will reflect current interests of faculty and graduate students.

1-3 credits

ANT 699 Research Seminar in Fieldwork Problems
Variable and repetitive credit
Economics
( ECO )

Chairperson: R. Bryce Hool
Ward Melville Social and Behavioral Sciences Building S601
( 516 ) 632-7560

Graduate Studies Director: Thomas Muench
Ward Melville Social and Behavioral Sciences S601
( 516 ) 632-7530

Degree Requirements
Requirements for the M.A. Degree in Economics

In addition to the minimum Graduate School requirements, the department has specific degree requirements. The M.A. degree requires a minimum of 27 resident graduate course credits (500 level or above, not including ECO 598 or ECO 698) with an average grade of B or higher.

Requirements for the Ph.D. Degree in Economics

The Ph.D. degree requirements are as follows:

A. Course Requirements
A minimum of 14 courses in economics (including core courses) must be completed, with a grade of B or better in each elective course. Included in the elective courses must be at least two in each of two or more fields (listed below). However, the Ph.D. committee may approve (i) the inclusion of up to two elective courses taken in another department, (ii) a waiver of part of the 14-course requirement in the case of students with graduate work elsewhere.

1. Core Courses

Those courses which provide the foundation in economic theory (micro and macro) and quantitative analysis (mathematical methods, statistics, and econometrics) are referred to as core courses.

2. Comprehensive Examinations

Comprehensive examinations are taken in microeconomics and macroeconomics and one field (listed in item 3), beginning at the end of the first year of study and to be completed by the end of the third semester. Comprehensive examinations are written but may be supplemented by oral examinations at the discretion of the Examining Committee.

3. Elective Courses and Fields of Specialization

In addition to core courses, normally at least seven elective courses must be taken, with groupings in at least two fields. It is usual but not necessary that a dissertation topic be chosen from one of these fields of specialization.

Fields currently offered by the department are advanced micro theory, advanced macro theory, advanced econometrics, labor economics, economic demography, international economics, industrial organization, urban economics, public sector economics, comparative economic systems, economic history, and economic development.

B. Seminars and Workshops

Participation in departmental seminars and research workshops is considered an essential part of a student's progress toward the doctorate. Seminars in economic theory and applied economics are presented on a regular basis by faculty, visitors, and graduate students. Workshops oriented toward thesis research are conducted by faculty and students working in related areas.

C. Advancement to Candidacy

Advancement to candidacy for the Ph.D. is achieved by completion of the comprehensive examinations in all three core fields and completion of required coursework. Advancement to candidacy normally must be achieved by the end of the fifth semester.

D. Dissertation

A doctoral dissertation must be completed. A dissertation prospectus must receive approval of the thesis advisor and members of the thesis committee. Final approval of the dissertation will be by a committee including the candidate's principal advisor, two other department members, and one member from another department. The results of the dissertation will be presented at a colloquium convened for that purpose.

Preliminary research on a dissertation topic is normally begun in the third year of study and most of the fourth is spent in developing and refining this research. Throughout this phase, students interact closely with faculty members who constitute their dissertation committee, one of whom will be principally involved as the thesis supervisor. At the same time, student research workshops provide the opportunity to present and receive feedback on research at any stage of development.

E. Teaching

The department is committed to achieving a high quality of teaching and encourages all graduate students to acquire teaching experience during their graduate studies. The department operates a training program to prepare teaching assistants for classroom presentation.

F. Time Limit

If the degree requirements have not been met within five years of entry into the program, departmental approval is required for continuation in the program.

Courses

ECO 500 Microeconomics I
The first semester of a one-year course in microeconomic theory. Deals with decision-making of economic agents in different choice environments using the analytical approach of utility theory. Topics include theory of the consumer, theory of the firm, decision making under risk and uncertainty, intertemporal choice, aggregation, and capital theory. Corequisite: ECO 590 Fall, 3 credits

ECO 501 Microeconomics II
A continuation of ECO 500, focusing on theories of equilibrium and market structure. Topics include general competitive equilibrium, imperfect competition and game theory, imperfect information, theory of public goods, and social choice. Prerequisite: ECO 500 Spring, 3 credits
ECO 502 Applied Microeconomic Problem Solving
Development and use of methods for applied microeconomic analysis. Specific applications to problems dealt with generally in ECO 500-501. Prerequisite: ECO 501 Fall. 3 credits

ECO 510 Macroeconomics I
The first semester of a one-year course in macroeconomic theory. Deals with theories and determinants of income, employment, and inflation. Topics include static equilibrium models, theories of money demand and monetary phenomena, theories of the labor market and unemployment, rational expectations and stabilization policy, consumption, and investment. Corequisite: ECO 500 Fall. 3 credits

ECO 511 Macroeconomics II
A continuation of ECO 510, focusing on dynamic models. Topics include models of economic growth, optimal growth and efficiency, overlapping-generations models, rational expectations, and optimal policy. Corequisite: ECO 501 Spring. 3 credits

ECO 520 Mathematical Statistics
The first semester of a one-year course in quantitative methods of economic analysis. Topics include probability theory, univariate and multivariate distributions, limiting distributions, point estimation, hypothesis testing, and regression analysis. Prerequisite: ECO 590 Spring. 3 credits

ECO 521 Econometrics
A continuation of ECO 520. The application of mathematical and statistical methods of economic analysis. Topics include forecasting, econometric methods, and the use of statistical analysis in economic research. Prerequisite: ECO 520 Fall. 3 credits

ECO 522 Applied Econometrics
A continuation of ECO 521. The application and extension of econometric techniques developed in ECO 521. Emphasis on relationship between economic theory and econometric modeling and estimation, and empirical inference. Computer usage for calculation of estimators. Critical examination of econometric studies in current journals. Prerequisite: ECO 521 Spring. 3 credits

ECO 527 Operations Research I
Offered concurrently with MSA 530. Elementary maxima and minima problems and the Lagrange multiplier. Linear programming including the simplex method. The transportation problem. Queuing problems under different assumptions. 3 credits

ECO 528 Operations Research II
Offered concurrently with MSA 538. Nonlinear programming and programming under uncertainty. Introduction to optimization theory, and game theory. Monte Carlo techniques. Applications such as inventory theory or traffic theory. Prerequisite: ECO 527 3 credits

ECO 590 Mathematical Foundations of Contemporary Economic Theory I
A one-semester course dealing with mathematical concepts and techniques relevant to economic theory. Emphasis on set theory, topology, linear algebra, and optimization theory. Applications to economic theory developed as time permits. Fall. 3 credits

ECO 598 Economic Fundamentals
Directed work for individuals or groups, on topics in which students are inadequately prepared at time of admission to program. Topics will be selected from the following areas: general linear models, nonlinear models, multivariate analysis, and applied econometrics. Prerequisite: ECO 521 or permission of instructor 3 credits

ECO 599 Research in Special Topics
Variable and repetitive credit

ECO 600 Advanced Microeconomic Theory I
Introduction to the major areas of microeconomic theory, including microfoundations of macroeconomics, temporary equilibrium, monetary equilibrium, and economic cycles, and the use of alternative stabilization policies. Prerequisite: ECO 501, ECO 590 or equivalent Corequisite: MAT 550 or MAT 521 3 credits

ECO 601 Advanced Microeconomic Theory II
Continuation of ECO 600, 3 credits

ECO 604 Game Theory and Economics
Introduction to game theory and its applications to economic problems. Topics include Nash equilibrium, strategic games, cooperative and non-cooperative games, and applications to perfect and imperfect competition. Prerequisite: ECO 590 or ECO 521 Spring. 3 credits

ECO 607 Production and Technology
Economic aspects of production and technological change. Emphasis is placed on the contrast between optimal and non-optimal production. Prerequisite: ECO 501, ECO 521 Fall. 3 credits

ECO 608 Development of Economic Analysis
A continuation of ECO 607. Further development of analytical methods including the use of regression analysis. Prerequisite: ECO 501, ECO 521 Fall. 3 credits

ECO 609 Studies in Economic Theory
Continuation of ECO 608. 3 credits

ECO 610 Advanced Macroeconomic Theory I
Topics in macroeconomic theory, including developments in macroeconomics, temporary equilibrium, and economic cycles, and the use of alternative stabilization policies. 3 credits

ECO 611 Advanced Macroeconomic Theory II
A continuation of ECO 610. Prerequisite: ECO 610 3 credits

ECO 613 Business Cycles, Stabilization Policies, and Forecasting
Analysis of modern theories of the business cycle and the use of alternative stabilization policies. Emphasis will be on the selection of optimal policies and the role of forecasting in the implementation of policy. Prerequisite: ECO 501, ECO 511 3 credits

ECO 619 Studies in Macroeconomics
Continuation of ECO 618. 3 credits

ECO 620 Advanced Econometrics
Foundations of econometric theory, emphasizing the problems of model identification, estimation, hypothesis testing, and model evaluation. Topics will be selected from the following areas: general linear models, nonlinear models, multivariate analysis, and applied econometrics. Prerequisite: ECO 521 or permission of instructor 3 credits

ECO 621 Advanced Econometrics II
A continuation of ECO 620. 3 credits

ECO 622 Seminar in Applied Econometrics
A survey of modern cross-section econometric methods with applications to policy analysis and empirical inference. Computer usage is expected. Prerequisite: ECO 521 3 credits

ECO 623 Data Analysis and Economic Applications
Survey of major sources of data in economics and theoretical hypotheses and statistical methods for organizing and analyzing such data. Statistical models for quantitative data as well as qualitative choices are presented. Prerequisite: ECO 501, ECO 521, ECO 590 Fall. 3 credits

ECO 629 Studies in Quantitative Methods
A continuation of ECO 628. 3 credits

ECO 630 Welfare Foundations of Public Sector Economics
This is a one-semester course designed to explore the micro basis of public sector economics. Emphasis is placed on the contrast between optimization in the private and public sectors, externality, and public goods, collective choice, public investment criteria, and optimal pricing in the public sector. Prerequisite: ECO 501, ECO 521, ECO 590 Fall. 3 credits

ECO 631 Seminar in Public Sector Economics
Analytical and econometric approach to selected topics in public sector economics. Topics include the areas of urban economics, medical economics, environmental economics, welfare economics, and public finance. This course may be taken as a continuation of ECO 630, but ECO 630 is not a prerequisite. Prerequisite: ECO 501, ECO 521, ECO 590 Fall. 3 credits

ECO 633 Applied Welfare Analysis
Development of selected topics in advanced welfare theory, including intertemporal resource allocation, uncertainty, preference transformation, and collective choice. Theoretical aspects of income distribution, efficiency and equity of alternative social welfare systems. This course may be taken as a continuation of ECO 630, but ECO 630 is not a prerequisite. Prerequisite: ECO 501, ECO 521, ECO 590 Fall. 3 credits

ECO 635 Public Finance
Analytical and econometric analysis of selected topics in public finance, such as optimal taxation and income distribution, optimal taxation and resource allocation, social security, retirement, and savings behavior; shifts in the tax system structure; and corporate, property, and payroll taxes. Prerequisite: ECO 501, ECO 521, ECO 590 Fall. 3 credits

ECO 636 Seminar in Public Sector Economics
Analytical and econometric approach to selected topics in public sector economics. Topics include the areas of urban economics, medical economics, environmental economics, welfare economics, and public finance. This course may be taken as a continuation of ECO 630, but ECO 630 is not a prerequisite. Prerequisite: ECO 501, ECO 521, ECO 590 Fall. 3 credits
ECO 636 Industrial Organization I: Applications of microeconomic theory to the determinants of market structure. Relationships between market structure, firm behavior, and allocational efficiency. Econometric estimation and testing of some hypotheses suggested by the theory.
Prequisite: ECO 501, ECO 521
3 credits

ECO 637 Industrial Organization II: This course is a continuation of ECO 636. It will deal with the same questions and tools as ECO 636, and will also provide an introduction to antitrust policy and to public policy toward industry, including regulation and deregulation, the design of optimal regulation, and the effectiveness of current regulation.
Prequisites: ECO 501, ECO 521
3 credits

ECO 640 Advanced Labor Economics Theory I: This is a primarily a course in advanced labor economics theory. There will, however, be some attention to empirical work. Topics will include the theory of equalizing differentials, human capital, labor supply, life cycle behaviors, and income distribution.
Prequisite: ECO 501
3 credits

ECO 641 Advanced Labor Economics Theory II: This is a continuation of ECO 640. There will, however, be more emphasis on empirical application. Topics to be covered are labor contracts, unemployment and job turnover, labor demand, unionism, and signaling and screening.
Prequisites: ECO 521, ECO 640
3 credits

ECO 642 Demographic Economics I: This course deals with the economics of the family. It utilizes recently developed techniques in economics and in demography to deal with questions concerning marriage, divorce, fertility, contraception, the intramariage distribution of resources, and the intergenerational distribution of resources. Students will do original theoretical and empirical research under the professor's supervision.
Corequisite: ECO 521
Prequisite: ECO 501
3 credits

ECO 643 Demographic Economics II: This course is a continuation of ECO 642. It will deal with the same questions and tools as ECO 642, but will emphasize primitive and developing economies. The connections between population growth and development will be stressed.
Corequisite: ECO 522
Prequisite: ECO 501
3 credits

ECO 646 Economics of Health: Theoretical and econometric analysis of selected aspects of the health care delivery system, such as the demand for medical services, the supply and demand for physician services, the utilization of non-physician medical personnel, alternative models of hospital behavior, third-party insurance reimbursement, national health insurance, and cost and price inflation in the hospital and long-term care sectors.
Prequisites: ECO 501, ECO 521
3 credits

ECO 647 Selected Topics in United States Economic History I: This course applies advanced economic theory to issues concerning the contribution of institutional arrangements to the development of the United States economy. Separate emphasis will be placed on the topics to be studied and the applications of the models. The seminar will concentrate on the political economy of the period.
Prequisite: ECO 501
3 credits

ECO 648 Selected Topics in United States Economic History II: This course applies advanced economic theory to issues related to the development of the United States economy from colonial times to the present. Among the issues to be studied are the character of modern economic growth in America, savings and growth, technical change, the interaction between growth and United States international economic relations, and the role of the Federal Reserve System in the Great Depression.
Prequisites: ECO 501, ECO 510
3 credits

ECO 650 International Trade: A modern and thorough presentation of international trade theory including the classical theory (Ricardo), the neoclassical theory (Heckscher-Ohlin-Samuelson) and extensions, welfare aspects, trade and growth, the theory of tariffs and applications.
Prequisite: ECO 501
3 credits

ECO 651 International Finance: Theories of balance of payments adjustment and exchange rate determination, including monetarist, Keynesian, and elasticity theories; disequilibrium macro models; policy analysis; international liquidity and capital flows.
Prequisites: ECO 501, ECO 511
3 credits

ECO 654 Foundations of Urban Economics: Analysis of the nature and functioning of urban areas. The theoretical foundations of urban economics are explored: theories of the consumer and housing producer in economic space, land rent and use, urban structure, and the size distribution and growth of urban areas. Emphasis is placed on methodology and hypotheses generated by the theories.
Prequisite: ECO 501
3 credits

ECO 655 Problems in Urban Economics: The theories developed in ECO 654 are applied to specific urban problems such as poverty, housing, slums and urban renewal, urban transportation, financing local government, and environmental quality. Emphasis is placed on methodology. ECO 654 is recommended though not a prerequisite.
Prequisite: ECO 501
3 credits

ECO 660 Comparative Economic Systems: A systematic treatment of systems analysis, stressing decision making, information and motivation. A conceptual framework is developed for analyzing market, centrally planned, and planned market models; the model and the reality of Soviet-type centrally planned economies and the reforms in these economies; the model and reality of worker management; and measurement of quality of system performance.
Corequisite: ECO 500
3 credits

ECO 661 Theory of Economic Systems: Introduction to the theory of social preference and choice functions, voting systems, informationally decentralized systems, Centralized and coercive systems. Team theory.
Corequisite: ECO 501
3 credits

ECO 662 Economic Development I: Analysis of the major issues in development and the principal theoretical contributions of economists to development problems. An effort will be made to examine the relevance of existing economic theories of development in the light of post-World War II experience, and with regard to the growth of multidisciplinary insights into widely variable institutional patterns of economic development.
Prequisites: ECO 501, ECO 510
3 credits

ECO 663 Economic Development II: A continuation of ECO 662, this course examines issues of development policy and plan formulation and implementation. Special attention will be devoted to selected regional, national, and sectoral cases.
Prequisite: ECO 662 or permission of instructor
3 credits

ECO 669 Studies in Economic Systems: 1-6 credits

ECO 690 Seminar in Applied Economics: Preparation, presentation, and discussion of student and faculty research in applied economics. Topics covered by student papers will usually be related to students' long-term research interests.
1-6 credits

ECO 691 Seminar in Economic Theory: Preparation, presentation, and discussion of student and faculty research in economic theory. Topics covered by student papers will usually be related to students' long-term research interests.
1-6 credits

ECO 692 Research Workshop in Systems and Development: Preparation, presentation, and discussion of student and faculty research on theoretical and applied topics in the fields of comparative systems and economic development. Topics covered by student papers will usually be related to students' long-term research interests.
1-6 credits

ECO 695 Research Workshops: Designed to direct students to the selection of dissertation topics. Oral and written presentation of student papers with active faculty participation. Several sections may be offered each semester in areas of broad research interest.
Prequisites: Three semesters of coursework in the Ph.D. program
1-6 credits, repetitive

ECO 696 Dissertation Seminar: A seminar for students engaged in dissertation research. Students give presentations of their dissertation research.
1-6 credits, repetitive

ECO 698 Practicum in Teaching: 1-6 credits

ECO 699 Dissertation Research: 1-9 credits
History

(HIS)

Chairperson: Fred Weinstein
Ward Melville Social and Behavioral Sciences Building N-309
(516) 632-7502/7510

Graduate Studies Director: Elizabeth Garber
Ward Melville Social and Behavioral Sciences Building N-325

Degree Requirements
Requirements for the M.A. Degree

In addition to the minimum Graduate School requirements, the following are required:

A. Advising
Upon registration, M.A. candidates will be assigned advisors in their anticipated area of study (e.g., United States, Europe, Latin America). The students will work out fields of study and schedules of appropriate courses with their advisors.

B. Courses
The M.A. program is designed to provide background in the department's three major areas of concentration (United States, Europe, Latin America) for students in each field. It will also provide training in research and writing skills. To achieve these goals, the M.A. curriculum consists of required courses that full-time students can complete in one academic year. These courses are as follows:

1. HIS 500: Introduction to Historiography
2. HIS 501-502, 521-522, 545-546: Introductory field seminars surveying the literature and controversies in each of the major fields (United States, Europe, and Latin America).
3. HIS 510-511, 530-531, 541-542: One-year sequence reading-research seminars to introduce students to the literature and methods of broad areas such as social or intellectual history. The first semester is introductory reading and discussion oriented toward formulation of a research topic. The second will concentrate on production of a research paper.
4. HIS 582: Exam preparation workshop, a study group under faculty supervision that will help the student prepare for the special emphasis (e.g., political history) within his/her M.A. examination field.

For students holding an assistantship (and, therefore, enrolled in HIS 581, Supervised Teaching) required courses will amount to the full 30 credits; those without assistantships (and, therefore without HIS 581) will make up the needed six credits through directed readings with individual faculty members.

The M.A. degree will be awarded upon satisfactory completion of the specified required courses, at least 30 graduate credits, and demonstration in an oral examination of competence in a field of history.

C. Examination
A committee of three faculty members, chosen by the student in consultation with an M.A. advisor, will assess the work accomplished by the student, and the knowledge acquired, in an oral examination. This examination will be taken in the student's final semester of M.A. work.

Requirements for the Ph.D. Degree

The Ph.D. is the highest professional degree granted by the History Department. Candidates for the degree must hold an M.A. awarded either by the State University of New York at Stony Brook or by another institution which it recognizes. Candidates must have been formally admitted to the Ph.D. program in history and have an advisor/thesis director who has agreed in writing, even if conditionally, to guide the student through the Ph.D. qualifying examinations and direct the dissertation.

The Ph.D. program, which is organized differently from the M.A. program, is supervised by a Ph.D. preparation committee made up of members of the graduate faculty in fields in which the student has an interest. The Preparation Committee will prescribe the content of the student's program. A foreign language requirement will be set by this committee and will in no case be less than a reading knowledge of one foreign language. The Ph.D. Preparation Committee will assist the student in defining and mastering two fields of knowledge:

Field 1, Dissertation Field: An area of historical knowledge which includes the student’s expected research interest, and which comprises a field sufficiently broad for the purpose of undergraduate teaching. Example: Modern European History with emphasis on 19th-century Germany.

Field 2, Comparative Field: An area of study comprising a second, distinct field based on selected historical problems or themes and the methods used in studying them. The topics chosen should cover more than one country or region. In Field 2, the department will offer four options that reflect the faculty's strengths and interests:
1. Social history with emphasis on, e.g., women, urbanization, industrial working class, blacks, peasantry, the family.
2. Intellectual history with emphasis on, e.g., ideas, popular culture, political economy.
3. Political history, with emphasis on, e.g., institutions, parties or movements, ideologies, foreign policy.
4. History of science and technology with emphasis on, e.g., intellectual and/or social history of physical or biological sciences, history of medicine, history of technology.

In addition to the minimum Graduate School requirements, the following are required:

A. Coursework
The program should be planned in consultation with the student's Ph.D. preparation committee. In every case, however, it must include four graduate seminars beyond the M.A., two of which must be research seminars. In addition, each student is required to take a formal reading course and a thesis prospectus workshop. These course requirements must be met before qualifying (preliminary) examinations are taken. All students holding full or
partial traineeships must register for three credits of HIS 581, Supervised Teaching, in each semester in which they hold such an appointment. Students who have not held a traineeship in the course of their graduate careers must take HIS 581 for at least one semester during their Ph.D. program. Full-time students are expected to take their qualifying (preliminary) examinations at the end of their fourth semester of post-M.A. work.

B. Ph.D.-Level Seminars
There are two types of doctoral-level seminars: Reading (numbered above 500), which are principally discussion and written analysis of selected historical works; and Research (numbered above 600), which provide the opportunity for original research and writing of a substantial paper based on the research. In addition to regular courses, students may take directed readings with faculty members to cover specialized fields.

C. Thesis Prospectus Workshop
All Ph.D. students will be required to take the thesis prospectus workshop (HIS 695) in order to help them prepare their dissertation prospectuses. This prospectus should contain an explanation of the research problem under investigation, a summary of the relevant secondary literature, a statement of hypothesis and an outline of both the research sources and the methods that the student expects to employ. The prospectus must be acceptable to both the instructor of the thesis workshop and the student’s Ph.D. committee. The workshop should be completed either before or in the same semester as the qualifying (preliminary) examination. Completion of the workshop and the dissertation prospectus are required for advancement to candidacy.

D. Qualifying (Preliminary) Examinations
The Ph.D. examination will be an oral examination covering both the dissertation and comparative fields, each given equal emphasis. The examining committee will take into consideration the student’s overall graduate record before recommending advancement to candidacy.

E. Foreign Languages
Proficiency in at least one foreign language must be demonstrated before a student may be advanced to Ph.D. candidacy. The student and his/her Ph.D. committee will decide which language is most suitable, with the approval of the graduate committee.

F. Supervised Teaching
Teaching assistants in the History Department are expected to perform either research or teaching functions in the department, up to a maximum of 12 hours a week.

Those who are teaching will enroll in HIS 581, Supervised Teaching, for three units per semester of degree credit. Their work will be supervised by the member of the faculty to whom they are assigned.

All doctoral students beyond the M.A. level, whether teaching assistants or not, are expected to perform some kind of supervised teaching during their graduate careers.

G. Advancement to Candidacy
After the student has passed the qualifying examination, the department shall propose to the Vice Provost for Research and Graduate Studies that the student be advanced to Ph.D. candidacy.

H. Dissertation
A dissertation is required for the Ph.D. degree. All students will be required to complete a preliminary dissertation prospectus before taking their qualifying examination.

After advancement to candidacy, a student will register for dissertation credits in consultation with the advisor. The student will select a dissertation topic within the major field. At present, the department offers dissertation fields in United States, Modern European, and Latin American history, and Expansion of Europe.

The dissertation must, upon completion, be approved by a dissertation examining committee of at least four members of the faculty, appointed by the Vice Provost for Research and Graduate Studies. This committee must include the dissertation supervisor and at least one person from outside the department.

Before final approval can be granted the student must present the results of the dissertation research at an informal dissertation colloquium convened for that purpose by the department and open to interested faculty members and graduate students.

I. Time Limit
All requirements for the Ph.D. degree must be completed within seven years after completing 24 hours of graduate courses in the department. In rare instances, the Vice Provost for Research and Graduate Studies will entertain a petition to extend this time limit, provided it bears the endorsement of the chairperson of the department.

For further details, see the appropriate section of the Graduate School regulations.

Courses

HIS 500 Historiography
Introduction to historiography through reading and writing about interpretations of history, historiography, research methods, and major historians. Term paper on historian of choice. Required for all M.A. students.
3 credits

HIS 501 Introduction to Early Modern Europe
Field seminar in early modern European history, 1450-1789. Surveys the major historical problems and interpretations from the Renaissance to the coming of the French Revolution. Required for M.A. students in European history.
3 credits

HIS 502 Introduction to Late Modern Europe
Field seminar in late modern European history, 1789-1945. Surveys the major historical problems and interpretations from the French Revolution through the Second World War. Required for M.A. students in European history.
3 credits

HIS 510, 511 Reading and Research Seminar in European History
A one-year sequence designed to develop research skills. First semester focuses on background reading, identifies a research problem, and prepares a prospectus and bibliography. Second semester concentrates on research and writing the project. This sequence is offered in broad topic areas such as intellectual history and stresses a comparative perspective. Required for M.A. in European history.
3 credits fall semester, 6 credits spring semester

HIS 521 Introduction to United States History to the Civil War
Field seminar in United States history from the founding of the British colonies to the beginning of the Civil War. Surveys the major topics and interpretations. Required for M.A. students in United States history.
3 credits

HIS 522 Introduction to United States History Since the Civil War
Field seminar in United States history from the Civil War to the Cold War. Surveys the major topics and interpretations. Required for M.A. in United States history.
3 credits

HIS 530, 531 Reading and Research Seminar in United States History
One-year sequence. See description of HIS 510, 511. Required for M.A. in United States history.
3 credits fall semester, 6 credits spring semester

HIS 541, 542 Reading and Research Seminar in Latin American History
One-year sequence. See description of HIS 510, 511. Required for M.A. in Latin American history.
3 credits fall semester, 6 credits spring semester

HIS 545 Introduction to Colonial Latin American History
Field seminar in colonial Latin American history. Surveys major historical problems and debates from the colonial period through the war for independence. Required for M.A. in Latin American history.
3 credits

HIS 546 Introduction to Modern Latin American History
Field seminar in modern Latin American history. Surveys major historical problems and debates from the post-independence period to the present. Required for M.A. in Latin American history.
3 credits
HIS 582 Introduction to Modern African and/or Asian History
Field seminar in Modern African and/or Asian History. Surveys major topics such as nationalism, anticolonial movements, and modernization. 3 credits

HIS 581 Supervised Teaching
Teaching practicum that usually accompanies a student's thesis work. 3 credits

HIS 582 M.A. Examination Workshop
A study group under faculty supervision that focuses on preparing specific fields for the M.A. examination. A tutorial approach is used when insufficient numbers or special attention merits it. No written assignments. Required for all M.A. students. 3 credits, repetitive

HIS 583-586 Directed Readings for M.A. Candidates
Specialized tutorials based on contractual relationship between individual student and faculty member. Required for M.A. students. Variable and repetitive credit

READING COLLOQUIA FOR M.A. AND PH.D. STUDENTS
The following are specialized reading colloquia that vary with student demand and faculty interest. 3 credits each

HIS 503, 504 Reading Colloquium in Ancient and Medieval History
HIS 505-509, 515-517 Reading Colloquium in European History Since 1500

HIS 512 Reading Colloquium in the History of Science
HIS 523-529, 532-534 Reading Colloquium in United States History
HIS 535 Reading Colloquium in History and Public Policy
HIS 543, 544 Reading Colloquium in Latin American History
HIS 552-555 Reading Colloquium in English History
HIS 561 Reading Colloquium in East Asian History
HIS 590 Reading Colloquium in Historical Methods
HIS 593 Reading Colloquium in Social Theory and History

RESEARCH SEMINARS
Research seminars provide advanced training for Ph.D. students in the practice of historical research and writing. They are offered on the basis of student need and the availability of faculty. At least one research seminar is scheduled for each major field, i.e., United States, European, and Latin American history, in the course of an academic year. 3 credits each

HIS 600 Research Seminar in Political History
HIS 601 Research Seminar in Economic History

HIS 602 Research Seminar in Social History
HIS 603 Research Seminar in Intellectual and Cultural History
HIS 604-610, 615-617 Research Seminars in European History Since 1500
HIS 621-634 Topical Research Seminars in United States History
HIS 641-645 Topical Research Seminars in Latin American History
HIS 652-655 Topical Research Seminars in English History
HIS 661 Topical Research Seminars in East Asian History
HIS 682-686 Directed Readings for Ph.D. Candidates
Specialized tutorials based on contractual relationship between individual student and faculty member. Variable and repetitive credit

HIS 695 Thesis Prospectus Workshop for Ph.D. Candidates
Required of all Ph.D. candidates in order to prepare a dissertation prospectus. This seminar should be completed either before or in the same semester as the qualifying examination. Offered once each year. 3 credits

HIS 699 Research for Ph.D. Candidates
Dissertation research under direction of advisor. Variable and repetitive credit
Degree Requirements

Requirements for the M.A. Degree in TESOL

In addition to the minimum Graduate School requirements, the following are required:

A. Formal Course Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIN 521 Syntax</td>
<td>3</td>
</tr>
<tr>
<td>LIN 522 Phonetics</td>
<td>3</td>
</tr>
<tr>
<td>LIN 524 Methods of TESOL</td>
<td>3</td>
</tr>
<tr>
<td>LIN 527 The Structure of English</td>
<td>3</td>
</tr>
<tr>
<td>LIN 571 Practicum in TESOL I</td>
<td>3</td>
</tr>
<tr>
<td>LIN 572 Practicum in TESOL II</td>
<td>3</td>
</tr>
<tr>
<td>3. Three of the following:</td>
<td>9</td>
</tr>
<tr>
<td>LIN 525 Contrastive Analysis</td>
<td></td>
</tr>
<tr>
<td>LIN 526 Analysis of an Uncommonly Taught Language</td>
<td></td>
</tr>
<tr>
<td>LIN 531 Language Testing</td>
<td></td>
</tr>
<tr>
<td>LIN 532 Second Language Acquisition</td>
<td></td>
</tr>
<tr>
<td>LIN 541 Bilingualism</td>
<td></td>
</tr>
<tr>
<td>LIN 542 Sociolinguistics</td>
<td></td>
</tr>
</tbody>
</table>

3. One elective course approved by the department 3

Total 30

B. Performance

The student must achieve a grade point average of B or higher in order to be graduated from the program.

C. Course Waivers

Certain required courses may be waived for students showing an exceptional background in linguistics or TESOL. Application for such waivers must be made in writing to the department. In any case, all students must complete 30 graduate credits of approved coursework to receive a degree.

Requirements for the M.A. Degree in Applied Linguistics

In addition to the minimum Graduate School requirements, the following are required:

A. Course Requirements

A total of 30 graduate credits, including:
- LIN 521 Syntax
- LIN 522 Phonetics
- LIN 523 Phonology and Morphology
- Other courses will be chosen from the student's major area of interest, and must be approved by the student's advisor.

B. Thesis

A thesis, to be written under the supervision of a thesis committee. The thesis must be approved by that committee.

C. Language Requirement

Proficiency in English and a reading knowledge of one other language.

Requirements for the D.A. in Foreign Language Instruction with a Concentration in TESOL

In addition to the minimum Graduate School requirements, the following are required:

A. Formal Course Requirements

<table>
<thead>
<tr>
<th>Major Field Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. LIN 521 Syntax</td>
<td>3</td>
</tr>
<tr>
<td>2. LIN 522 Phonetics</td>
<td>3</td>
</tr>
<tr>
<td>3. LIN 542 Sociolinguistics</td>
<td>3</td>
</tr>
<tr>
<td>4. LIN 535 Historical Linguistics</td>
<td>3</td>
</tr>
<tr>
<td>5. LIN 523 Phonology &amp; Morphology</td>
<td>3</td>
</tr>
<tr>
<td>6. Electives</td>
<td>9</td>
</tr>
</tbody>
</table>

Subtotal 24

Professional Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. LIN 532 Second Language Acquisition</td>
<td>3</td>
</tr>
<tr>
<td>8. LIN 524 Methods of Foreign Language Teaching</td>
<td>3</td>
</tr>
<tr>
<td>9. LIN 571 Practicum</td>
<td>3</td>
</tr>
</tbody>
</table>

C. Language Requirement

Proficiency in English and a reading knowledge of one other language.

Elective courses must be approved by the departmental advisor. A maximum of six transfer credits may be recognized for non-SUNY candidates and nine for SUNY candidates. The requirement of one of the items in 9-10, i.e., Practicum, Internship, or Externship, may be waived upon production of satisfactory teaching record.

B. Language Requirement

Demonstration of proficiency in speaking, understanding, reading, and writing a language other than the candidate's native tongue.

C. Comprehensive Examination

Successful completion of a comprehensive examination consisting of both an oral and a written examination is required.

D. Dissertation

A dissertation must be submitted and approved by the doctoral committee.

Courses

LIN 521 Syntax
A study of the fundamental notion of grammar as a formal device which generates (describes) all and only the well formed sentences of a language. The general methodology of modern syntax is applied to a wide range of problems in a variety of languages, providing students with the tools for independent analysis. Crosslisted with ANT 571. 3 credits

LIN 522 Phonetics
A study of articulatory phonetics and the international phonetic alphabet, with intensive practice in phonetic transcription from a wide variety of languages. Acoustic phonetics, speech perception, and the applications of phonetics to foreign language teaching. Crosslisted with ANT 572. Fall, 3 credits

LIN 523 Phonology and Morphology
An introduction to the formal study of sound patterns and the internal structure of words. Although English will be central, a wide variety of languages will be analyzed. Prerequisite: LIN 522 3 credits
LIN 524 Methods and Materials of TESOL
Theoretical bases of foreign language pedagogy; inputs from linguistics, psychology, and education; overview of methods; syllabus design; lesson plans; teaching aids; techniques for teaching grammar, vocabulary, pronunciation, reading, and writing; teaching communicative competence; evaluating and creating textbooks and supplementary materials.
Fall, 3 credits

LIN 525 Contrastive Analysis
A survey of linguistic typology and a comparison of various languages as a basis for understanding the errors made by language learners and devising strategies for teaching a foreign language. Crosslisted with ANT 576.
Prerequisite: LIN 522 or permission of instructor
3 credits

LIN 526 Analysis of an Uncommonly Taught Language
Working from primary and secondary sources, students construct an outline of the phonology, morphology, and syntax of a language previously unknown to them. Crosslisted with ANT 576.
Pre-or corequisite: LIN 521 and LIN 522, or permission of instructor
3 credits, repetitive

LIN 527 Structure of English
A description of the major sentence elements, subsystems, and productive grammatical processes of English. The justification of grammatical categories, interaction between systems and processes, and notions of standard and correctness are discussed with a view to their application in the ESL classroom.
Fall, 3 credits

LIN 530 Introduction to General Linguistics
An introduction to modern theoretical and applied linguistics, including phonology, morphology, syntax, language acquisition, historical linguistics, and sociolinguistics.
3 credits

LIN 531 Language Testing
The application of the principles of measurement to the assessment of linguistic functioning. The relation of test strategies to validity and reliability. The role of testing in research, schools, and society. Examination of specific language tests.
3 credits

LIN 532 Second Language Acquisition
Study of the acquisition of a second language by children and adults. The focus is on the systematicity of the learners' errors, the ease of acquisition in childhood, etc., the adequacy of theories (e.g., interlanguage processes, the monitor model, the critical period) to explain data, and the reliability of methods of obtaining data. Students conduct an empirical study testing a current hypothesis.
3 credits

LIN 534 Applied Linguistics
A survey of the potential and actual applications of linguistic principles and findings to a variety of human concerns. The implications of linguistics for theories of language learning, syllabus design, error prediction and correction, literary analysis, non-standard and non-native varieties of language, language teaching for specific functions, and bilingual functioning.
3 credits

LIN 535 Historical Linguistics
A study of linguistic change. Some general topics to be discussed are the genetic classification of languages; language families, language, and prehistory; reconstruction; types of sound change; types of semantic change; borrowing.
3 credits

LIN 541 Bilingualism
Study of the social, linguistic, educational, and psychological aspects of bilingualism.
3 credits

LIN 542 Sociolinguistics
An introduction to major topics in sociolinguistics, including variation theory, language attitudes, language planning, language change, and pidgins and creoles.
3 credits

LIN 550 Selected Topics in Linguistics
Topics will be announced each semester. The course may be repeated for credit as the topic differs.
Fall and spring, 3 credits each semester

LIN 555 Error Analysis
Study of the systematic errors made by foreign language learners and the potential of various linguistic theories to predict and account for these errors.
Prerequisites: LIN 521, LIN 522, and LIN 525, or permission of instructor
3 credits

LIN 571 Practicum in TESOL I
Each student will have primary responsibility for teaching a section of English as a Second Language under the supervision of a member of the TESOL Department.
Fall and spring, 3 credits each semester

LIN 572 Practicum in TESOL II
Each student will have primary responsibility for teaching a section of English as a Second Language under the supervision of a member of the TESOL Department.
Fall and spring, 3 credits each semester

LIN 578 Language and Cultural Context
Language and its use in cultural context. Topics include structure of languages; origin and development of human language; relationship of language and culture (ethno-linguistics, sociolinguistics); language and cultural change, language and mind, language acquisition.
Crosslisted with ANT 578.
Spring, 3 credits

LIN 591 Directed Readings
Students read and evaluate the literature on a topic of special academic interest or professional relevance under the direction of a faculty member.
Prerequisite: Permission of instructor
1-3 credits, repetitive

LIN 592 Directed Research
Students conduct research on a topic of special academic interest or professional relevance under the direction of a faculty member.
Prerequisite: Permission of instructor
1-3 credits, repetitive

LIN 595 Thesis
Exceptionally well qualified students may be given the opportunity to present a thesis, consisting of original work on a topic in applied linguistics. Only students who are specifically invited to do so by the faculty may take this course.
Fall and spring, 3 to 6 credits

DLT 801 Internship in TESOL
Students in the Doctor of Arts Program will assist an instructor as an aide in a language course on the undergraduate level.
Fall and spring, 1-3 credits

DLT 802 Externship in TESOL
Students in the Doctor of Arts Program will teach one to three courses at the high school, junior college, or college level under the supervision of a master teacher.
Prerequisite: All other coursework completed
Fall and spring, 1-3 credits

DLT 699 Doctoral Research in TESOL
Independent research for the Doctor of Arts degree. Open only to candidates for the Doctor of Arts who have passed the preliminary examination.
Fall and spring, 1-6 credits, repetitive

DLT 680 Doctoral Seminar
Doctoral candidates will present and discuss their own research work.
Prerequisite: Advanced standing
Fall and spring, 3 credits each semester
Political Science

(POL)

Chairperson: Mark Schneider
Ward Melville Social and Behavioral Sciences Building S-711
(516) 632-7660

Graduate Studies Director: John T. Scholz
Ward Melville Social and Behavioral Sciences Building N-727
(516) 632-7655

Degree Requirements
Requirements for the M.A. Degree
In addition to the minimum requirements of the Graduate School, the department requires all candidates to complete 30 credits of approved graduate coursework in which a grade of B or higher has been received.

Requirements for the Ph.D. Degree in Political Science
Candidates must meet the general requirements for the Ph.D. degree set by the Graduate School. Departmental requirements are as follows:

A. Core Courses
Students take three core courses:
1. POL 533: Administration and Public Policy
2. POL 550: American Politics
3. POL 551: Political Psychology.

B. Methods
Students are expected to master the methods necessary to engage in scholarly work:
1. All students take a three course sequence in mathematics, statistics, and research methods (POL 602, 603, 604).
2. American government and policy students are required to take at least one advanced methods course either in this department or in a cognate field (e.g., economics). The student's choice of advanced elective(s) is decided in consultation with the student's advisor.
3. Political Psychology students take POL 554, a graduate level course in experimental design. They are also required to take an additional advanced methods course, chosen in conjunction with their advisor.

C. Electives
Students take a series of advanced seminars in their area of specialization. These seminars can be within the department or can be in cognate fields such as psychology, economics, or applied math. The course of study is selected by the student in consultation with his/her advisor and must be approved by the department's graduate studies director. The student usually takes between 15-16 courses before taking comprehensive examinations, normally following the student's third year.

D. Teaching and Research Apprenticeship
To ensure that all students become proficient in teaching and research, students work with the faculty on an individual basis. Funded students participate in faculty research projects and assist in teaching courses. Advanced students then prepare and teach their own undergraduate classes.

E. Evaluation
Graduate students in the Ph.D. program are formally evaluated in the middle of the spring semester, based on grades received in the program and on evaluations by faculty familiar with the student's work.

The evaluation committee's charge is to make one of the following three possible determinations with regard to the student's progress: (a) recommend continuation of graduate study toward the Ph.D. (b) recommend that the student be allowed to continue toward a terminal M.A. but not to continue in the Ph.D. Program, (c) recommend that the student not be permitted to enroll in additional graduate courses in the department.

4. Students who have attended the ICPSR Summer Program in Quantitative Methods at the University of Michigan can have the advanced elective requirement waived.

4. Students who have attended the ICPSR Summer Program in Quantitative Methods at the University of Michigan can have the advanced elective requirement waived.

The evaluation also serves as the basis for the decision on whether the student is to receive financial support during subsequent semesters of graduate work.

F. Comprehensive Examinations
1. Timing of Examinations
Students making normal progress toward the Ph.D. should anticipate taking comprehensive examinations following the third year of coursework. Examinations in three fields compose the doctoral comprehensive examinations.

2. Examination Fields
The department's policy is to allow students to take exams only in those areas in which its faculty strengths allow in-depth training, including:
- Methods
- American Politics
- Public Policy
- Political Psychology

All students are required to take the methods exam. Students then prepare two of the three substantive areas for written examination.

3. Preparation and Evaluation of Examinations
The graduate studies director appoints a committee (with a designated committee chairperson) responsible for each examination field. The committee prepares the written examination, providing sufficient options for questions on which students may write. The committee members read the student's examination and prepare an evaluation of that performance, which is reviewed by the Ph.D. committee.

G. Dissertation
A preliminary dissertation proposal is developed during the third year as a part
of preparation for the comprehensive examination. Upon successful completion of the examinations, the student begins the formal process of preparing his/her dissertation.

The student, in consultation with his/her faculty advisor and the graduate studies director, selects a dissertation committee of four faculty members—three from the Department of Political Science and one with whom the student has worked from outside the department.

In consultation with the committee and with the guidance of the advisor, the student prepares a formal dissertation proposal. This proposal is formally presented to the committee at the beginning of the semester following the successful completion of the comprehensive examinations. If the dissertation committee rejects the proposal, a candidate is allowed to revise the proposal for a subsequent defense. If this second attempt also results in failure, the student's program is terminated.

Upon successful conclusion of research, the student defends the completed dissertation to the committee and the university community-at-large.
Courses

The required courses for first-year students are given every year, while electives are generally offered every other year. Courses are open to qualified students from other programs with permission of the graduate studies director.

REQURED COURSES

POL 533 Foundations: Administration and Public Policy
A systematic introduction to the principles of public administration and public policy, with an emphasis on the formulation of legislative and administrative decisions. A major part of the course is devoted to student projects which analyze the formulation of a governmental program or policy. 3 credits

POL 550 Foundations: American Politics
A review of the basic political science literature on American politics, with emphasis on American political institutions. 3 credits

POL 551 Foundations: Political Psychology/Behavior
A review of the political behavior literature, including such topics as attitude formation and change, belief systems, political socialization, demographic and small group influences on political beliefs and conduct, political leadership, electoral behavior, elite vs. mass politics, decision making, personality and politics, political conformity, and protest. 3 credits

POL 602 Mathematical Methods I
Introduction to mathematical methods and in-depth discussion of polynomial arithmetic, including: sets, functions and relations, number system, structure spaces, calculus, and maximization. This course is aimed at a general audience. Strong mathematical background is not required. 3 credits

POL 603 Applied Data Analysis II
The application of statistical and mathematical models to the analysis of political data, introduction to the research process, including philosophy of science, research designs, measurement, basic descriptive, and inferential statistics. 3 credits

POL 604 Applied Data Analysis III
A continuation of POL 603 with emphasis on methodological assumptions and problems: correlation, analysis of variance, simple and multiple regression. Prerequisite: POL 603 or equivalent 3 credits

ELECTIVES: METHODOLOGY

POL 606 Time Series Analysis
The use of time series to study the effects of "interventions" (policies, events) on a phenomenon observed over time, model the dynamic relationships between several time series, such as unemployment and government popularity, inter causal effects, and make forecasts. ARIMA models provide the basic analytic tool, which also helps handle trends, seasonality, and cyclical patterns. 3 credits

POL 609 Advanced Research Design
A practical application of topics in the philosophy of science to the research design. Students will prepare their dissertation proposal as a part of this course. Prerequisite: Permission of graduate studies director 3 credits

POL 676 Advanced Topics: Methods I
A course reviewing the literature and methodology of specific areas of political science research. The course will relate directly to research applications and provide students with an opportunity to apply advanced research tools to selected substantive problems. Prerequisite: Permission of graduate studies director 3 credits, repetitive

POL 677 Advanced Topics: Methods II
A continuation of POL 676. 3 credits

ELECTIVES: AMERICAN POLITICS

POL 612 Classics of American Politics
Reading and discussion of a selection of the most frequently cited works in the field of American Politics, with emphasis on relatively contemporary authors. 3 credits

POL 613 Introduction to Public Choice
An introduction to public choice theory with empirical applications. Major areas to be covered are: models of voting and decision theory as general models of political decision making, social choice theory as a normative tool for analyzing voting systems. Empirical applications will focus primarily on American presidential elections. 3 credits

POL 614 American Judiciary
A seminar on judicial process and behavior. Emphasis will be placed on the Supreme Court, but trial courts and other appellate courts will be examined as well. Topics will include constitutional interpretation, and both legal and extra­ficial models of decision making. Students should possess basic methodological skills. 3 credits

POL 615 Legislative Process
A seminar on the legislative process, focusing on current research on the United States Congress. 3 credits

POL 616 Political Parties and Elections
A seminar on parties, campaigns, and elections in the United States to be covered include party organization and leadership, nomination and general election campaigns, and the role of parties in government. 3 credits

POL 617 Electoral Behavior
Models of voting choices; key attitudes such as part identification, issue orientations and ideology; the impact of group affiliations, economic conditions; campaign strategies of candidates; congressional versus presidential elections; historical change, e.g., party realignments. 3 credits

POL 673 Advanced Topics: American Politics
A seminar in American institutions and processes, focusing current research in such areas as Congress, the Supreme Court, presidency, political parties, or bureaucracy. Prerequisite: POL 650 3 credits, repetitive

POL 674 Advanced Topics: American Politics II
A continuation of POL 673. 3 credits

ELECTIVES: PUBLIC POLICY

POL 530 Topics in Public Affairs
Specially organized seminars are offered on topics of particular importance to students of public affairs. These courses are led by distinguished experts in those policy areas. 3 credits

POL 531 Topics in Public Affairs: Planning
This course addresses the planning process as a decision-making tool in the implementation of public policy in housing, land-use, transportation, and environmental management. The course also investigates intergovernmental relations and the impact of citizen participation on policy implementation. 3 credits

POL 534 Intergovernmental Relations and Policy Delivery
The examination of the formulation, implementation, and impact of intergovernmental policy. Several policies are examined in depth, including grant-in-aid programs, General Revenue Sharing, housing and community development, and employment programs. The historical, economic, and political foundations of intergovernmental policy delivery systems are examined. 3 credits

POL 535 Public Policy Analysis and Evaluation
This course concentrates on the strategies and methods of public policy analysis and evaluation. Skills stressed in the course include developing a research strategy and design, choosing measures for analyzing data and communicating results. Students develop a program evaluation of their own and partially conduct their research during the semester. Prerequisite: POL 533 or permission of graduate studies director 3 credits

POL 543 Environmental Politics and Policy
An examination of the scope of government regulation of business, especially environmental policies, as well as the political economy of the environment. The course explores how the environment has been defined, how government policies are developed, and the implications of these policies for the economy and society. 3 credits

POL 602 Water and Sanitation Policy
An examination of the scope of government regulation of business, especially environmental policies, as well as the political economy of the environment. The course explores how the environment has been defined, how government policies are developed, and the implications of these policies for the economy and society. 3 credits

POL 611 Intergovernmental Relations
An examination of the formulation, implementation, and impact of intergovernmental policy. Several policies are examined in depth, including grant-in-aid programs, General Revenue Sharing, housing and community development, and employment programs. The historical, economic, and political foundations of intergovernmental policy delivery systems are examined. 3 credits

POL 621 Theories of Policy-Making
An introduction to theories of policy-making, especially policy formulation, stressing reading and thinking about classics and acquiring skills necessary for theorizing, including mathematical modeling and formal theory. Laboratories focus on improving special skills (e.g., optimization) and theorizing about particular policy areas (e.g., pork barrel politics). 3 credits

POL 622 Bureaucracy and the Policy Process
An examination of bureaucracy as part of the policy-making process. This course reviews theoretical explanations for the bureaucrat as a political institution and implications of its rapid growth since the New Deal. It also includes inside bureaucratic organizations, examining factors that influence the exercise of discretion and policy implementation. 3 credits

POL 673 Advanced Topics: American Politics
A seminar in American institutions and processes, focusing current research in such areas as Congress, the Supreme Court, presidency, political parties, or bureaucracy. Prerequisite: POL 650 3 credits, repetitive

POL 674 Advanced Topics: American Politics II
A continuation of POL 673. 3 credits
**POL 623 Urban Politics**
This course concentrates on urban and suburban growth; the decentralization of metropolitan areas; land use policy and reforming metropolitan policy-making. Specific policy areas, such as education, finance, and police are considered. Political phenomena, including parties and ethnic groups, are also discussed.
3 credits

**POL 624 Decision Making in Organizations**
A seminar on decision procedures in public and private organizations. The course begins with the rational choice model developed primarily in economics and policy analysis, then considers common problems of decision making arising from limited capabilities, conflicts among organization members, and uncertainties and ambiguity in the organization's environment. Readings are from several disciplines.
3 credits

**POL 670 Advanced Topics: Public Policy Analysis I**
An intensive examination of major substantive and methodological concerns involved in the investigation of the public policy process. Programs evaluation methodologies will be investigated as well as the political milieu within which these evaluations must be utilized. 
Prerequisite: Permission of graduate studies director
3 credits, repetitive

**POL 671 Advanced Topics: Public Policy Analysis II**
A continuation of POL 670.
3 credits

**ELECTIVES: POLITICAL PSYCHOLOGY**

**POL 554 Foundations II: Experimental Design & Methods**
An introduction to laboratory experimentation, with emphasis on experimental methods and design, as well as data analysis and interpretation. Students will become acquainted with the Political Science Department's Laboratory for Behavioral Research and the Media Research Laboratory, conducting experiments in these labs. In addition, students will be required to design their own research project.
3 credits

**POL 631 Political Cognition**
A survey of contemporary psychological models of information processing, with emphasis on experimental applications to the analysis of the content and structure of political concepts. 
Prerequisite: POL 551
3 credits

**POL 632 Mass Communication and Political Persuasion**
In depth examination of the role of mass media in the political process and the psychological dynamics of media influence. Effects of the media on public opinion and voting, implications of media influence on democratic theory.
3 credits

**POL 633 Social Influence & Group Processes in Political Decision Making**
Review of contemporary theories of social influence processes and group decision making, with emphasis on applications to decision making in politics. Special focus on small group methods and research applications.
3 credits

**POL 634 Behavioral Decision Theory**
Emphasizes psychological theories of judgment and choice and prediction of the errors that individual decision makers are likely to make. These ideas are applied to a variety of political contexts.
3 credits

**POL 678 Advanced Topics: Political Psychology/Behavior I**
Review of the literature and methods related to a single topic or problem in contemporary political science, voting behavior, issue formation, etc. Students will participate in regular research seminars.
Prerequisite: POL 550, 551
3 credits, repetitive

**POL 679 Advanced Topics: Political Psychology/Behavior II**
A continuation of POL 678.
3 credits, repetitive

**ELECTIVES: GENERAL**

**POL 553 Foundations: Comparative/International**
Survey and evaluation of the major theoretical approaches, issues, and problems in comparative political analysis. The course examines such areas as political development, empirical democratic theory, or political socialization, along with a detailed examination of one or more selected non-American political systems.
3 credits

**POL 598 Thesis Registration**
1 credit, repetitive, grading S, U

**POL 599 Independent Study**
This course can be arranged between a student and faculty member for the purpose of allowing the student to pursue independently supervised research. It may be arranged at the master's, doctoral, and graduate levels.
1-6 credits, variable and repetitive

**POL 667 Political Elites**
A critical review of established and new theoretical approaches and methodological orientations to the study of political elites.
3 credits

**POL 675 Advanced Topics: Comparative Politics I**
Readings and research papers on topics in comparative politics. Particular attention is given to concepts and methods identified with the field.
Prerequisite: POL 553
3 credits, repetitive

**POL 680 Independent Study**
Prerequisite: Permission of instructor and graduate studies director
1-6 credits, repetitive

**POL 681 Independent Study**
Prerequisite: Permission of Instructor and graduate studies director
1-9 credits, repetitive, grading S, U

**POL 690 Research Colloquium**
A course actively involving students in an ongoing research project under the direction of a principal investigator. Students will participate in all stages of research project and be required to present a research report on one aspect of the project.
3 credits, grading S, U

**POL 691 Research Practicum I**
A continuation of POL 690. Students actively participate in either a second research project, where they will continuing their participation in the same project, or one or more selected non-American political systems.
3 credits

**POL 692 Research Practicum II**
A continuation of POL 691. Students actively participate in either a second research project, where they will continuing their participation in the same project, or one or more selected non-American political systems.
3 credits, grading S, U, repetitive

**POL 699 Doctoral Dissertation Research**
Prerequisite: Permission of graduate studies director
1-9 credits, repetitive, grading S, U
Degree Requirements

The award of the Ph.D. signifies both a scholarly mastery of the field of psychology and the ability to conduct independent research. In addition to the Graduate School's degree requirements, students must satisfy the following requirements (as well as requirements of their area of studies):

A. Course Requirements
A student must maintain a graduate GPA of at least 3.0 and successfully complete an approved program of study with a grade of at least B in each required course. Two semesters of quantitative methods and three core courses selected from at least two areas outside the student's area of graduate studies are required. The core courses currently include: Neuropsychology, Physiological Psychology, and Comparative Behavior (Biopsychology); Psychopathology, (Clinical); Cognitive Development (Developmental); Animal Learning, Cognition and Memory, Sensation and Perception, and Measurement and Scaling (Experimental); Contemporary Issues in Social and Community Psychology (Social); and History of Psychology (General). In addition, two semesters of First-Year Lectures (no credit), and a one-credit practicum in statistical computer applications are required. Following admission students with graduate training elsewhere can petition to satisfy course requirements on the basis of their previous graduate work. Petition to waive requirements above, or to satisfy them on the basis of previous graduate work, should be directed to the Psychology Graduate Office. Petitions concerning area requirements should be addressed to the student's area director.

B. First-Year Evaluation
Progress of each first-year graduate student is reviewed at the end of the academic year by the entire faculty. The purpose of this review is to allow the student to withdraw without an excessive investment of time when, in the opinion of the faculty, the student would not pass the preliminary examination at the Ph.D. level or produce a suitable dissertation. Any student whose performance is below the standard the Ph.D. established by the department may be dismissed or asked to withdraw. Under certain circumstances a student may be permitted to obtain a terminal Master of Arts degree after passing the general examination at the M.A. level satisfactorily completing the required courses and 30 graduate credit hours of study culminating in an M.A. thesis.

C. M.A. Degree in the Course of Doctoral Studies
The department will recommend granting an M.A. degree to students who have successfully completed the general examination and other second-year requirements and have completed a research paper (which need not be presented in the form of a thesis), upon the recommendation of the faculty in the student's area of graduate studies.

D. Preliminary Examination
This examination ordinarily must be completed by the end of the fifth semester of study and consists of two parts. The general examination includes the completion of certain courses (see A) and a second year review/research paper suitable for submission to a refereed journal. This second year paper requirement must be satisfied prior to the specialty examination. The form of the specialty examination depends upon the student's area of graduate studies, but all areas require its completion before the end of the third year.

E. Advancement to Candidacy
Upon successful completion of the preliminary examination and requirements of the student's area of studies, a majority vote of the faculty of the student's area is required to recommend advancement to candidacy for the Ph.D.

F. Research and Teaching
Supervised teaching and research experience from admission through the fourth year is required. The program requires both research and instructional experience during each semester, rather than having students serve either as teaching assistant or as research assistant. This requirement can be waived or modified for students holding fellowships, serving as full-time interns or as graduate instructors, or being supported for grant research. Two semesters of substantial direct instruction in the classroom or laboratory is required. During these semesters, graduate students must receive teaching evaluations by their students.

G. Residence
Minimum residence of two years and the equivalent of three years of full-time graduate study is ordinarily required. Unless admitted as part-time students, residents must register for full-time study until advanced to candidacy. Full-time study is at least 12 credits during the first year of graduate study and nine thereafter.

H. Dissertation
The approval of the dissertation proposal and successful oral defense of the completed thesis are required.

Courses

PSY 500 Quantitative Background
For students with inadequate mathematical background and/or aptitude who will take PSY 501 and 502. Includes review and practice on topics in algebra, logic, sets and relations, functions, and elementary probability, as well as individually assigned remedial work on more elementary topics as required.
Prerequisite: Undergraduate statistics
Fall or spring. 3 credits

PSY 501 Analysis of Variance and Experimental Design
The design and analysis of factorial experiments having a single dependent variable. Topics include one- and within-subjects designs, mixed factor designs, interactions, trend analysis, planned comparisons, and analysis of covariance. Emphasis on applications in psychological research. Required of all Ph.D. students in psychology.
Prerequisite: Undergraduate statistics
Fall. 3 credits

PSY 502 Correlation and Regression
Correlation, regression, multiple correlation, multiple regression, partial correlation, and introduc-
PSY 503 Experimental Design
Examination of properties of common experimental designs in psychology together with the study of appropriate statistical analyses. Topics include factorial, hierarchial, latin square and incomplete designs. Statistical procedures include analysis of variance, linear contrasts, analysis of covariance and selected post-hoc procedures. This is an advanced course in design and statistics.
Prerequisite: PSY 501
Fall or spring, biennially, 3 credits

PSY 504 First-Year Lectures
Presentation and discussion of current research progress and interests. Required of all first-year Ph.D. students.
Fall and spring, no credit

PSY 507 Distribution-Free Statistics
Statistical inference when the exact form of population distributions is not specified, or when interval estimates are not available. These techniques are compared with "classical" methods.
Fall or spring, biennially, 3 credits

PSY 509 Practicum in Computer Applications
Workshops and practical experience in computer applications. Provides computer access for courses which do not have their own accounts and for student projects to satisfy other degree requirements.
Prerequisite: Psychology doctoral student not advanced to candidacy; for Section 2 (statistical applications), PSY 502 as a pre- or corequisite. Section 1: fall and spring, no credit, repetitive; Section 2: fall or spring, 1 credit

PSY 510 History of Psychology
Intensive reading in the history of psychology from original sources. Emphasis will be on class discussion and relation to modern problems.
Fall or spring, 3 credits

PSY 511 Classical Theories and Animal Learning
A consideration of the basic principles of learning. Analysis of the leading theories of learning as well as areas of controversy and dispute.
Fall, 3 credits

PSY 512 Cognition and Memory
An introduction to research and theory related to human learning and information processing. A review of major historical contributions as well as critical review of contemporary developments.
Spring, 3 credits

PSY 514 Sensation and Perception
An introduction to the phenomena of sensation and perception and the methods by which they may be studied. Different theoretical frameworks will also be considered.
Fall, 3 credits

PSY 515, 516 Research Practicum in Experimental Psychology
A review of the basic literature of experimental psychology. Emphasis will be placed on a research project which each student will formulate and complete within the year. Required of all second-year experimental students.
Fall and spring, 3 credits each semester

PSY 522 Children's Learning
The literature relating to learning processes in children will be covered. Respondent, operant and observational learning will be major topics. The experimental analyses of behavior will be stressed.
Fall or spring, biennially, 3 credits
gross potential recording) in vertebrates and invertebrates, but include microelectrode fabrication, electronic instrumentation, and mammalian brain dissection. Spring, biennially. 3 credits

PSY 557 Proseminar in Biopsychology
An in-depth critical review of the experimental literature concerning brain and behavior. Topics include cellular neurophysiology, motor control, sensory processing, and the neural basis of complex physiological processes. Fall or spring, biennially. 3 credits

PSY 558 Human Electrophysiology
Techniques for recording the electrophysiological activity of the human brain will be presented. Sensory and cognitive event-related potentials are discussed, as well as the application of these techniques to clinical questions. Individual reports on selected topics based on library research are required. Fall, 3 credits

PSY 559 Human Electrophysiology Lab
Experience in a variety of human electrophysiological techniques, with the emphasis on recording nervous potentials in auditory, visual, and somatosensory modalities. Individuals are responsible for conducting experiments on selected topics and submitting reports. Spring, 3 credits

PSY 571, 572 Comparative Behavior
Comparative methods for the observation and measurement of animal behavior. Both naturalistic and laboratory methods will be discussed. This course will be taught in conjunction with PSY 573, 574. Fall and spring, 3 credits each semester

PSY 573, 574 Comparative Behavior Lab
The use of detection response techniques, conditioning techniques, and habituation methods in the study of adaptive behavior are practiced using a wide variety of vertebrate and invertebrate species. Fall and spring, 3 credits each semester

PSY 575 Psychobiology of Primates
An advanced general course in the behavior of Old World monkeys and apes. Emphasis is placed on social organization, communication, development, and learning, especially under naturalistic conditions; but beyond this, topics are selected to reflect the most current advances in the area. Prerequisite: Permission of instructor Fall or spring, 3 credits

PSY 581, 582 Comparative Physiological Colloquium
Colloquium presentations on current research problems by advanced students, staff, and visiting scientists. Lecture and seminar each week. Fall and spring, 0-3 credits each semester, repetitive

PSY 583, 584 Experimental Psychology Colloquium
Seminars on current research problems directed by staff and invited scientists. Required of all experimental psychology students not advanced to candidacy. Fall and spring, 0-3 credits each semester, repetitive

PSY 590 Theories of Child Development
This course is oriented toward analyzing three classes of developmental theory (analytic, cognitive, and behavioral approaches) and relating the basic structure of each class of theory to current notions of philosophy and science. Spring, 3 credits

PSY 592 Proseminar in Applied Child and Family Research
Designed for students associated with the concentration in child and family studies, to introduce conceptual and methodological issues in research on prevention and amelioration of problems experienced by children and families. Students form research problems that require solution and the proseminar focuses on these problems. Students register for three credits during two semesters of active involvement in organizing presentations, otherwise for one credit. Fall and spring, 1-3 credits, repetitive

PSY 593 Normal Problems of Child Rearing
A critical review of research on the causes and treatments of behavioral problems in child rearing, with particular focus on understanding these problems in the context of research on normal development. Topics include sleep disturbances, toileting, discipline, peer interactions, aggression, school, and language problems. Fall or spring, biennially, 3 credits

PSY 594 Psychology of Women
Theoretical approaches to the psychology of women including Freud, Hornby, Thompson, Horner, and Ross. Women and the life cycle from adolescence to old age. Included are adolescent identity formation, female sexuality, marriage, childbirth, motherhood, and problems of middle and old age. Women in psychology textbooks: truth or fantasy? Women and psychopathology and psychotherapy. The psychology of the "New Woman." Fall or spring, biennially, 3 credits

PSY 595 Functional Analysis of Child Behavior
A functional analysis of behavior excesses and behavior deficits in children, with particular emphasis on the interface between development and behavioral psychology. Fall or spring, biennially, 3 credits

PSY 596 Deviant Development
A critical review of contemporary research on factors that contribute to the development of deviations from the norm for cognitive, affective, and behavioral functions in infants, children, and adolescents. Antecedent conditions to be considered are genetic, constitutional, nutritional, pharmacological, and societal factors, as well as those dealing with the influence of parents, peers, and school. Fall or spring, biennially, 3 credits

PSY 599 Instructional Methods for Child Development
The purposes of the course are (1) to introduce the student to literature on college teaching; (2) to aid the student in formulating instructional objectives; (3) to consider instructional methodologies; and (4) to provide the student with systematic feedback on his/her teaching performance. Fall and spring, 3 credits each semester

PSY 600 Teaching Methods and Practicum
Ordinarily a working seminar for students teaching or assisting in some particular course(s), particularly PSY 103, 211, or 303, with emphasis on delineation of course objectives, the preparation and presentation of special materials or topics, and the evaluation of teaching methods. Prerequisites: Appointment as teaching assistant or graduate instructor and permission of instructor Fall and spring, 1-3 credits, repetitive

PSY 601 First-Year Clinical Practicum
Exposure to the application of clinical methods. Corequisite: PSY 533 or PSY 534 Fall and spring, 1 credit each semester

PSY 602 Second-Year Clinical Practicum
Supervised experience in the application of clinical methods Corequisite: PSY 537 or PSY 538 Fall and spring, 1 credit each semester

PSY 603 Advanced Clinical Practicum
Supervised experience in clinical practice for advanced clinical students. Fall and spring, variable and repetitive credit

PSY 604 Clinical Psychology Internship
Qualified clinical students carry supervised clinical responsibilities in settings approved by the faculty. Fall and spring, variable and repetitive credit

PSY 606 Clinical Neuropsychology Internship
Qualified students specializing in neuropsychology carry out supervised responsibilities in an approved clinical neuropsychology facility. Fall and spring, 1-12 credits

PSY 610, 620 Seminars in Selected Topics
Topics selected on the basis of the needs of the graduate program and research interests of the staff. Prerequisite: Permission of instructor Fall and spring, 1-3 credits, repetitive

PSY 621 Seminar in Teaching Methods
Theory and pragmatics of good college teaching. Topics include lecturing, use of discussion, types of evaluation of students and teachers, factors affecting undergraduate learning, ethics, student-faculty relations, course administration, and audio-visual devices. Prerequisite: Matriculated psychology graduate student, permission of instructor Fall or spring, 3 credits, repetitive

PSY 638 Psychophysiological Methods
Covers organization of the human nervous system and its interaction with physiological response systems. Studies methods of recording and analyzing psychophysiological response measures. Examines the application of psychophysiological response measures and patterns to the study of individual attitudes and behaviors. Crosslisted with POL 630. Spring, 3 credits

PSY 696 Readings
Prerequisite: Permission of instructor Fall and spring, variable and repetitive credit

PSY 698 Research
Prerequisite: Permission of instructor Variable and repetitive credit

PSY 699 Doctoral Research
Prerequisite: Advancement to candidacy Variable and repetitive credit
Degree Requirements
Requirements for the Ph.D. Degree in Sociology

In addition to the minimum Graduate School requirements, the following are required:

A. Residence
Minimum residence is one year of full-time study. Students may be admitted to the Ph.D. program on a part-time basis, but these arrangements usually require that the students appear on campus during certain periods of the normal working day. Full-time study entails 12 or more graduate credit hours per semester for those students entering without prior graduate study or less than 24 graduate credit hours, and nine or more graduate credit hours per semester for those students entering with more than 24 graduate credit hours or with advanced standing provided by prior graduate work. Since a graduate trainee-ship is considered part of the academic program, credit hours will be given for teaching or research assistantships as well as supervised teaching. Credit hours may also be given for individual research work outside formal courses but under the supervision of faculty members.

B. Courses
Course requirements for a Ph.D. in sociology include four designated courses, two in sociological theory and two in research methods taken in the first year of graduate study. Of an additional 10 required courses, one must provide additional methodological training and can be chosen by the student from a variety of suitable offerings specified by the department. Three of the remaining nine required courses may be taken outside the department, upon written approval by the department’s graduate committee, and these three courses must be completed with at least a B average.

During the first year of study all full-time students take eight courses (for those students who have less than 24 graduate credit hours; students who have 24 or more graduate credit hours from prior graduate study take six courses during their first year). These must include two two-course sequences, one in sociological theory (SOC 505 and 506) and one in statistics and research methods (SOC 501 and 502)—and two elective courses. For those holding graduate traineeships, a teaching assistantship under the supervision of a faculty member would consist of two of the eight courses (one each semester).

C. M.A. Degree
A student is awarded the M.A. degree as a sign of progress toward the Ph.D. To receive the M.A. a student must complete:
1. Two consecutive semesters of full-time study, achieving a 3.0 grade point average for 30 hours of graduate work.
2. One of the three papers required by the writing option (Section D, Option 2) for the Ph.D. program.

D. Professional Competence Options
Continuing doctoral students have two options for completing the first half of the doctoral program before moving on to work in a special field and on their dissertation.

Option 1—Comprehensive Examination and M.A. Research Report: In this rather traditional option, the adequacy of a student’s general preparation is evaluated by means of a written comprehensive examination. This examination, to be taken between the beginning of the fifth semester and the beginning of the sixth semester of graduate study, must be passed at the standard set by the department for doctoral-level work. A student who fails to pass this examination at the required level, but whose performance is satisfactory in all aspects, may be permitted to take a terminal M.A. by completing 30 credits of graduate coursework and submitting an acceptable research report. Upon passing the comprehensive examination, the student must submit a research report that demonstrates ability to analyze empirical data and to present findings clearly and systematically. Upon successful completion of all of the above requirements, along with completion of a minimum of 30 hours of graduate credit, the department will recommend to the Vice Provost for Research and Graduate Studies that the student be awarded the M.A. degree as a sign of progress toward the Ph.D. Recipients of the terminal M.A. will not be granted permission to continue.

Option 2—The Three Papers: In this option, a student can meet M.A. requirements and proceed to the second half of doctoral work through the submission of three papers written under faculty supervision. These should normally be completed by the middle of the fourth academic year; each of the three papers is designed to allow students to demonstrate different competence. Each paper should be more substantial than a seminar paper and less substantial than an M.A. thesis; two substantive areas must be represented in the three papers. The three papers are designed to demonstrate three kinds of skills:
1. Theory paper: An attempt to say something original, focused on theoretical questions, i.e., how they should be addressed or refined. Evaluating alternative theoretical positions in light of available evidence or data is an acceptable possibility for such a paper.
2. Empirical paper: Should include some justification for why this particular manipulation of data is necessary or desirable. Of the three papers, this is the one that is intended to look most like a research report. A wide variety of methods is permitted.
3. Analytic review of the state of the art in some substantive area in sociology. This paper can take various forms, for example:
   a. A review essay (see Journal of Economic Literature or Psychological Review).
b. An essay that outlines a field for use in teaching a graduate seminar.

Upon successful completion of all the above requirements, along with completion of 30 hours of graduate credit, the student may proceed to the advanced stage of his/her doctoral work.

E. Teaching Requirement
Graduate training includes supervised teaching experience. In the fall of their fourth year, students enroll in a teaching practicum to prepare them to teach their own course, under supervision, the following semester.

F. Preliminary Examination
This takes the form of an oral examination in the student's specialty to be given only after all the above requirements have been met. It is designed to appraise the depth of knowledge in the broad area from within which the student has selected a dissertation topic. The content of this area is to be defined individually for each student. It consists of a generally recognized, broad subfield and must deal with related materials from other subfields.

G. Advancement to Candidacy
The department's recommendation that a student be advanced to candidacy for the Ph.D. is based on passing the preliminary examination and approval of a dissertation proposal.

H. Doctoral Dissertation
This must be an independent piece of research and scholarship representing an original contribution, the results of which are worthy of publication. Upon oral defense and acceptance of the dissertation, the department will recommend to the Vice Provost for Research and Graduate Studies that the student be awarded the Ph.D. degree.

The progress of every student will be evaluated by the department at the end of the first full year of graduate study. Those whose performance and ability are clearly below the standard for the Ph.D. established by the department will be asked to withdraw before they have made a costly investment of time. If more than seven years have elapsed since the student completed 24 hours of graduate courses in the department, the student's Ph.D. candidacy will lapse. After the first year, a progressively larger proportion of a student's time will be spent as a participant in research activities, under the supervision of faculty members. Ordinarily, a student with adequate preparation and involved in full-time study should be able to earn a Ph.D. within five to six years from the start of graduate work.

Students who arrive with an M.A. degree in sociology or with three semesters of work in the discipline will be expected to complete some of the above requirements more quickly.

Joint M.S.W. and Sociology Ph.D. Program
The Sociology Department cooperates with the School of Social Welfare in offering a joint M.S.W./Ph.D. in Sociology for persons wanting to pursue research careers in social welfare. The two programs are articulated so that some of the requirements of each can be met by work done in the other. A student applying for the joint program must independently meet the admission requirements of each program and must pursue the Planning, Administration, and Research concentration within the School of Social Welfare.

Courses
SOC 501, 502 Research Design and Statistics
A review of the main statistical techniques used in sociological research. Discussion of and practical experience in the design of sociological research. These two courses must be taken in the same academic year. 3 credits each semester

SOC 503 Multivariate Analysis of Social Data
The general linear model and multivariate analysis, including dummy variable analysis, multiple covariance, multivariate analysis of variance, and factor analysis. Prerequisite: SOC 502 or permission of instructor 3 credits

SOC 505, 506 Sociological Theory
A review of the intellectual development of the discipline, its epistemological foundations, current major theoretical orientations, and newly developing perspectives. 3 credits each semester

SOC 508 Experimental Methods
The design, conduct, and analysis of laboratory and field experiments. 3 credits

SOC 509 Field Work
Practicum in field interviews and observations; problems of rapport, reliability, and validity. 3 credits

SOC 511 Population Analysis
A survey of demographic theory and research. Determinants and consequences of population size, growth rates, composition and spatial distribution, family formation, fertility, mortality, and migration. Prerequisite: One course in statistics 3 credits

SOC 513 The Metropolitan Community
Determinants and consequences of the growth of urban settlements. Their demographic composition and spatial structure. Problems in metropolitan community organization. 3 credits

SOC 514 Sociological Methods
An introduction to the logic of research and data analysis. Emphasis on concepts of association, elementary causal analysis, sampling, and problems of measurement. Applications in the interpretation of data encountered in the school curriculum and the mass media. 4 credits

SOC 521 Social Interactions
The study of interaction in formal and informal settings. The reciprocal influence among group structure, norms, and interactive processes. A prior course in social psychology is assumed. 3 credits

SOC 522 Socialization and the Self
Socialization as a continuous process throughout the life-cycle. Social and cultural sources of identity. Self and other systems as a form of social control. A prior course in social psychology is assumed. 3 credits

SOC 523 Sociology of Education
Relationships between education and other institutions. Internal dynamics of the school and the classroom. 3 credits

SOC 531 Stratification
Causes and consequences of the unequal distribution of wealth, power, prestige, and other social values in different societies. Changes in the stratification system as a result of industrialization and revolution. 3 credits

SOC 532 Complex Organizations
Division of labor, communication, and decision making in large and formally administered organizations, such as industrial concerns, governmental agencies, political parties, trade unions, schools, hospitals, and prisons. 3 credits

SOC 541 Conflict and Violence
Conflict and violence as related to social change. Examination of community controversies, social movements, uprisings, and war. 3 credits

SOC 542 Deviance
Survey of recent research literature on various kinds of deviance (crime, delinquency, and morally stigmatized behavior). Controversial issues in theory and research methods. 3 credits

SOC 545 Social Movements and Collective Behavior
Unorganized collectives and their role in change. Studies of specific social movements and other collective behavior episodes. 3 credits

SOC 546 Sociological Perspectives on American Society
Analysis of American social structure. Political and economic institutions and their bearing on social problems. Students attend the lectures of CES 581 (consult School of Continuing Education's bulletin) and a supplementary seminar. 4 credits

SOC 549 Social Change
The image of technological, generational, and cultural forces on social organization from a historical and comparative perspective. 3 credits

SOC 556 Political Sociology
The study of political institutions and of the politically relevant actions and attitudes of individuals and groups. Particular stress will be placed on the reciprocal relationship between social movements and political institutions. 3 credits

SOC 560 Sociology of Intellectual Life
A comparative and historical analysis of the social conditions leading to the development of intellectual professionals. 3 credits

SOC 562 Sociology of the Arts
The relations between social structure, social change, and the development of major art forms. 3 credits
SOC 583 Sociology of Science
The relations between science and society; social influences on the choice of problems and methods; the social organization of scientific research.
3 credits

SOC 584 Communications
The social organization of the communications industry; the effects of mass communication.
3 credits

SOC 571 Sociology of Health and Medicine
Social factors in health and illness; the socialization of health practitioners; the social organization of hospitals, clinics, and other facilities.
3 credits

SOC 580/581 Practicum in Applied Sociology
Sociological inquiry into aspects of American life and social problems, with emphasis on evaluation studies and policy planning in education, race relations, mass communications, deviance, environment, and community issues. During the spring semester students design a teaching unit or a research project on a topic of their own choice.
4 credits

SOC 590 Independent Study
Intensive reading, under supervision of one or more instructors, of material not covered in the formal curriculum.
Variable and repetitive credit

SOC 591, 595 Special Seminars
Topics to be arranged. The seminar will be built around actual research activities of students and faculty. The following topics have been covered: Microsociology; Advanced Topics in Marxist Theory; Sociology of Emotions; Historical Methods; Ethnic Relations; Biosociology; Comparative Stratification; Max Weber; Science of Sociology and Everyday Life; Methods of Behavioral Observation; Social Structure; Sociology of the Family; Cognitive Sociology; Sociology of Work; Economic Sociology; Sociology of Gender; Sociology of Culture; Development of Capitalism.
1-3 credits each semester

SOC 598 Research
Execution of a research project under the supervision of one or more faculty members.
Variable and repetitive credit

SOC 603 Advanced Topics in Quantitative Analysis
Mathematical and statistical methods in the analysis of quantitative data.
Prerequisites: SOC 501 and 502 and 503
3 credits

SOC 604 Advanced Topics in Qualitative Analysis
The use of personal documents, official records, field observations, and interviews.
3 credits

SOC 606 Sociological Theory
Construction
Modes of conceptualization and theory construction. Problems in developing a theory.
Prerequisite: Permission of instructor
3 credits

SOC 691 Practicum for Teaching and Graduate Assistants
Individualized supervision of initial (first two semesters) teaching assistance. Discussion, examination construction, student consultation, and grading. Register for section of supervising instructor.
3 credits each semester

SOC 692 Practicum in the Teaching of Sociology
The exploration of teaching goals, processes, and outcomes. Practice lectures, videotaped and discussed; classroom visits; planning, outlining, selections of course material; writing of syllabus for Introductory Sociology section to be taught as SOC 693 in following semester.
Fall, 3 credits

SOC 693 Practicum for Graduate Teaching Interns
Supervised teaching of a section of Sociology 103 using the outlines, materials, and techniques developed in SOC 692. Includes weekly meetings of all persons registered for SOC 693 and observation of classes by both faculty and fellow graduate students.
Prerequisite: SOC 692
Spring, 3 credits

SOC 698 Dissertation Research
Variable and repetitive credit
The College of Engineering and Applied Sciences consists of six academic departments: Applied Mathematics and Statistics, Computer Science, Electrical Engineering, Materials Science and Engineering, Mechanical Engineering, and Technology and Society. The latter offers a program leading to the Master of Science in Technological Systems; each of the other five departments offers programs leading to the Master of Science and Doctor of Philosophy degrees.

Each department has its own laboratories for teaching and research; in addition, collaborative research programs are carried out utilizing the facilities in the School of Basic Health Sciences, Marine Sciences Research Center, Brookhaven National Laboratory, and other off-campus national and industrial laboratories. The graduate programs in the College of Engineering and Applied Sciences are designed to train both academically oriented students and students with professional goals in industrial and governmental occupations requiring an advanced degree.

Each academic department evaluates candidates for admission to its programs. The material that follows describes these programs and their supporting facilities in detail. Prospective applicants should address inquiries directly to the graduate studies director of the appropriate department.
Degree Requirements

Requirements for the M.S. Degree

In addition to the minimum Graduate School requirements, the following are required:

A. Course Requirements
The M.S. degree in the Department of Applied Mathematics and Statistics requires the satisfactory completion of a minimum of 30 graduate credits. All credits in satisfaction of the degree must be at the graduate level. The department may impose additional requirements as described below. In addition, the average for all courses taken must be B or higher, and at least 18 credits of all courses taken must carry a grade of B or higher.

Core Requirements for the M.S. Degree
1. Applied Mathematics
   a. AMS 501 Differential Equations and Boundary Value Problems
   b. AMS 503 Applications of Complex Analysis
   c. AMS 504 Foundations of Applied Mathematics
   d. AMS 505 Applied Linear Algebra
   e. AMS 507 Introduction to Probability
   f. AMS 509 Numerical Analysis I
   g. AMS 527 Numerical Analysis II
2. Operations Research
   a. AMS 505 Applied Linear Algebra
   b. AMS 507 Introduction to Probability
   c. AMS 530 Linear Programming
   d. AMS 538 Stochastic Models
   e. AMS 536 Queuing Theory or AMS 529/CSE 530 Simulation and Modeling
   f. One course in statistics
3. Statistics
   a. AMS 504 Foundations of Applied Mathematics
   b. AMS 505 Applied Linear Algebra
   c. AMS 507 Introduction to Probability
   d. AMS 570 Mathematical Statistics I
   e. AMS 572 Exploratory Data Analysis
   f. AMS 575 Internship in Statistical Consulting
   g. AMS 578 Regression Theory
   h. AMS 582 Design of Experiments

Elective Requirements for the M.S. Degree
Any graduate-level AMS or other related graduate-level courses in a related discipline approved by the graduate studies director may be used to satisfy the credit requirement beyond the core course requirement. In addition, six elective credits may be earned by completion of a master's thesis.

B. Final Recommendation
Upon the fulfillment of the above requirements the faculty of the graduate program will recommend to the Vice Provost for Research and Graduate Studies that the Master of Science degree be conferred or will stipulate further requirements that the student must fulfill.

C. Time Limit
All requirements for the Master of Science degree must be completed within three years of the student's first registration as a full-time graduate student.

Requirements for the Ph.D. Degree

A. Course Requirements
The course of study prescribed for the M.S. degree provides basic guidelines for doctoral study in consultation with the graduate advisor.

B. Qualifying Examination
A student must pass a qualifying examination to be allowed to continue toward the Ph.D. degree. The qualifying examination is given twice a year and is designed to test the student's preparation to do research in applied mathematics. Each student must demonstrate competency in algebra and analysis and in-depth knowledge of two areas of applied mathematics. The list of areas from which students may currently choose is as follows:

- Differential Equations and Applied Analysis
- Numerical Methods and Computing
- Mathematical Programming
- Applied Probability
- Probability and Mathematical Statistics
- Applied Statistics
- Game Theory

C. Research Advisor
After completion of at least one year of full-time residence and prior to taking the preliminary examination, the student must select a research advisor who agrees to serve in that capacity.

D. Preliminary Examination
This is an oral examination given to the student when he/she has developed a research plan for the dissertation approved by the student's research advisor.
AMS 501 Differential Equations and Boundary Value Problems I
Recommended prerequisite: AMS 504
Spring, 3 credits
AMS 502 Differential Equations and Boundary Value Problems II
The initial and boundary value problems for the wave, the heat, and Laplace’s equations illustrated by a number of examples in heat induction, vibrations, aerodynamics. Transform techniques, separation of variables, conformal mapping, and approximation. Prerequisite: AMS 501
3 credits
AMS 503 Applications of Complex Analysis
A study of those concepts and techniques in complex function theory which are of interest for their applications. Pertinent material is selected from the following topics: harmonic functions, calculus of residues, conformal mapping, and the argument principle. Application is made to problems in heat conduction, potential theory, fluid dynamics, and feedback systems. Spring, 3 credits
AMS 504 Foundations of Applied Mathematics
An introductory course for the purpose of developing certain concepts and techniques which are fundamental in modern approaches to the solution of applied problems. An appropriate selection of topics is based on the concepts of metric spaces, convergence, continuity, compactness, and normed and Hilbert spaces. Included is an introduction to measure theory and integration. Spring, 3 credits
AMS 505 Applied Linear Algebra
Review of matrix operations. Elementary matrices and reduction of general matrices by elementary operations, canonical forms, and inverses. Applications to physical problems. Fall, 3 credits
AMS 506 Finite Structures
Problemsolving in combinatorial analysis and graph theory using generating functions, recurrence relations, Polyá’s enumeration formula, graph coloring, and network flows. 3 credits
AMS 507 Introduction to Probability
Sample spaces, conditional probability and independence, random variables and functions of random variables: binomial, Poisson, normal and other special distributions; moment-generating functions; law of large numbers and central limit theorem; Markov chains. Applications to statistics. 3 credits
AMS 511 Methods in Applied Mathematics for Engineers and Scientists
This course is concerned with basic mathematical questions relating to solutions frequently encountered in engineering and scientific problems. Topics include series, sequences, convergence; integral formulas and relationships (Gauss, Stokes, Green’s theorems); implicit function theorems. 3 credits
AMS 516 Special Functions of Applied Mathematics
A study of the more common higher mathematical functions which are required for the analytical solution of engineering and scientific problem...

E. Language Requirement
The student must demonstrate a reading ability in one of the following three languages: French, German, or Russian. Proficiency may be demonstrated in a number of ways described in detail in the Graduate Student Handbook of the Department of Applied Mathematics and Statistics.

F. Advancement to Candidacy
After successfully completing all requirements for the degree other than the dissertation, the student is eligible to be recommended for advancement to candidacy. This status is conferred by the Vice Provost for Research and Graduate Studies upon recommendation from the departmental graduate studies director.

G. Dissertation
The most important requirement of the Ph.D. degree is the completion of a dissertation, which must be an original scholarly investigation. The dissertation must represent a significant contribution to the scientific literature and its quality must be comparable with the publication standards of appropriate and reputable scholarly journals.

H. Dissertation Defense
The student must defend the dissertation before the dissertation examining committee. On the basis of the recommendation of this committee, the Department of Applied Mathematics and Statistics will recommend acceptance or rejection of the dissertation to the Vice Provost for Research and Graduate Studies. All requirements for the degree will have been satisfied upon the successful defense of the dissertation.

I. Minimum Residence
At least two consecutive semesters of full-time study is required.

J. Time Limit
All requirements for the Ph.D. degree must be completed within seven years after the completion of 24 graduate credits in the program. There are also time limits for the qualifying and preliminary examinations and advancement to candidacy, which are described in the departmental Graduate Student Handbook.

Courses
AMS 500 Mathematical Modeling
The course will consist of about eight generally unrelated case studies. Problems selected for both the physical and social sciences will be employed to illustrate the process of model formulation and solution. Mathematical ideas and techniques will be developed as needed to deal with the problems being studied. Realistic data and situations will be employed whenever possible. Fall, 3 credits

AMS 517 Ordinary Differential Equations
This course deals with theory and properties of ordinary differential equations which are of importance in the application of this subject. Among the topics covered are solutions of singular equations, boundary value problems, the Green’s function method, and eigenvalue problems. 3 credits

AMS 520 Mathematical Modeling in the Analysis of Public Systems
Review of models relating to the questions of the improvement in delivery of urban service systems (e.g. fire, police, health, sanitation, traffic). Topics include optimal location and districting of public facilities, distribution networks, models of congestion and delay in municipal services, and optimal deployment of emergency vehicles. 3 credits

AMS 521 Mathematical Models in Physiological Sciences
Mathematical models of blood flow and renal function. Numerical solution of the counter current exchange models by utilizing information about the physiological structures in the solution process. Use of compartmental analysis, sparse matrix techniques, and generalized inverses. 3 credits

AMS 524 Theory of Approximation
A survey of various solutions which present special problems in approximation theory. Topics will include smoothing of data, least squares methods, Chebyshev approximation by rational functions, orthogonal functions, Hilbert space methods, and general aspects of approximation in normed linear spaces. 3 credits

AMS 526 Numerical Analysis I
Direct and indirect methods for solving simultaneous linear equations and matrix inversion, conditioning, and round-off errors. Computation of eigenvalues and eigenvectors. 3 credits

AMS 527 Numerical Analysis II
Numerical integration. Solution of ordinary differential equations. Different methods for partial differential equations; consistency, convergence and stability. Numerical solution of integral equations. AMS 527 may be taken whether or not the student has completed AMS 526. 3 credits

AMS 529 Simulation and Modeling
A comprehensive course in formulation, implementation, and application of simulation models. Topics include data structures, simulation languages, statistical analysis, pseudo-random number generation and design of simulation experiments. Students will apply simulation modeling methods to problems of their own design. Crosslisted with CSE 529. Prerequisite: CSE 201 or equivalent
Spring, 3 credits

AMS 530 Linear Programming
Formulation of linear programming problems and solution by simplex method. Duality, sensitivity analysis, dual simplex algorithm, decomposition. Applications to the transportation problem, two-person games, assignment problem, and introduction to integer and nonlinear programming. Corequisite: Linear algebra course Fall, 3 credits
AMS 531 Generalized Inverses and Sparse Matrices
Moore-Penrose, various other types of generalized inverses; efficient methods for their computation. Condition numbers and scaling. Factored forms of inverses; large sparse matrices, and their relationship to elimination and orthogonalization methods. Sparse matrices and graph theory. Applications to applied problems in linear programming.
3 credits

AMS 532 Mathematical Demography
A one-semester introduction to human demography. Topics will include survival and childbearing probabilities, discrete and continuous models of birth renewal process, marriage models, migration, occupational mobility, kinship, and the problems of inferring birth and death rates from census data.
Fall, 3 credits

AMS 533 Integer Programming
Discrete optimization. Linear programming in which the variables are restricted to being integer-valued. Cutting plane methods, enumeration methods, and group theoretic methods. Study of branch and bound, knapsack problem and cutting stock problems.
Prerequisite: AMS 530
Fall, odd years, 3 credits

AMS 534 Nonlinear Programming
Necessary and sufficient conditions for unconstrained and constrained optima. The geometric background is developed using tangents and cones in finite dimensional spaces. Computational methods, including interior (penalty function), boundary (gradient projection), and exterior (cutting plane) approaches.
Prerequisite: AMS 530 or permission of instructor
Spring, 3 credits

AMS 535 Stochastic Processes
Prerequisites: AMS 504; AMS 507 or equivalent
Spring, 3 credits

AMS 536 Queuing Theory
Prerequisite: AMS 507
Fall, even years, 3 credits

AMS 537 Inventory Theory
Prerequisite: AMS 507
Fall, odd years, 3 credits

AMS 538 Operations Research: Stochastic Models
Queuing problems under varying assumptions on input, service mechanism, and queue discipline. Basic ideas of inventory theory. Introduction to statistical decision theory. Monte Carlo methods.
Prerequisite: AMS 507 or equivalent
3 credits

AMS 539 Network Flows
Theory of flows in capacity constrained networks. Topics include maximum flow, feasibility criteria, scheduling problems, matching and covering problems, minimum cost paths, minimum cost flows, and associated combinatorial problems.
Prerequisite: AMS 530 or permission of instructor
Spring, even years, 3 credits

AMS 540 Modeling Laboratory
Students undertake practical operations research problems. Lectures on case studies of recent systems analysis projects by faculty and local industrial/governmental groups. Students must present their work on their project.
Prerequisite: Permission of instructor
Spring, 3 credits

AMS 541 Dynamic Programming
Prerequisite: AMS 535 or AMS 538
3 credits

AMS 542 Analysis of Algorithms
Models of computation and associated time and space measures for complexity of algorithms in the various models. Techniques for designing efficient algorithms, including choice of data structures, recursion, divide and conquer, and dynamic programming. Asymptotic behavior, lower bounds on complexity and correctness of algorithms for sorting, set manipulation, graph operations, matrix multiplication, fast Fourier transform, and pattern matching. Also covers nondeterminism, NP-completeness, and intractability.
Prerequisite: CSE 521
Recommended: AMS 506
Spring, 3 credits

AMS 545 Graph Theory and Applications
Basic structure of undirected and directed vector space analysis of graphs, applications.
3 credits

AMS 549 Combinatorial Analysis
Permutations, combinations, generating functions, urn problems, inclusion-exclusion, Möbius inversion, Ramsey's theorem, block designs, orthogonal Latin squares, finite geometries, extremal problems, chromatic numbers, probabilistic methods.
3 credits

AMS 552 Game Theory
Elements of cooperative and non-cooperative games. Matrix games, pure and mixed strategies, and equilibrium. Solution concepts such as core, stable sets, and bargaining sets. Voting games, the Shapley and Banzhaf power indices.
3 credits

AMS 553 Control Theory
Introduction to optimal control via the calculus of variations. Discussions of functional minimization from optimal control viewpoint. Introduction of state variable form for linear differential equations used to solve linear, quadratic cost, optimal control problem, and time minimum control for some simple systems. Derivation of matrix Ricatti equation. Presentation of linearization on non-linear differential equations using perturbation techniques.
Prerequisite: AMS 501
3 credits

AMS 556 Computational Fluid Dynamics
Prerequisite: Permission of instructor
3 credits

AMS 558 Wave Propagation I
3 credits

AMS 569 Probability Theory I
Prerequisite: AMS 504 or equivalent
3 credits

AMS 570 Mathematical Statistics I: Estimation
Prerequisite: AMS 312 or equivalent
3 credits

AMS 571 Mathematical Statistics I: Hypothesis Testing
Decision problems, Neyman-Pearson lemma, likelihood ratio tests, uniformly most powerful tests, unbiased tests, invariant tests, sequential tests. Parametric problems, tests on contingency tables and multivariate data. Bayesian approaches and introduction to current research problems.
Prerequisite: AMS 570 or equivalent
3 credits

AMS 572 Data Analysis I
Introduction to basic statistical procedures. Survey of elementary statistical procedures such as the t-test and chi-square test. Procedures to verify that assumptions necessary for the validity of the tests are satisfied. Extensions of simple procedures to more complex situations and introduction to one-way analysis of variance. Basic exploratory data analysis procedures such as stem and leaf plots, straightening regression lines, and techniques to establish equal variance.
Prerequisite: AMS 312 or permission of instructor
Fall, 3 credits

AMS 573 Design and Analysis of Categorical Data
Methods to test the strength of association between pairs of categorical variables. Methods for evaluating classification procedures and interrater agreement. Analysis of the associations between two or more categorical variables using log linear models. Logistic regression.
Prerequisite: AMS 572
Spring, 3 credits

AMS 575 Internship in Statistical Consulting
Directed undergraduate research problem in construction and with currently existing research programs outside the department. Students specializing in a particular area will work on a problem from that area; others will work on problems related to their interests, if possible. Research and effective use of computers. Each student will give at least one informal lecture to his/her colleagues on the research problem and its statistical aspects.
Prerequisite: Permission of instructor
3 credits

AMS 576 Statistical Methods for Social Scientists
This course is an introduction to statistical thinking in the social sciences. The course will cover statistical variability, standard scores, regression, correlation, sampling notions, estimation, confidence intervals, significance testing, conditional probability, and Bayesian manipulations.
Prerequisite: AMS 310 or permission of instructor
3 credits
AMS 577 Multivariate Analysis
The multivariate normal distribution. Estimation of the mean vector and covariance matrix of the multivariate normal. Discriminant analysis. Canonical correlation. Principal components. Factor analysis. Cluster analysis. Prerequisites: AMS 572 and AMS 578 3 credits

AMS 578 Regression Theory
Classical least squares theory for regression including the Gauss-Markov theorem and classical normal statistical theory. An introduction to stepwise regression, procedures, and exploratory data analysis techniques. Analysis of variance problems as a subject of regression. Brief discussions of robustness of estimation and robustness of design. Prerequisite: AMS 572 or equivalent 3 credits

AMS 580 Reliability Theory
Monotone failure rates, renewal theory, availability theory, classes of life distributions, coherent structures and systems, general stochastic models for failure, maintenance policies, redundancy optimization. Prerequisite: AMS 535 or equivalent 3 credits

AMS 581 Analysis of Variance
Analysis of models with fixed effects. The Gauss-Markov theorem; construction of confidence ellipsoids and tests with Gaussian observations. Procedures and critical values for multiple tests of hypotheses. One-way, two-way, and higher-way layouts. Analysis of incomplete designs such as Latin squares, incomplete blocks, and nested designs. Analysis of covariance problems. Prerequisite: AMS 570 or equivalent 3 credits

AMS 582 Design of Experiments
Discussion of the accuracy of experiments, partitioning sums of squares, randomized designs, factorial experiments. Latin squares, confounding and fractional replication, response surface experiments, and incomplete block designs. Prerequisite: AMS 572 or equivalent 3 credits

AMS 584 Sequential Methods
Sequential decision problems in statistics. Two-armed bandit, selection by relative rank, and other examples. Optimal stopping and sequential analysis of empirical Bayes and compound decision problems. Fixed-width confidence intervals, confidence sequences, and tests of power. Adaptive least squares and stochastic approximation. Prerequisite: AMS 570 3 credits

AMS 585 Sampling Techniques
Properties of simple random sampling, application to estimating proportions and sample sizes which give predetermined accuracy. Stratified random samples, Neyman allocation. Ratio and regression estimates, accuracy and bias, systematic sampling, cluster sampling, two-stage sampling. Prerequisite: AMS 312 or equivalent Fall, 3 credits

AMS 586 Time Series

AMS 587 Nonparametric Statistics
This course will cover the applied nonparametric statistical procedures—1-sample Wilcoxon tests, 2-sample Wilcoxon tests, runs test, Kruskal-Wallis test, Kendall's tau, Spearman's rho, Hodges-Lehman estimation, Friedman analysis of variance on ranks. The course will give the theoretical underpinnings to these procedures, showing how existing techniques may be extended and new techniques developed. An excursion into the new problems of multivariate nonparametric inference will be made. Prerequisites: AMS 312 and AMS 572 or equivalents Fall, 3 credits

AMS 588 Biostatistics
Statistical techniques for planning and analyzing medical studies. Planning and conducting clinical trials and prospective and retrospective epidemiological studies. Analysis of survival times including singly censored and doubly censored data. Quantitative and quantal bioassay, two-stage assays, routine bioassay. Quality control for medical studies. Prerequisite: AMS 572 or permission of instructor Fall, 3 credits

AMS 599 Research
Variable and repetitive credit

AMS 605 Probability Theory II
Advanced probability, Conditional sigma-fields, stochastic processes, Brownian motion, Markov property, weak convergence, infinitely divisible distributions, martingales, stochastic integrals, stochastic differential equations, stochastic approximation. Prerequisite: AMS 569 or instructor's permission 3 credits

AMS 611 Theory of Partial Differential Equations and Their Applications
Theorem of Cauchy and Kowalewsky; classification of partial differential equations in general, characteristics; potential theory and elliptic equations; hyperbolic equations and propagation of discontinuities, parabolic equations, various methods of solving partial differential equations, applications to problems in electromagnetics, solid mechanics, plasma physics. Prerequisite: AMS 502 3 credits

AMS 615 Nonlinear Differential Equations

AMS 620 Theory and Applications of Large-Scale Networks
A rigorous treatment of mathematical techniques used to answer many practical questions arising in the study and design of large-scale networks. Emphasis on the development of algorithms. Several lectures devoted to specific applications to computer networks to be used throughout the course. Prerequisite: AMS 530 or equivalent 3 credits

AMS 621 Numerical Solutions of Partial Differential Equations
Variational form of the problem, Ritz Galerkins, collocation, and mixed methods; triangular, rectangular (2-D), and tetrahedral element (3-D); accuracy, convergence, stability, solutions of linear, nonlinear steady state, and dynamic problems; implicit, explicit time integration; equivalence of finite element and finite difference methods. Prerequisite: AMS 502 or equivalent 3 credits

AMS 627 Theory of Integral Equations and Their Applications
Integral equations with degenerate kernels, equations of the second kind, iterative solutions, contraction mapping principle, Fredholm theory, spectral theory for symmetric kernels, Volterra equations of the first and second kind, equations with weakly singular kernels, simultaneous systems, applications. Prerequisites: AMS 504 and AMS 505 3 credits

AMS 628 Applications of Functional Analysis
Introduction to such topics as unbounded operators and the closed graph theorem, convexity and weak convergence in Hilbert space and degree theory. Applications to monotone operators and the stability of nonlinear systems, to Schwartz distributions and passive linear systems, and to the solution of nonlinear equations. 3 credits

AMS 651 Nonlinear Analysis and Optimization
Iterative methods for solving nonlinear operator equations in Fréchet differentials. The Newton-Raphson method in function space and nonlinear boundary value problems. The Courant penalty concept and constrained optimization. General multiplier rules. Variable metric gradient projection for nonlinear least square methods, with applications. 3 credits

AMS 691 Topics in Applied Mathematics
Varying topics selected from the list below if sufficient interest is shown. Several topics may be taught concurrently in different sections.

Advanced Operational Methods in Applied Mathematics
Approximation Methods in the Boundary Value Problems in Applied Mathematics
Control Theory and Optimization
Foundations of Passive Systems Theory
Game Theory
Mixed Boundary Value Problems in Elasticity
Partial Differential Equations
Quantitative Genetics
Stochastic Modeling

AMS 698 Practicum in Teaching
3 credits, repetitive

AMS 699 Dissertation Research
Variable and repetitive credit
Degree Requirements
Students in the M.S. degree program choose between two options, the M.S. with thesis and the M.S. without thesis. The course requirements depend on the option chosen.

A. Residence
There is no residency requirement.

B. Language requirement
None.

C. Proficiency requirements
Demonstration of proficiency in automata theory (e.g., CSE 303), compilers (e.g., CSE 304), and operating systems (e.g., CSE 306), at the undergraduate or graduate level, and, in finite mathematics (e.g., AMS 301) and digital systems (e.g., ESE 318) at the undergraduate level.

D. Course requirements
Satisfactory completion of 30 graduate credits in the following manners:

1. M.S. without thesis
   a. Core courses (CSE 502, 520, 526, and 548) (15 credits)
   b. Laboratory in Computer Science (CSE 523/524) (15 credits)
   c. Eleven credits of graduate level elective courses, chosen with advisor’s approval, excluding CSE 599.

2. M.S. with thesis
   a. Core courses (CSE 502, 520, 526, and 548) (14 credits)
   b. Eight credits of graduate level elective courses, chosen with advisor’s approval, excluding CSE 523/524.
   c. CSE 599 Research (8 credits)

3. In either option, CSE 587 (Independent Study in Computer Science) may be used to fulfill at most one of the proficiency requirements for automata theory, compilers, or operating systems, with an advisor’s approval.

E. Grade Point Average
A cumulative graduate grade point average of 3.0/4.0 or higher is required.

F. Thesis requirements
1. M.S. without thesis: Students enrolled in this option must complete an M.S. project approved by the faculty.
2. M.S. with thesis: A student choosing the thesis option must select a research advisor as soon as possible who agrees to serve in this capacity. The advisor will supervise the student’s other studies and advise the student on his/her choice of courses. The thesis must be approved by a departmental faculty committee of no less than three members, appointed by the graduate program director. At the discretion of the committee, the student may be required to present a seminar on the topic of his/her thesis.

G. M.S. degree requirements for Ph.D.-bound students
1. A student enrolled in the Ph.D. program may satisfy the requirements for the M.S. degree by passing the Ph.D. qualifying examination and completing 30 credits of coursework with a cumulative graduate grade point average of 3.0/4.0 or higher.
2. Ph.D. students who elect to terminate with an M.S. degree prior to passing the Ph.D. qualifying examination must satisfy all requirements for the M.S. degree with a thesis.

Requirements for the Ph.D. Degree
A. Residence
Two consecutive semesters of full-time graduate study.

B. Qualifying Examination and Research Proficiency Examination
Students must satisfactorily pass a qualifying examination to demonstrate their ability to undertake the course of study leading to the Ph.D. degree. The examination is given in January of each year. The student must take the examination within four semesters of admission to the Ph.D. program (i.e., during the second year of residence). For further information please request the Graduate Student Handbook from the department.

Students who perform satisfactorily on the qualifying examination are required to demonstrate their ability to undertake creative research by preparing an oral presentation to the faculty (research proficiency examination) within six months after passing the qualifying examination.

C. Course Requirements
The faculty of the Department of Computer Science has decided that the student seeking the Ph.D. degree shall initially pursue a relatively heavy and controlled program of courses. The first-year program of courses below will be followed by the majority of students in the Ph.D. program. Students with exceptional strengths or weaknesses follow appropriately modified programs, worked out in consultation with the advisors. In the following model program of courses, it is assumed that the student has taken a course in either digital systems or modern algebra before entering. Students in the Ph.D. program may not take CSE 523/524, which are traditionally master’s level courses.

First Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>CSE 520</td>
<td>Techniques of Software Design</td>
<td>4</td>
</tr>
<tr>
<td>Fall</td>
<td>CSE 541</td>
<td>Theoretical Foundations of Computer Science</td>
<td>3</td>
</tr>
<tr>
<td>Fall</td>
<td>CSE 534</td>
<td>Advanced Operating Systems</td>
<td>3</td>
</tr>
<tr>
<td>Fall</td>
<td>CSE 535</td>
<td>Asynchronous Systems</td>
<td>3</td>
</tr>
</tbody>
</table>
H. Approval and Defense of Dissertation

The dissertation must be orally defended before a dissertation examination committee, and the candidate must obtain approval of the dissertation from this committee. The committee must have a minimum of four members (at least two of which are faculty members from the department), including the research advisor(s), at least one person from outside the department, and a committee chairperson. (Neither the research advisor nor the outside members may serve as the chairperson.) The oral defense of the dissertation is open to all interested faculty members and graduate students. The final draft of the dissertation must be submitted to the committee no later than three weeks prior to the date of the defense.

Time Limit

The candidate must satisfy all requirements for the Ph.D. degree within seven years after completing 24 credit hours of graduate courses in the Department of Computer Science at Stony Brook. In rare instances, the Vice Provost will entertain a petition to extend this time limit, provided it bears the endorsement of the Chairperson of the department. The Vice Provost or the department may require evidence that the student is still properly prepared for the completion of work. In particular, the student may be required to pass the preliminary examination again in order to be permitted to continue work.

Courses

CSE 502 Computer Architecture

Register transfer language, arithmetic algorithms for integer and floating point formats. Control unit design, hardware and microprogrammed control, instruction set design. Memory devices: organization and management, I/O processing. Program controlled I/O interrupts, direct memory access. Performance measurement. Multi-processor systems, parallel processing, computer networks. Students will perform design exercises using a high-level computer simulation language.

Prerequisites: ESE 318

4 credits

CSE 503 VLSI Design

The course covers the Mead-Conway method for the design of large-scale integrated silicon chips and is supported by a suite of software design tools available in Berkeley UNIX. These cover symbolic layout, design rule check, cell libraries, and logic simulation. The students team up in pairs in the second half of the semester to generate IC designs which, if pursued through successful simulation, are then submitted for fabrication.

Prerequisites: CSE 502 and ESE 318

4 credits

CSE 504 Bit Microprocessor Applications

The course covers 16-bit microprocessor hardware, architecture, I/O devices, programming, and applications. It is supported by a coordinated laboratory meeting three hours per week throughout the semester. The students use design modules based on the MC 68000 processor and its peripheral chips. First they perform six sets of experiments illustrating cross-software, resident monitor, down loading, I/O devices, and handlers. Then they divide up and work on projects. The fact that object modules can be downloaded from a host and manipulated by a local executive program means that programmed applications of some sophistication can be run.

Prerequisites: CSE 318

4 credits

CSE 505 Computing with Logic

The course will explore logic-based computing and logic programming. It includes an introduction to programming in logic, covering basic techniques for solving problems in a logic programming system. Particular attention will be paid to user interface issues and how a logic system can provide a useful computing environment. The course covers implementation issues, emphasizing how a logic programming system generalizes both traditional programming language systems and traditional database systems.

Prerequisites: Undergraduate courses in compilers and data structures

3 credits

CSE 507 LISP and Functional Programming

Introduction to the theory and practice of LISP and functional programming. Includes an introduction to programming in LISP and other functional languages. The course will cover some of the following topics: lambda calculus, programming environments, implementation of functional language processors.

Prerequisites: CSE 304 or equivalent

3 credits

CSE 513 Advanced VLSI Design

The purpose of the course is to follow up the introductory design course (CSE 503) by providing interested students from that course the opportunity to continue with a significant VLSI design project. The first part of the course will be devoted to the exploration of possible projects. Interaction with other research groups in the department will be encouraged, for example, by offering some guest lectures. This will culminate in the selection of one or possibly two large projects on which the group will collaborate. By approximately one month into the course, it is expected that the chips fabricated from the previous semester will arrive. These will be divided up among the seminar students for testing, using the simulation command files from the previous semester. The remainder of the semester will be devoted to completing the new designs through high-level simulation, layout, and low-level simulation.

Prerequisite: CSE 503

3 credits

CSE 520 Techniques of Software Design

Topics relevant to software design and development, especially those relating to commercial industrial programming environment. To include system and module construction and decomposition methodologies (top down, bottom up, hierarchical), structured programming concepts, maintainability, reliability, program and system documentation (design specs, implementation specs, user manual), management of software ("Mythical Man Month," etc.), and psychology of computer programming and programmers.

Prerequisite: CSE 201 or equivalent

4 credits

CSE 522 Advanced Topics in Compiler Design

Advanced topics in the design and implementation of compilers and interpreters. Topics drawn from intermediate code languages, code generation for advanced language constructs,
global program improvement techniques requiring flow analysis such as constant propagation and dead code elimination, loop optimization, local program improvement techniques such as s-expression optimization, tail recursion elimination, table-driven final code generation techniques, runtime environments, and register allocation. Non-Algol-like languages, such as APL, LISP, and functional programming languages, also compile for interactive program development systems.

Prerequisites: CSE 304 or equivalent

CSE 523 Laboratory in Computer Science
A significant programming problem or digital system design will be undertaken. The laboratory project will extend over two consecutive semesters and will be completed in CSE 524.

Prerequisites: CSE graduate student status or permission of instructor

2 credits

CSE 524 Laboratory in Computer Science II
Solutions to the programming problem or digital system design, which was undertaken in CSE 523, are to be included as part of large-scale problem solving including cost analysis, design, testing, and documentation. A final report documenting the design, implementation, testing and documentation is required, and is to be written in a manner appropriate to a user's manual.

Prerequisites: CSE 523

3 credits

CSE 525 Operating Systems
Review of batch processing systems. Discussion of topics such as virtual memory, protection, interprocess communication, and directory structures in the context of several modern operating systems. Sequential processes, asynchronous operation, and modularization of systems.

Prerequisites: CSE 120 and CSE 201 or equivalents

4 credits

CSE 526 Principles of Programming Languages
Analysis of concepts in programming language concepts and design, with emphasis on abstraction mechanisms. Topics studied include denotational semantics, imperative and functional languages, object-oriented programming, procedure call and parameter passing mechanisms, generic and polymorphic definitions, abstract data types, concurrent and distributed programming primitives, and efficiency issues.

Several representatives of each paradigm (such as ALGOL 60, Pascal, ALGOL 68, Euclid, C, SMALLTALK, LISP, FP, ADA) studied in detail with emphasis given to design issues and interactions of features. Background in compiler construction and programming experience in a high-level language required.

Prerequisites: CSE 304

3 credits

CSE 527 Introduction to Image Analysis
Survey of methods used for the analysis of images by computer, including computer vision and pattern recognition. Topics to be covered are image formation, image segmentation and edge detection, binary images and shape analysis, shape from shading, motion field and optical flow, surface inference, and classification techniques.

Prerequisites: B.S. degree in Computer Science, Engineering or the mathematical and physical sciences

3 credits

CSE 528 Computer Graphics
This course emphasizes a hands-on approach to the use of computer graphics. The topics covered include models, picture description, and interaction; windowing, clipping, panning, and zooming; geometrical transformations in 2D and 3D; algorithms for raster displays, scan-line conversion, polygon fill, polygon clipping, etc.; hidden surface techniques, global, shading models; user interaction. The students will implement a substantial application program for one of the graphics terminals available in the department.

Prerequisite: Undergraduate course in data structures

3 credits

CSE 529 Simulation and Modeling
An introductory course to the tools and methodology of performance evaluation. Topics will include Markov chains and renewal processes, queueing models, parameter estimation, an introduction to queueing networks, and applications to computer systems; discrete event simulation, pseudo-random number and random variate generation, simulation design, simulation techniques, model design, model control using statistical inference, and variance reduction techniques.

Prerequisites: AMS 310 or AMS 507 (or equivalent), or permission of instructor

3 credits

CSE 530 Analysis of Computer Systems
This course is devoted to the performance evaluation of computer systems and will include topics from queueing networks and operations analysis, statistical data analysis, modeling single and multiple-resource systems, program behavior, memory management, scheduling, and resource allocation, modeling concurrent processes, computer networks, and distributed processing, work-load characterization, system monitoring, calibration, and fine-tuning.

Prerequisite: CSE/AMS 529 or permission of instructor

3 credits

CSE 532 Theory of Database Systems
Storage and retrieval from large well-structured databases. Relational model, deductive and object-oriented databases, query processing, concurrency control, database security and integrity. The emphasis is on more theoretical aspects of the topic.

Prerequisite: CSE 303 or permission of instructor

3 credits

CSE 533 Computer Network Communication Protocols
This is a survey of network communication software and hardware techniques, especially the TCP/IP reference model of layered protocols. Topics include connectivity and delay analysis, data transmission techniques, pipelining window protocols, virtual circuits and datagrams, routing, congestion control, local area network access, process-to-process message transport, internetwork gateways, encryption, and distributed application protocols.

Prerequisites: Prior course in operating systems or permission of instructor

3 credits

CSE 534 Advanced Operating Systems
This is a survey of modern operating system techniques (also needed for distributed operating systems. Topics include network topologies, interprocess communication, failure detection and system recovery, local kernel functions, global network services, location transparency, large network constraints, distributed control algorithms (synchronization, configuration, deadlock detection, and searches), and existing distributed systems.

Prerequisite: Undergraduate course in operating systems or permission of instructor

3 credits

CSE 535 Asynchronous Systems
Discusses asynchronous systems, their description using concurrent and distributed program design languages, and their verification. Topics include monitors, message passing, formal methods, and natural language front-ends to databases and other application programs. The course will emphasize both theoretical methods and practical implementations.

3 credits

CSE 537 Artificial Intelligence
A comprehensive introduction to the problems of artificial intelligence and the techniques for attacking them. Topics include program representation, problem-solving methods, search, pattern recognition, natural language processing, learning, expert systems, and AI programming languages and techniques. The course will emphasize both theoretical methods and practical implementations.

3 credits

CSE 538 Natural Language Processing
A survey of computational approaches to natural language processing issues in phonology, morphology, syntax, semantics, and pragmatics. The course will be divided into four language parsing algorithms, generation algorithms, and knowledge representations. Models for speech recognition systems, story understanding systems, and natural language front-ends to databases and other application programs will be investigated.

Prerequisite: CSE 537

3 credits

CSE 539 Expert Systems
Characteristics of some existing expert consultation and problem-solving systems. Techniques, tools, and languages for designing and building such systems. Knowledge representation. Problems of knowledge base construction and maintenance, extracting the "expertise" from the expert. Students will participate in a class project in which an expert knowledge-based consultation system for a specific problem domain will be specified and built.

Prerequisite: Graduate student status or permission of instructor

3 credits

CSE 541 Theoretical Foundation of Computer Science
First order predicate calculus. Proof theory. Introduction to model theory. Application of logic to program verification (Hoare's assertion/assumption method, structural induction, fixed-point semantics). Non-classical logics useful in computer science (modal logic, temporal logic, many-sorted logic, intuitionistic logic).

Prerequisite: CSE 303 or permission of instructor

3 credits

CSE 543 Computability and Undecidability
Automata theory (with more emphasis on Turing machines, less on regular and context-free languages) and the halting problem. Introduction to recursive function theory. Models of computation and associated time and space measures for complexity of algorithms in the various models.

Prerequisite: CSE 303 or permission of instructor

3 credits

CSE 544 Theory of Computational Complexity
Machine-based polynomial complexity theory, including nondeterministic computation, probabilistic computation, and space tradeoffs, and complexity hierarchies applied to related areas such as combinatorial algorithms and cryptography.

Prerequisite: CSE 543 or CSE 548 or permission of instructor

3 credits
CSE 545 Mechanical Inferences
Refutational and deductive theorem proving: resolution, paramodulation, and natural deduction systems. Techniques for proving partial correctness and termination of programs. Inductive theorem proving. Term rewriting systems. Deductive synthesis of programs. Prerequisite: CSE 541 or permission of instructor 3 credits

CSE/EESE 546 Analysis and Synthesis of Communication Networks
Mathematical analysis of message queuing and buffering processes for various signal statistics. Analytical and algorithmic methods for networked optimization. Topological design for network reliability. Waveform optimization encoding. Error analysis of coded and feedback systems. Optimization features and software requirements of communication processors. 3 credits

CSE 548/AMS 542 Analysis of Algorithms
Techniques for designing efficient algorithms, including choice of data structures, recursion, branch and bound, divide and conquer, and dynamic programming. Complexity analysis of searching, sorting, matrix multiplication and graph algorithms. Standard NP-complete problems and polynomial transformation techniques. Some computing will be required. Prerequisite: Some familiarity with data structures Recommended: AMS 506 3 credits

CSE 549 Formal Foundations for VLSI Design
A study of the algorithms related to VLSI design. Among topics covered: area/time tradeoffs, layout algorithms, networks of processors, systolic algorithms. Prerequisites: CSE 503 and CSE 548, or permission of instructor 3 credits

CSE 551 Program Semantics and Verification
Formal approaches to defining semantics of programming languages: denotational, operational, axiomatic, and transformational semantics. Formal systems for program verification. Logics of program, type theory, lambda calculus. Further topics selected from term rewriting approach to proving properties of data types, and semantics and verification of languages with concurrent and parallel constructs. Prerequisite: CSE 541 3 credits

CSE 557 Independent Study in Computer Science
A course that involves the student in an independent study course under the supervision of a faculty member. Prior permission of the graduate studies director is required if the course is to be counted toward the fulfillment of the degree requirements. 1-4 credits, variable and repetitive

CSE 559 Research
Variable and repetitive credit

CSE 600 Topics in Modern Computer Science
A survey of current computer science research areas and issues. This course comprises lectures by faculty members and visitors, selected readings, and introductory-level research problems. Possible topics include approximation algorithms for intractable problems, probabilistic algorithms, distributed systems, system design, expert systems, robotics, networks, VLSI, and multiprocessor computers. Prerequisite: Permission of instructor 3 credits

CSE 621 Seminar in Programming Languages
3 credits, repetitive

CSE 622 Seminar in Operating Systems
3 credits, repetitive

CSE 625 Seminar in Artificial Intelligence
3 credits, repetitive

CSE 631 Seminar in Database Systems
3 credits, repetitive

CSE 645 Seminar in Theory of Computation
3 credits, repetitive

CSE 648 Seminar in Analysis of Algorithms
3 credits, repetitive

CSE 652 Mathematical Techniques for the Analysis of Algorithms
Course includes advanced topics in combinatorics, the analysis of sorting and hashing algorithms, an introduction to probabilistic analysis, asymptotic analysis and Mellin transforms. Also covered are techniques for solving recurrence equations and Greene's calculus on labeled formal languages. Prerequisite: CSE 548 Recommended: Some skills in mathematical analysis 3 credits

CSE 663 Modern Developments in Algorithms and Complexity
Course covers probabilistic estimation techniques, the Hungarian method, and approximation algorithms. Also covers probabilistic algorithms, including primality testing, the theory of pseudo-random number generation and an introduction to cryptography. Prerequisite: CSE 548 Recommended: Some knowledge of probability and number theory 3 credits

CSE 681 Special Topics in Programming Languages
3 credits, repetitive

CSE 682 Special Topics in Computer System Design
3 credits, repetitive

CSE 683 Special Topics in Computer Applications
3 credits, repetitive

CSE 684 Special Topics in Computer Architecture
3 credits, repetitive

CSE 685 Special Topics in Artificial Intelligence
3 credits, repetitive

CSE 686 Special Topics in Theory of Computation
3 credits, repetitive

CSE 687 Special Topics in Computer Graphics
3 credits, repetitive

CSE 698 Practicum in Teaching
Variable and repetitive credit

CSE 699 Dissertation Research
Variable and repetitive credit


Degree Requirements

Requirements for the M.S. Degree

The M.S. degree in the Department of Electrical Engineering requires the satisfactory completion of a minimum of 30 graduate credits. These requirements may be satisfied by either one of the two following options:

I. M.S. Non-Thesis Option

A. At least 30 graduate credits with a grade point average of 3.0 or better. Among these 30 credits, up to six credits may be ESE 506, ESE 507, ESE 597, ESE 599, ESE 691, ESE 696, or ESE 699. All non-EE courses must receive prior approval from the graduate studies director.

B. Minimum of eight regular courses with at least 3.0 grade point average. At least five regular courses must be in the Department of Electrical Engineering. At least three of these five regular courses must be selected from the following five choices: (a) ESE 502, (b) ESE 503, (c) ESE 511, (d) ESE 520, and (e) either ESE 545 or ESE 580.

C. ESE 506, ESE 507, ESE 597, ESE 599, ESE 698 and ESE 699 are not counted as regular courses in item B. ESE 670 may not be counted more than twice (maximum of six credits) in item B.

D. Up to six transfer credits may be applied toward the degree with the approval of the program committee.

E. Satisfactory completion of a thesis.

Requirements for the Ph.D. Degree

A. Qualifying Examination

A student must pass a written qualifying examination.

B. Course Requirements

1. A minimum of six regular courses beyond the M.S. degree or 14 regular courses beyond the baccalaureate degree. The choice must have the prior approval of the designated faculty academic advisor. The courses ESE 506, ESE 507, ESE 597, ESE 599, ESE 638, and ESE 699 are not counted as regular courses. Courses that are presented under the title ESE 670 may not be counted more than four times (maximum of 12 credits), in total, for all graduate degrees awarded by the Department of Electrical Engineering.

2. The student must satisfy the stipulations of a plan of study which must be filed with the graduate program committee within six months after the student passes the qualifying examination. The study plan, which will include the six regular courses as required in item I will be developed under the aegis of the designated faculty advisor (who may or may not be the eventual thesis advisor).

C. Preliminary Examination

A student must pass the preliminary examination within 36 months after passing the qualifying examination. Both a thesis topic and the thesis background area are emphasized.

D. Advancement to Candidacy

After successfully completing all requirements for the degree other than the dissertation, the student is eligible to be recommended for advancement to candidacy. This status is conferred by the Vice Provost for Research and Graduate Studies upon recommendation from the chairperson of the department.

Dissertation

The most important requirement for the Ph.D. degree is the completion of a dissertation, which must be an original scholarly investigation. The dissertation must represent a significant contribution to the scientific literature and its quality must be compatible with the publication standards of appropriate and reputable scholarly journals.

F. Dissertation Defense

The student must defend the dissertation before an examining committee. On the basis of the recommendation of the committee, the Dean of Engineering and Applied Sciences will recommend acceptance or rejection of the dissertation to the Vice Provost for Research and Graduate Studies. All requirements for the degree will have been satisfied upon the successful defense of the dissertation.
G. Residency Requirement
A one-year residency is required.

H. Time Limit
All requirements for the Ph.D. degree must be completed within seven years after completing 24 hours of graduate courses in the department.

Courses

ESE 501 Graduate Laboratory in Electrical Sciences
Intended to familiarize the student with the use of research laboratory equipment, basic measurement techniques, and integration into an overall experimental project. Each student will select at least three experimental projects from the following areas to be supervised by the faculty: applied optics, microwave electronics, wave propagation, and solid-state electronics. The student must set up the experimental system, measure the necessary parameters, and perform the required experiments in order to complete the project.
Fall, 3 credits

ESE 502 Linear Systems
Mathematical descriptions and correspondences between continuous-time and discrete-time linear systems. State variable and input-output formulation of linear time-invariant systems and two transforms in analysis. Controllability, observability, minimum realization, and structural canonical forms. Assignment of system nodes, Rx state feedback, and the design of observers. Assignment of system nodes, Rx state feedback, and the design of observers.
Spring, 3 credits

ESE 503 Stochastic Systems
Fall, 3 credits

ESE 504 Congestion and Delay in Communications Systems
Prerequisite: ESE 503 or permission of instructor
Fall, Spring, 3 credits each

ESE 506, 507 Electronic Circuits, Devices, and Systems I and II
An intensive coverage of the concepts fundamental to the analysis and synthesis of electronic circuits and systems, both analog and digital. The course is not open to students with an undergraduate degree in electrical engineering.
Prerequisite: Permission of graduate studies director
Fall, Spring, 3 credits each semester

ESE 510 Fundamentals of Physical Electronics
Lagrangian and Hamiltonian formulation of mechanics; Classical and quantum statistics; Schroedinger's and Heisenberg's representation of quantum mechanics; perturbation theory. Solid-state theory; crystal structure, simple band structure, effective mass theorem, properties of semiconductors. Transport theory, derivation and application of Boltzman transport theory. Semiconductor devices.
Fall, 3 credits

ESE 511 Solid-State Electronics I
A study of transport processes in solids leading to the analysis and design of solid-state devices. Electrical and thermal conductivities; scattering mechanism; diffusion, galvanomagnetic, thermomagnetic, and thermoelectric effects. Hall effect and magnetoresistive devices. Conductivity in thin films. Ferroelectrics, piezoelectrics, theory of magnetism and of magnetic devices.
Fall, 3 credits

ESE 512 Solid-State Electronics II
Resonance phenomena in solids; applications to microwave devices and to measurements of electronic parameters, optical properties of solids, direct and indirect transitions, luminescence, photoelectric devices, photomagnetic effects. Elements of superconductivity, the macroscopic and the microscopic theories, tunneling effects.
Spring, 3 credits

ESE 514 Semiconductor Electronics
This course provides an introduction to the physics, design, and fabrication techniques for planar MOS-FET devices and LSI and VLSI integrated circuits. Topics include the following: surface field effect, MOS capacitors and transistors, threshold voltage as a function of oxide thickness, capacitance-voltage measurement, interface charge density and substrate bias, characteristics of MOS devices under different operating conditions for both low and high frequencies, equivalent circuits and device parameters and their dependence on different processing techniques. The latest technological developments to achieve high-speed and high-density LSI circuits will also be discussed.
Prerequisite: ESE 511
Fall, 3 credits

ESE 515 Quantum Electronics I
Physics of microwave and optical lasers. Topics include introduction to laser concepts; quantum theory; classical radiation theory; resonance phenomena in two-level systems; Bloch equations — Kramers Kronig relation, density matrix; rate equation and amplification; CO2 lasers; discharge lasers; semiconductor lasers.
Fall, 3 credits

ESE 516, 517 Integrated Electronic Devices and Circuits I and II
Theory and applications: elements of semiconductor device theory, methods of fabrication, bipolar junction transistors, FET, MOS transistors, diodes, capacitors, and resistors. Design techniques for linear digital integrated electronic components and circuits. Discussion of computer-aided design, MSL, and LSI.
Fall, spring, 3 credits each semester

ESE 518 Quantum Electronics II
Spring, 3 credits

ESE 520 Electronics II—Fundamentals of Electromagnetics
Electro- and magnetostatics; Maxwell's equations; vector and scalar potentials; vector and tensor transformation properties. Lorentz transformation; derivation of Maxwell's equations from the Lorentz transformation. Boundary value problems; Green's function, guided waves, travelling wave, and charged particle interactions. Radiation.
Fall, Spring, 3 credits

ESE 521 Applied Electromagnetic Theory
Advanced boundary value problems in electromagnetic and microacoustic wave propagation, guided wave, and radiation. Topics include variation and perturbation methods applied to cavity, wave guide discontinuity radiation from guided aperture, and source theorem, mode theory of guided wave around the earth, microwave acoustic wave guide transducers.
Fall, 3 credits

ESE 522 Lightwave Communications
This course covers the essential components of a modern optical fiber communication system. Following a brief review of optical sources and characterization of optical fiber waveguides the remainder of the course examines the incoherent optical system currently in use. A complete analysis of optical receivers, modulation techniques, and optical receiver design is tackled. Finally, future coherent optical systems are examined.
Prerequisite: ESE 319
Fall, 3 credits

ESE 523 Integrated and Fiber Optics
The course includes the following topics: thin-film dielectric optical waveguides and modes, dielectric fibers, semiconductor planar waveguides, input and output couplers, groove reflectors, semiconductor lasers, amplifiers, and detectors, semiconductor junction lasers and thin-film feedback lasers, fabrication techniques of thin-film guides and devices; optical communication system consideration and requirements.
Fall, 3 credits

ESE 524 Microwave Acoustics
Continuum acoustic field equations. Wave equation, boundary conditions, and Poynting vector. Waves in isotropic elastic media: plane-wave modes, reflection and refraction phenomena, bulk-acoustic-wave (BAW) waveguides, surface acoustic waves (SAW's). Plane and guided waves in piezoelectric media. BAW transduction and applications: delay-line and resonator structures, the Mason equivalent circuit, monolithic crystal filters, IM CON dispersive delay lines, acoustic microscopes, SAW transduction and applications: the interdigital transducer, band-pass filters, dispersive filters, convolvers, tapped delay lines, resonators.
Prerequisite: ESE 319
Fall, 3 credits

ESE 525 Electromagnetic Methods in Geophysical Exploration
The theory and methods of exploring the structure of the earth and searching for oil and mineral resources by using electric, electromagnetic, and magnetotelluric techniques: resistivity methods, electromagnetic induction, magnetotelluric principles, electromagnetic transients, induced polarization, sounding techniques, well logging, computational problems, inverse problems.
Prerequisite or corequisite: ESE 520 or equivalent
Fall, 3 credits

ESE 526 Introduction to Integrated Circuits Technology
This course introduces the basic technologies employed to fabricate advanced integrated circuits. These include epitax, diffusion, oxidation, chemical vapor deposition, ion implantation, lithography, and etching. The significance of the variation of these steps is discussed with respect to its effect on device performance. The electrical and the geometric design rules are examined together with the integration of these fabrication techniques to reveal the relationship between circuit design and the fabrication process.
Prerequisite: ESE 514
Fall, 3 credits

109
ESE 529 Network Theory

ESE 530 Computer-Aided Design
The course presents techniques for analyzing linear and nonlinear dynamic electronic circuits using the computer. Some of the topics covered include network graph theory, generalized nodal and hybrid analysis, companion modeling, Newton's method in n-dimensions and numerical integration.
Prerequisite: B.S. in electrical engineering
Spring, 3 credits.

ESE 531 Detection and Estimation Theory
Hypothesis testing and parameter estimation. Series representation of random processes. Detection and estimation of known signals in white and non-white noise. Detection of signals with unknown parameters. Prerequisite: ESE 503 or permission of instructor Spring, 3 credits.

ESE 532 Theory of Digital Communication
Optimum reception, component signaling, comparison classes of signaling schemes. Channel capacity theorem, bounds on optimum system performance, encoding for error reduction, and the fading channel. Source coding and some coding algorithms.
Prerequisite: ESE 503 Fall, 3 credits.

ESE 533 Satellite Communication Engineering
Historical perspective, economics, orbital mechanics, synchronous satellites, transponders, multaccess earth terminals, frequency division multiple access, time division multiplexing, time division multiple access, PSK, carrier-phase tracking, filter distortion, bit sync, timing systems, delay-lock tracking.
Prerequisite: ESE 503 or equivalent Spring, 3 credits.

ESE 534 Information Theory and Reliable Communications
Source and channel models. Measure of information and source coding theorems. Mutual information, channel capacity, and channel coding theorems. Block codes, convolutional codes. Research topics.
Fall, 3 credits.

ESE 539 Communications Transportation and Power Nets
A problem-oriented lecture and seminar course in deterministic and probabilistic large-scale systems, and techniques for the solution of problems arising therein. Spring, 3 credits.

ESE 541 Discrete Time Systems
Prerequisite: ESE 502 Spring, 3 credits.

ESE 542 Stability Theory and Application
Definition and application of stability criteria in both linear and nonlinear systems. Topics include equilibrium points, limit cycles, describing function analysis, construction of Lyapunov functions, the popov circle criterion, and perturbation methods of stability theory to design of nonlinear control systems. Spring, 3 credits.

ESE 543 Optimal Control
Topics include parameter optimization, La Grange multipliers, and numerical techniques such as steepest descent. Newton's method and conjugate gradients. In the area of trajectory optimization, the hamilton-jacobi Equations. Pontryagin maximum principle and dynamic programming are applied to the quadratic regulator, minimum time, minimum fuel, and other linear and nonlinear control problems. Control in restricted phase space.
Fall, 3 credits.

ESE 544 Optimal Filtering and Data Reconstruction
Effects of stochastic noise and inexact measurement on the performance of control and communication systems. Topics include matching filter, coherent detection, optimal estimation, prediction, and smoothing of data using the Weiner-Hopf and Kalman-Bucy methods. The separation principle in optimal control of stochastic systems.
Spring, 3 credits.

ESE 545 Computer Architecture
Covers multiprocessors, stack-organized computers, pipelined computers, microprocessors, and computer networks. Topics including microprogramming, computer design language, hierarchical memory management systems, machine architecture, high-speed arithmetic, hardware dynamic loader, micro-programmed control. Input/output organization, virtual memory, and virtual machine are discussed. May not be taken in addition to CSE 502 for credit.
Prerequisite: ESE 318 Spring, 4 credits.

ESE/CSE 546 Analysis and Synthesis of Computer Communication Networks
Spring, 3 credits.

ESE 547 Digital Signal Processing
The course covers three aspects of digital signal processing: digital filter, fast fourier transform (FFT), and error analysis. Topics include review of analog filters and design of infinite impulse filters; algorithm and implementation of FFT, application of FFT; effects and analysis of quantization errors.
Fall, 3 credits.

ESE 549 Fault Diagnosis of Digital Systems
This course is designed to acquaint students with fault diagnosis of logic circuits. Both combinational and sequential circuits are considered. Concepts of faults and fault models are presented. Emphasis is given to test generation, test selection, fault detection, fault location, fault location within a module, and fault correction.
Prerequisite: ESE 318 or equivalent Spring, 3 credits.

ESE 551 Switching Theory and Sequential Machines
Survey of classical analysis and synthesis of combinational and sequential switching circuits, followed by related topics of current interest such as error diagnosis and fall soft circuits, use of large-scale integration, logic arrays, automated local design.
Prerequisite: ESE 318 or equivalent Fall, 3 credits.

ESE 552 LSI and Microprocessor Design and Application
Prerequisite: ESE 101, 102, ESE 318, or equivalent Spring, 4 credits.

ESE 554 Introduction to VLSI Systems
The course provides sufficient basic information about integrated devices, circuits, digital and analog sample-data subsystems, and system architecture to enable the student to span the range of abstraction from the underlying physics to complete VLSI systems. The course presents basic procedures for designing and implementing digital and analog integrated systems, including a structured design methodology, use of schematic design technology, and organization and design of high-level design language, and use of a scalable set of design rules. Also examined are the effects of scaling down the dimensions of devices and systems, the potential for future improvements in fabrication technology.
Prerequisite: B.S. in electrical engineering or computer science Fall, 3 credits.

ESE 555 VLSI Circuit Design
As a continuation of ESE 554, this course provides students with the opportunity to design a VLSI chip in its entirety: from systems specifications, choice of devices, layout and test, to fabrication and testing. Prerequisite: ESE 554 Spring, 3 credits.

ESE 556 Nonlinear Discrete-Time Systems
Analysis of various classes of nonlinear discrete-time systems. Theory and applications of nonlinear ordinary difference equations, closed-form solutions, fixed-points and limit cycles, asymptotic expansions, local and global stability, bifurcations, chaos, strange attractors, a selection of applications in electrical engineering, economics, and biology.
Spring, 3 credits.

ESE 557 Digital Signal Processing II: Advanced Topics
A number of different topics in digital signal processing will be covered, depending on class and current research interest. Areas to be covered will include the following: parametric signal modeling, spectral estimation, multirate processing, advanced FFT and convolution algorithms, adaptive signal processing, multidimensional signal processing, advanced filter design, dedicated signal processing chips, and signal processing for inverse problems. Students will be expected to read and present current research literature.
Prerequisite: ESE 547 or permission of instructor Spring, 3 credits.

ESE 558 Digital Image Processing I
The material in this offering will constitute a first course introduction to the field of digital image processing. Image generation, electro-optical sensor characteristics, vision, color perception/matching will be discussed with respect to image processing requirements followed by image sampling techniques, 2D Nyquist Theorem,
aliasing effects and scalar/vector quantization techniques of image processing techniques will be treated from finite and infinite dimensional vector space approaches and will include Fourier, Haar, singular-value decomposition, Karhunen-Loeve transforms and their fast counterparts. Application of these techniques to image enhancement/restoration will follow and will include histogram equalization, deburring, weighted filtering, and pseudo-inverse restoration.  
Prerequisite: Linear Problems/Problem Theory  
Fall, 3 credits

ESE 559 Digital Image Processing II  
The course material will proceed directly from DIP I, starting with image reconstruction from projection data using basic projection theorem. Theorems are developed, computerized axial tomography techniques will be examined in detail including forward and inverse random transforms, convolution, back projection and Fourier reconstruction: nuclear magnetic resonance imaging and positron emission tomography will be similarly covered. Surer resolution concepts will be developed and applied to a variety of remote sensing applications as well as digital image coding for efficient transmission of digital TV imagery.  
Prerequisite: ESE 558  
Spring, 3 credits

ESE 560 Optical Information Processing  
The course is designed to give the student a firm background in the fundamentals of optical information processing techniques. It is assumed that the student is familiar with Fourier transforms and complex algebra, and is conversant with the principles of linear system theory. The course begins with a mathematical introduction to linear system theory and Fourier transformation. The body of the course is concerned with the scalar treatment of diffraction and its application to the study of imaging techniques and coherent and incoherent optical processors.  
Prerequisite: Bachelor's degree in Physical Sciences  
Spring, 4 credits

ESE 563 Fundamentals of Robotics I  
This course covers homogenous transformations of coordinates; kinematic and dynamic equations of robots with their associated solutions; control and programming of robots.  
Prerequisite: Permission of instructor  
Fall, 3 credits

ESE 564 Fundamentals of Robotics II  
This course advances ESE 563, with more emphasis on kinematic and dynamic equations, as well as advancing control strategy. In addition it covers the following topics: vision, sensory processing, collision-free trajectory planning.  
Prerequisite: Permission of instructor  
Spring, 3 credits

ESE 570 Bioelectronics  
Origin of bioelectric events; ion transport in cells, membrane potentials; neural action potentials and muscular activity, cortical and cardiac potentials. Detection and measurement of bioelectric signals, including measurement of blood flow; impedance cardiology, vector cardiology; characteristics of transducers and tissue interface; special requirements for the amplification of transducer signals.  
Fall, 3 credits

ESE 572 Electronic Instrumentation and Operational Amplifier  
Design specification for electronic instruments; instrumentation, bioelectric signals, modeling, measurement of pollution in air and in water, media-electrode interfaces, electrodes, sensors/transducers, Signal conditioning, instrument amplifiers, operational amplifiers. Data processing, conversion, microprocessors, signal transmission; output systems, storage, display, remote instrument packages for measurement monitoring, analyzing.  
Spring, 3 credits

ESE 574 The Design of Artificial Organs  
The physiology, anatomy, and pathology of the heart, lungs, and kidneys is presented to enable the student to understand the technical constraints on the design of counterparts. The role of the engineer in the conceptual process is described and constraint imposed by surgical, material, and other technical aspects on the design is discussed. The student presents a proposed design of a selected organ using the formal standard of NIH grant proposal.  
Fall, 3 credits

ESE 576, 577 Physiology for Engineers and Physical Scientists  
Study of human physiology with emphasis on quantitative engineering interpretation. Among the physiological systems considered are neural, cardiovascular, respiratory, renal, gastrointestinal and endocrine.  
Fall, spring, 3 credits

ESE 580, 581 Microprocessor-Based Systems Engineering I and II  
This course is a study of methodologies and techniques for the engineering design of microprocessor-based systems. Emphasis is placed on the design of reliable industrial quality systems. Diagnostic features are included in these designs. Steps in the design cycle are considered. Specifically, requirements definition, systematic design implementation, testing, debugging, documentation, and maintenance are covered. Laboratory demonstrations of design techniques are included in this course. The students also obtain laboratory experience in the use of microprocessors, the development of systems, circuit emulations, and the use of signature and logic analyzers.  
Fall, spring, 4 credits, each semester

ESE 585 Applications of Artificial Intelligence to Signal Processing  
Principles of artificial intelligence with applications to signal processing and robotics; topics include stochastic pattern recognition, decision functions, mathematical programming, predicate calculus, and design of expert systems.  
Prerequisite: ESE 503  
3 credits

ESE 588 Pattern Recognition  
Basic concepts of pattern recognition techniques are introduced and illustrated. Cases of pattern recognition, syntactic pattern recognition, and graph matching. Topics on Bayes decision theory, parametric and nonparametric methods, clustering techniques, and the use of machine learning.  
Fall, 3 credits

ESE 596 Internship in Bioengineering  
Student will work with physicians in hospital or other clinical facility, and will gain experience in clinical instrumentation diagnosis and in treatment of diseases.  
Prerequisite: Physiology background  
Fall, spring, 3 credits, repetitive

ESE 597 Practicum in Engineering  
Discussion and case studies of practical problems in designing an internship for part-time graduate students, related to their current professional activity. Registrants must have the prior approval of the graduate studies director.  
The grade will be assigned, and credit granted, upon successful completion of the internship. Fall, spring, variable and repetitive credit

ESE 599 Research  
Fall, spring, variable and repetitive credit, grading S, U

ESE 610 Seminar in Solid-State Devices and Circuits  
Current research in solid-state devices and circuits and computer-aided network design.  
Fall, spring, 3 credits

ESE 630 Seminar in Communication Theory  
Fall, spring, 3 credits

ESE 640 Seminar in Systems Theory  
Recent and current research work in systems theory.  
Fall, spring, 3 credits

ESE 650 Advanced Topics in Digital Systems  
Topics of special interest in the area of digital systems.  
Fall, spring, 3 credits

ESE 660 Seminar in Biomedical Systems Engineering  
This seminar will treat topics of current interest in bioengineering. Modeling and simulations of physiological systems, such as cardiovascular, respiratory, renal, and endocrine systems. Instrumentation systems including automatic chemical assays, electric probes, ultrasound, tracer methods, and radiation techniques. Application of computers in biomedicine in the subject of diagnosis, emergency services, and hospital management.  
Prerequisites: ESE 310, ESE 370 or equivalent  
Fall, spring, 3 credits

ESE 670 Topics in Electrical Sciences  
Varying topics selected from current research topics. This course is designed to give the necessary flexibility to students and faculty to introduce new material into the curriculum before it has attracted sufficient interest to be made part of the regular course material. Topics include: a) biomedical engineering, b) circuit theory, c) controls, d) electronics circuits, e) digital systems and electronics, f) switching theory and sequential machines, g) digital signal processing, h) digital communications, i) computer architecture, j) networks, k) systems theory, l) solid state electronics, m) integrated electronics, n) quantum electronics and lasers, o) communication theory, p) wave propagation, q) integrated optics, r) optical communications and information processing, s) instrumentation, and t) VLSI computer design and processing.  
Fall, spring, variable and repetitive credit

ESE 691 Seminar in Electrical Engineering  
This course is designed to expose students to the broadest possible range of the current activities in electrical engineering. Speakers from both on and off campus discuss topics of current interest in electrical engineering. All full-time Ph.D. candidates are required to present their thesis finding to the department as a whole.  
Fall, spring, 1 credit, repetitive, grading S, U

ESE 698 Practicum in Teaching  
Fall, spring, variable and repetitive credit, grading S, U

ESE 699 Dissertation Research  
Fall, spring, variable and repetitive credit, grading S, U
Materials
Science and Engineering
(ESM)

Chairperson: Raymond Egerton
Engineering Building 314 (516) 632-8484
Graduate Studies Director: Clive Clayton
Engineering Building 320 (516) 632-8504

Degree Requirements
In addition to the College of Engineering and Applied Sciences and Graduate School requirements, a student will be admitted to the Ph.D. degree program after satisfactorily passing a graduate program qualifying examination. (However, see "Requirements for the Ph.D. Degree" for students entering with the M.S. degree.) The qualifying examination will be given at the beginning of each semester and will be a comprehensive examination covering undergraduate work in materials science, physics, chemistry, and applied mathematics. The qualifying examination will be taken by every student who plans to study toward the Ph.D. degree within the first month of the second semester in which he/she is enrolled as a full-time student in the Materials Science and Engineering Department. However, well-prepared students are encouraged to take this examination in their first semester.

Requirements for the M.S. Degree
A. Course Requirements
1. Satisfactory completion of a minimum of 18 graduate course credits and a thesis in the student's area of specialization. A total of 30 graduate credits is required.

or

2. The satisfactory completion of a minimum of 30 graduate credits, 24 of which must be for graduate courses, and six credits for research. This option is primarily for part-time students. Full-time students may petition the graduate studies committee of the Materials Science and Engineering Department to elect this option, but the petition must be made at the time of admission application.

In addition, the average grade for all credits, excluding ESM 599, ESM 698, and ESM 699, must be B or better.

B. Thesis
For the student who elects to complete a thesis for the M.S. degree, the thesis must be approved by three faculty members, at least two of whom are members of the Materials Science and Engineering Department, including the research advisor.

C. Final Recommendation
Upon the fulfillment of the above requirements the faculty of the graduate program will recommend to the Vice Provost for Research and Graduate Studies, through the graduate studies committee, that the Master of Science degree be conferred or will stipulate further requirements that the student must fulfill.

D. Time Limit
All requirements for the master's degree must be completed within three years of the student's first registration as a matriculated full-time graduate student. For matriculated part-time students, the degree must be completed within five years. In rare instances, the Vice Provost for Research and Graduate Studies will entertain a petition bearing the endorsement of the chairperson of the department for an extension of this time limit. In such instances, the student may be required to repeat certain examinations or present evidence that he/she is still prepared for the thesis or the final examination.

Requirements for the Ph.D. Degree
A. Qualifying Examination
Students must satisfactorily pass a qualifying examination as described above. A student who elects the non-thesis option for the M.S. program will be considered a terminal M.S. student by the department and must formally reapply for admission to the department if he/she wishes to pursue a Ph.D. degree. Students who elect the M.S. thesis program, however, will be considered as continuing students in the department and may proceed to the Ph.D. qualifying examination.

B. Plan of Work
Before completion of one year of full-time residence, the student must have selected a research advisor who agrees to serve in that capacity. The student will then prepare a plan of further coursework. This must receive the approval of the student's advisor and of the graduate committee.

C. Preliminary Examination
This is a comprehensive oral examination on the subjects covered in graduate materials science courses. The examination committee will consist of four members including the research advisor, two members of the Materials Science and Engineering Department, and one member from outside the department. Students entering the program with a baccalaureate degree must take the preliminary examination before the end of the fifth semester. If a second examination is required, this must be completed by the tenth week of the sixth semester. Students entering the program with a master's degree must complete the examination by the tenth week of the second semester.

D. Advancement to Candidacy
After the student has successfully completed all requirements for the degree, other than the dissertation, he/she is eligible to be recommended for advancement to candidacy. This status is conferred by the Vice Provost for Research and Graduate Studies upon recommendation of the chairperson of the graduate program.

E. Dissertation
The most important requirement of the Ph.D. degree is the completion of a dissertation, which must be an original scholarly
investigation. The dissertation shall represent a significant contribution to the scientific literature and its quality shall be comparable with the publication standards of appropriate and reputable scholarly journals.

F. Defense
The candidate shall defend the dissertation before an examining committee consisting of four members including the research advisor, two members of the Materials Science and Engineering Department and one member from outside the department.

G. Residency
Two consecutive semesters of full-time study are required.

H. Time Limit
All requirements for the Ph.D. degree must be completed within seven years after completing 24 credit hours of graduate courses in the department, exclusive of research credit.

Courses

ESM 502 Techniques of Materials Science
A survey of the important experimental methods employed in studies of materials. Essentially a laboratory course where the student carries out refined measurements using research-grade equipment. The areas covered include metallography, corrosion, X-ray diffraction studies of crystalline and amorphous materials, optical and electron microscopic examination of materials, and the mechanical properties of materials.
Fall, 3 credits

ESM 504 Production Processes
Selected topics in manufacturing processes in modern industry: forming, joining, fabrication, and finishing metal and alloys as well as special methods of ceramics processing. Coatings and thin-film techniques will be reviewed relative to substrate protection and for electronics and electrical applications.
Fall, 3 credits

ESM 505 Diffraction Techniques and the Structure of Solids
The structure of solids can be studied using X-ray, neutron and electron diffraction techniques. Topics covered are coherent and incoherent scattering of radiation, structure of crystalline and amorphous solids, stereographic projection and crystal orientation determination; concept of reciprocal vector space. Laboratory work in X-ray diffraction is also included.
Fall, 3 credits

ESM 506 Mechanical Properties of Engineering Materials
A unified approach for all solid materials will be made with regard to the correlation between microstructure and their macroscopic mechanical properties. The course deals with various testing techniques for delineating mechanical properties of materials, considering elasticity, anelasticity, plasticity, dislocation theory, cohesive strength, fracture, and surface wear. Attention is given to strengthening mechanisms for solids, metals, ceramics, and polymers.
Fall, 3 credits

ESM 509 Thermodynamics of Solids
Current knowledge regarding the thermodynamic properties of condensed phases is discussed. The thermodynamic treatment of ideal, regular, and real solutions is reviewed. Estimation of reaction-free energies and equilibria in condensed phase reaction such as diffusion, growth, and phase transformations; thermodynamic analysis of phase equilibria diagrams.
Fall, 3 credits

ESM 510 Kinetic Processes in Solids
Atomistic rate processes in solids with emphasis on diffusion, creep, grain growth, and deformation and experimental techniques; role played by a broad class of crystalline imperfections. Topics include annealing of deformed materials, kinetics of deformation, thermally controlled deformation, kinetics of nucleation and growth, solidification and precipitation.
Spring, 3 credits

ESM 511 Solid State Electronics
Fall, 3 credits

ESM 512 Dielectric and Magnetic Properties of Materials
The physical origin and manifestation of the dielectric and magnetic properties of materials is treated in relation to structure. Topics include the atomic origin of electric and magnetic susceptibility, optical properties, piezoelectricity, ferroelectricity, ferromagnetics, magnetic properties of alloys, ferrites, and garnets. Where possible, the importance of materials properties on device and system behavior will be discussed.
Spring, 3 credits

ESM 515 Phase Transformations
A review of the processes by which structures are developed in solids. Classical nucleation theory including homogeneous and heterogeneous mechanisms. Diffusion and fusionless growth mechanisms. Transformation kinetics.
Prerequisite: ESG 332
Spring, 3 credits

ESM 516 Mathematics Materials
Modern materials science requires a working knowledge of a number of quantitative methods of analysis. This course is designed to develop in the context of material science applications: vector and tensor concepts, linear operators in quantum mechanics, eigenvalue problems, Fourier series, integral transforms, and Green's functions. This is a problem-oriented course.
Fall, 3 credits

ESM 599 Research
Variable and repetitive credit

ESM 600 Seminar in Surface Science
Discussions and readings on current problems in surface physics, chemistry, and crystallography.
Spring, 3 credits

ESM 602 Seminar in Plasticity and Fracture
Intended for advanced students, especially those doing research in the area. Topics: detailed description of defects and their relation to mechanical structure, the dislocation theory; plasticity and yield criteria, creep, fatigue; microscopic study of fracture including ductile and brittle behavior and the relationship of plastic flow to cleavage.
3 credits

ESM 604 Seminar in Ultrasonic Methods and Internal Friction in Solids
Review of advanced measurement techniques in the field of ultrasonics coupled with quantitative descriptions of experimental variables related to the sample microstructure. Applications to optical, electrical, and mechanical properties will be discussed. Use of ultrasonics for non-destructive evaluation will be considered.
Spring, 3 credits

ESM 605 Advanced Diffraction Techniques
Advanced topics in diffraction theory including the dynamical theory in perfect and imperfect crystals and its applications. Other topics from the following list will be pursued if time is available: EXAFS/EXELFS/SEXAFS; LEED/RHEED; small-angle scattering; interference and electron-channeling patterns; convergent beam diffraction; phonon scattering; glancing incidence X-ray diffraction; diffraction from defect structures; colored symmetry; holography.
Prerequisites: ESM 505 or permission of instructor

ESM 606 Seminar in Optical Properties of Material
A survey of modern optical materials and their characteristics. The properties of both glasses and crystalline materials are related to physical origin. Electro-optic, elasto-optic, and magneto-optic properties and their interrelations are related to applications in technology including laser systems, displays, and spectroscopy.
Fall, 3 credits

ESM 607 Imperfections in Crystals
A unified treatment of crystal lattice defects encompassing point, line, and planar defects; their geometric properties, energies, interactions, and contributions to material properties.
Spring, 3 credits

ESM 608 Seminar in Catalysis
Introduction to homogeneous and heterogeneous catalysis. General discussion of catalysis. The kinetics of heterogeneous catalysis. Electronic factors in catalysis; metals, semiconductors, and surface species. Preparation and properties of metal surfaces. Porosity, Typical industrial processes, e.g., Fischer-Tropsch, ammonia synthesis, ammonia oxidation, etc.
Fall, 3 credits

ESM 610 Seminar in Reactions in Inorganic Solids
Fall, 3 credits

ESM 612 Seminar in Advanced Thermodynamics of Solids
The fundamentals of the thermodynamics of irreversible processes are presented and the theory applied to thermal diffusion, thermoelectric transport and other coupled processes in solids. Thermodynamics of multicomponent phase equilibria. Diffusion, oxidation, and other rate processes in ternary and higher-order systems.
Prerequisite: ESM 509
Spring, 3 credits

ESM 613 Seminar in Materials and Environment
Interactions between materials and their environments including corrosion, oxidation, ab- sorption, and adsorption reactions. The influence of these reactions on the properties of materials, the design of materials resistant to these phenomena, alternative methods of protection, and the utilization of these reactions in promoting breakdown and deterioration of material.
Spring, 3 credits
Seminar in Diffusion in Solids
Diffusion in solids is considered in detail including solution of the transport equations for volume, grain boundary, and surface diffusion. Kirkendall effect and other diffusion phenomena, atomic mechanisms of diffusion, correlation effects, etc. Next, the theory of processes in which diffusion plays an important role is considered, such as ionic conduction, oxidation of metals, and the sintering of solids.

Spring, 3 credits

Seminar in Phase Transformations
The theory of phase transformations in solids is considered. Kinetics and the mechanisms of nucleation and growth and martensitic transformations. Melting and solidification, precipitation from solid solution, polymorphic transformations, eutectic and eutectoid reactions, second-order transitions, recrystallization, and other transformations in solids.

Fall, 3 credits

Special Problems in Materials Science
Supervised reading and discussion of selected publications in particular fields of materials science. This course is designed primarily for advanced graduate students who are, or expect to be, involved in research in these areas, although other students may enroll with permission of the instructor.

3 credits, repetitive

Materials Science Colloquium
A weekly series of lectures and discussions by visitors, local faculty members, and students presenting current research results.

1 credit, repetitive

Practicum in Teaching
0-3 credits, repetitive

Dissertation Research
Variable and repetitive credit
Academic Advisor
Students are strongly encouraged to choose an advisor in their areas of specialization as soon as possible. This will benefit the student in course selection, research, and other areas of academic importance. Students receiving financial aid and students in the Ph.D. program must select an advisor before the start of their second semester.

Academic Standing
An average in all coursework of B or higher is a minimum requirement for satisfactory status in the graduate program. In the doctoral program, a 3.5 grade point average is expected, exclusive of thesis credits ESC 699, ESC 698, and ESC 699.

B.E./M.S. Program
B.E./M.S. students will have started their Master’s Thesis in their senior year by registering for ESC 440 and ESC 599 in place of ESC 441, and substituting one graduate course for an undergraduate technical elective. For the fifth year of the B.E./M.S. Program, students are required to register for 24 credits, of which 18 are course credits and six are ESC 599.

Degree Requirements
Requirements for the M.S. Degree
A minimum of 30 credits, exclusive of ESC 698 Practicum in Teaching, is required for the M.S. degree.

A. Course Requirements
1. M.S. with thesis: 21 approved graduate course credits with an accepted thesis registered as nine credits of ESC 599. No more than six credits of ESC 696 may be applied toward the approved graduate course credit requirements.
2. M.S. without thesis: 30 approved graduate credits. No credit for ESC 599 Master’s Thesis is approved for fulfilling this requirement. No more than six credits of ESC 696 may be applied toward the approved graduate course credit requirements.
3. Physics 503 Methods of Mathematical Physics I is a requirement for every student enrolled in the graduate program. The graduate studies director may waive this requirement if the student has taken an equivalent course elsewhere.
4. Satisfactory participation in ESC 565 Departmental Research Seminar is mandatory for every first-year graduate students.
5. A minimum of 18 graduate credits (including ESC 599) must be taken in the Department of Mechanical Engineering. Except for Physics 503, all courses taken outside the department must have the prior approval of the student’s advisor and the graduate studies director.

B. Transfer Credits
A student who has entered the Ph.D. program with an M.S. degree from another institution may transfer up to 12 credits; a student with a master’s degree from Stony Brook may transfer up to six credits toward the Ph.D. degree. Credits used to obtain any prior degrees are not eligible for transfer. Requests for transfer of credits must be submitted to the graduate studies director.

C. Major and Minor Requirements
The student must specialize in one of the four areas within the department:
1. Thermal Sciences and Fluid Mechanics
2. Solid Mechanics
3. Mechanical Design
4. Atmospheric Sciences

Students who major in areas 2, 3, and 4 must select a minor from one of the following academic disciplines:
1. Fluid Mechanics
2. Heat Transfer
3. Combustion and Propulsion
4. Statistical Mechanics
5. Solid Mechanics
6. Atmospheric Sciences
7. Mechanical Design
8. Disciplines outside the department approved by the student’s advisor and the graduate program director.

Requirements for the Ph.D. Degree
A. Course Requirements
Fifteen approved graduate credits beyond the M.S. degree requirement, excluding credit for ESC 699 and ESC 698. Physics 503 Mathematical Physics I is a requirement which the graduate studies director may waive if the student has taken an equivalent course elsewhere. Enrollment in ESC 565 Departmental Research Seminar is mandatory for every first-year graduate student in the department. The student’s advisor may impose additional course requirements.

B. Transfer Credits
A student who has entered the Ph.D. program with an M.S. degree from another institution may transfer up to 12 credits; a student with a master’s degree from Stony Brook may transfer up to six credits toward the Ph.D. degree. Credits used to obtain any prior degrees are not eligible for transfer. Requests for transfer of credits must be submitted to the graduate studies director.

C. Major and Minor Requirements
The student must specialize in one of the four areas within the department:
1. Thermal Sciences and Fluid Mechanics
2. Solid Mechanics
3. Mechanical Design
4. Atmospheric Sciences

Students who major in areas 2, 3, and 4 must select a minor from one of the following academic disciplines:
1. Fluid Mechanics
2. Heat Transfer
3. Combustion and Propulsion
4. Statistical Mechanics

The Thermal Sciences and Fluid Mechanics area is composed of four subdisciplines:
1. Fluid Mechanics
2. Heat Transfer
3. Combustion and Propulsion
4. Statistical Mechanics
There is no minor requirement in this area. The written qualifying examination will test basic knowledge in all four subdisciplines.

D. Written Qualifying Examinations
Written examinations in each area of specialization are offered once every year in January. Students who enter the graduate program with a master's degree from another university must take the examination the first time it is offered following one academic year in residence. Students without a master's degree or students enrolled in the master's doctoral program at Stony Brook must take the qualifying examination within 14 months after completing 30 graduate credits. Only under extraordinary conditions, and by a written petition to the graduate program committee, may this examination be deferred.

E. Preliminary Oral Examination
Within one year after passing the written qualifying examination or within one year after the student's master's thesis is accepted (whichever occurs later), the student is required to submit a dissertation proposal and register for three (3) credits of ESC 699. Part-time Ph.D. students are required to appear in the preliminary oral exam within two years of passing the written qualifying exam. The examination committee consists of three department faculty members and one member from outside the department. The committee members must be approved by the Graduate School Committee. The final decision is made to the dean of the Graduate School for approval. The dissertation is to be distributed to the committee members at least three weeks before the dissertation defense; one copy is to be kept in the departmental office for examination by the faculty.

Courses

ESC 501 Convective Heat Transfer and Heat Exchange
An introduction to the analysis of heat transfer characteristics of both external and internal flows (laminar and turbulent) with free and forced convection. Study of the operation and design of a variety of heat exchange types including shell and tube, regenerator, finned plate, etc. Prerequisite: Graduate student standing in the department
Spring, 3 credits

ESC 502 Conduction and Radiation Heat Transfer
Heat conduction and convection; law of radiation; black body radiation, and Kirchhoff's law; analysis of heat conduction problems; analysis of radiative exchange between surfaces and radiative transport through absorbing, emitting, and scattering media. Prerequisite: Graduate student standing in the department
Fall, 3 credits

ESC 503 Computation of Fluid Flow and Heat Transfer
An introduction to a general purpose computer method: for numerical solution of problems in heat transfer, fluid flow, and related processes. Prerequisites: ESC 501, 502, 511, 512
Fall, alternate years, 3 credits (not offered in 1988/89)

ESC 511 Advanced Fluid Mechanics I: Perfect Fluids
Lagrangian and Eulerian frames. Dynamical equations of momentum and energy transfer. Two-dimensional fluid dynamics. Jets and cavities. Convective waves internal waves. Perfect shear flows. Spring, alternate years, 3 credits (not offered in 1988/89)

ESC 512 Advanced Fluid Mechanics II: Viscous Fluids
The role of viscosity in the dynamics of fluid flow. The Navier-Stokes equations, low Reynolds number behavior including lubrication theory, percolation through porous media, and flow due to moving bodies. High Reynolds number behavior including steady, unsteady, and detached boundary layers, jets, free shear layers, and wakes. Phenomenological theories of turbulent shear flows are introduced. Fall, alternate years, 3 credits (not offered in 1989/90)

ESC 513 Advanced Fluid Mechanics III: Compressible Fluids
One-dimensional gas dynamics and wave propagation. Shock waves in supersonic flow. The method of characteristics. Effects of viscosity and conductivity, and concepts from gas kinetics. Spring, alternate years, 3 credits (not offered in 1988/89)

ESC 514 Advanced Fluid Mechanics IV: Introduction to Turbulence

ESC 521 Thermodynamics of Energy Systems
First law and second law. A rigorous examination of the concept of equilibrium and the nature of processes toward equilibrium. Reversible processes and availability of energy. Carnot engine and the thermal equilibrium. Van't Hoff reaction box and the chemical equilibrium. Reversible processes such as mixing and combustion. Applications to energy systems of interest to mechanical engineers. Fall, alternate years, 3 credits

ESC 522 Combustion Theory I
Explosions and explosion theories. Premixed, diffusion, and turbulent flames. Detonations in gaseous and condensed phases. Theories of extinction and detonability limits. Transitions between deflagration and detonation. Applications to internal combustion engine and jet and rocket propulsion. Fall, alternate years, 3 credits

ESC 523 Atmospheric Molecular Processes
Review of electromagnetic theory of scattering and spectroscopy in a manner appropriate for studies of planetary atmospheric phenomena involving gaseous molecules. A major portion is devoted to a quantitative spectroscopic aspects of atomics and molecules in planetary atmospheres. Spectral line shapes and band models. Fall, alternate years, 3 credits

ESC 524 Statistical Mechanics: The Molecular Basis of Continuum Mechanics
The course develops the basic tools necessary for an understanding of the relationship between the properties of matter in the bulk (e.g., thermodynamic and transport properties) and the underlying interparticle forces at all length scales. Spring, alternate years, 3 credits (not offered in 1988/89)

ESC 525 Mechanical Systems Design
The formulation of design problems frequently encountered in mechanical systems as optimization problems. Theory and application of methods of mathematical programming for the solution of optimum design problems. Procedures for attacking a new design problem, formulation of design concepts into analyzable models, applications of interactive computer software, and related topics will also be emphasized. Prerequisite: Permission of instructor Fall, alternate years, 3 credits (not offered in 1988/89)

ESC 528 Introduction to Experimental Stress Analysis
Elementary theory of elasticity, electrical, and mechanical strain gauges. Introduction to photoelasticity and moire methods. Brittle coating and analysis methods. Application of different methods to the study of static and dynamic problems. Laboratory participation is an integral part of the course. Fall, 3 credits

ESC 532 Structural Dynamics
The time-dependent response of engineering structures is studied for steady-state and transient conditions. Topics studied are single- and multi-degree-of-freedom systems, elastic
strings, rods, beams and nonlinear vibration. Methods of analysis include normal coordinates, Lagrangian dynamics and Laplace transform theory.

ESC 533 Molecular Theory of Fluids
The course will have three main aspects. One will be the molecular basis of the results of fluid mechanics. The second will be those techniques and viewpoints common to the statistical theory of turbulence and the molecular theory of fluids. The third will be the selected applications to problems of current engineering interest (e.g., flow through porous media and fluidized beds).

ESC 536 Mechanics of Solids
A unified introduction to the engineering mechanics of elastic, plastic, and time-dependent solid materials and structures, with emphasis on physical aspects of the subject. Stress and equilibrium. Kinematics of deformation, strain, and compatibility. Tensor representation and principal strains. Theory of small strain and large strain will be covered. Principles of virtual work. Formulation of stress-strain relations in elasticity, plasticity, and visco-elasticity.

ESC 537 Experimental Fluid Mechanics I: Measurement Techniques
Fundamentals of measurements and instrumentation. Operating principles and performance characteristics of instruments for measurements of physical quantities such as velocity, pressure, and temperature. Introduction to hot-wire anemometry and laser-doppler velocimetry along with current optical measuring techniques. Application of non-intrusive visualization techniques to liquid and gas flows. Laboratory demonstrations.

ESC 538 Experimental Fluid Mechanics II: Data Acquisition and Processing
Fundamentals and application of analog and digital data collection techniques. Fast-rate data acquisition systems and storage. Data analysis of raw data. Special applications to turbulent flows. Numerous examples of modern signal processing techniques as applied to various areas of fluid mechanics.

ESC 539 Finite Element Methods in Structural Analyses
Theory of finite element methods and their application to structural analysis problems. Matrix operations, force and displacement methods. Derivation of matrices for bars, beams, shear panels, membranes, plates, and solids. Use of these elements to model actual structural problems. Weighted residual techniques and extension of the finite element method into other areas such as heat flow and fluid flow. Laboratory sessions introduce use of the computer in solving finite element problems. Programs for the solution of force and displacement method problems are configured. A computer project consisting of the solution and evaluation of a structural problem is required.

ESC 542 Elasticity

ESC 543 Plasticity
Stress and deformation of solids: Yield criteria, and rules for plasticity deforming solids; the concept of a stable plastic equilibrium; static and dynamic analysis of plastic bodies under rheological and thermal loadings; use of load bounding theorems and the calculation of collapse loads of structures; the theory of the slip-line field.

ESC 544 Atmospheric Radiation
Discussion of the compositions and radiative components of planetary atmospheres. Black-body and gaseous radiation with emphasis upon the respective processes of electromagnetic theory and quantum statistics. Derivation of the equation of radiative transfer, and radiative exchange integrals, with application to energy transfer processes within the atmospheres of Earth and other planets.

ESC 545, 546 Theoretical Meteorology I, II
Introduction to the quantitative interpretation of the theories of the atmosphere. The atmosphere's general circulation, and numerical weather prediction.

ESC 547 Planetary Aeronautics
This course will focus on the chemical and thermal structures of planetary atmospheres, especially upper atmospheres. We will discuss the ways that solar energy is absorbed and how it radiates away in the Earth's atmosphere (both neutral and ionic), temperatures, and airflow features. We will also look into escape of species from the top of the atmosphere and into space.

ESC 549 Composition of the Atmosphere
A survey of the current knowledge regarding the compositions of the troposphere and the stratosphere. Global distributions, sources, sinks, and chemical reactions of trace gases such as carbon dioxide, methane, nitrous oxide, nitrogen oxides, ozone, and chlorofluorocarbons will be discussed. Changes in atmospheric composition arising from natural and anthropogenic causes will also be covered.

ESC 552 Analysis of Composite Solids
The course is concerned with the analysis of layered composite materials subject to mechanical loads. Cartesian tensor calculus is used. Homogeneous anisotropic media are studied first. The effect of layering is then analyzed. Applications to plates and shell are studied and analytical methods of solution are given. Numerical analysis of composite solids is also considered using finite-difference and finite-element methods.

ESC 553 Kinematic Analysis and Synthesis of Mechanisms
Introduction to linkages, mechanism structure, basic concepts of mechanisms, canonical representation of motion. Kinematicananalysis, algebraic method, vector-loop method, complex number method, spherical and spatial method, matrix method, dual number quaternion method, screw coordinate method, line coordinate method, motor algebra method, type synthesis, number synthesis, coupler curves, curvature theory path generation, finite displacement theory, rigid body guidance, function generation, computer-aided mechanisms analysis and synthesis.

Prerequisite: Permission of instructor

ESC 556 Computer-Aided Manufacturing
Computer-aided manufacturing including computer control theories and concepts, analysis of computer control systems, numerical control machines, CAD programming, design for robotic assembly, and precision measurement for computer-controlled machines.

ESC 571 Analysis and Design of Robotic Manipulators
Introduction to robot manipulators from mechanical viewpoint emphasizing mechanisms fundamentals and design considerations. Kinematicananalysis, static and dynamic analysis, motion planning, control fundamentals; algorithms development; computer graphics simulation of manipulators; current applications.

Prerequisite: Permission of instructor

ESC 591 Thermodynamics
The course will begin with a review of elementary thermodynamics and go on to consider more advanced areas of thermodynamic theory that are fundamental to various engineering applications, such as irreversible thermodynamics. Special topics will include thermophysical properties of fluids and the form of thermodynamic perturbation theory that has proven to be of enormous utility to chemical engineers.

ESC 599 Research
Variable and repetitive credit

ESC 601 Nonlinear Mechanics

ESC 602 Two-Phase Suspension Flows
The flow of a two-phase suspension of particles in a carrier fluid plays a central role in a large class of technical processes with important practical applications. Topics include interface dynamic interaction, formulation of fundamental governing equations for a two-phase mixture, migration of particles in laminar and turbulent flows, and experimental techniques which are needed for the study of such flows.

Prerequisite: ESC 364

ESC 614 Applications of Statistical Mechanics
The relation between the thermodynamical properties of a system at equilibrium and its Hamiltonian. The emphasis is on developing a set of techniques that enables one to assess the properties of fluids and certain solids over a wide range of thermodynamic conditions (critical or curve point). The use of cluster expansions and func-
tional Taylor series are among the techniques stressed.

ESC 620 Chemical Kinetics of Combustion and Atmospheric Reactions

ESC 621 Propulsion Systems
This course studies propulsion systems for vehicles with suspension means of three major types: magnetic fields by superconducting coils; airfoil lift with duct jet propulsion (this class includes turboprops, turbofans, turbojets, ramjets, scramjets, and pulsejets); and inertia force with rocket propulsion. More conventional propulsion systems for surface vehicles are studied in ESC 623. 3 credits

ESC 622 Combustion Theory II
Special topics in combustion and combustion kinetics: Engine knocking and cool flames, kinetic and thermal-kinetic oscillations, soot and carbon black formation, photo-chemical smog and kinetic processes in atmosphere, jet engine stability and rocket oscillations, coal combustion and gasification, and combustion safety in nuclear reactor environment. 3 credits

ESC 623 Internal Combustion Engines

ESC 625 Turbulent Diffusion
Eulerian description of passive contaminants in homogeneous turbulence. Closure techniques and their flaws. Lagrangian description of single particle and relative diffusion. Similarity in shear flows. The role of buoyancy forces in atmospheric transport. An introduction to turbulent reactive flows. 3 credits

ESC 626 Rheological Heat Transfer
Consideration of the flow and heat transfer of rheological fluids in duct and boundary layers. Both purely viscous and viscoelastic fluids will be considered. The measurement of rheological transport properties will be discussed. Prerequisite: permission of instructor Fall, alternate years, 3 credits (not offered in 1988/89)

ESC 641 Fracture Mechanics

ESC 671 Optical Methods for Experimental Stress Analysis
Theory and applications of more methods (in-plane, shadow, reflection, projection, and refraction moire techniques) for measuring static and dynamic deformation of 2-D and 3-D models, bending of plates and shells, and temperature distribution or refractive index change in fluids. Other topics: holographic interferometry, laser speckle interferometry, and current research activities of the field. 3 credits

ESC 681 Planetary Atmospheres
A survey of current knowledge about the compositions, structures, and dynamics of the atmospheres of planets in our solar system. Models for upper and lower regions and probable evolutionary histories will be discussed. Emphasis will be placed on the most recent results obtained from spacecraft and ground-based observations. Student participation is encouraged. This course is identical to AST 611. Fall, alternate years, 3 credits (not offered in 1988/89)

ESC 694 Graduate Seminar in Atmospheric Sciences
Discussion of special research topics centered on monographs, conference proceedings, or journal articles. Topics include climate change, atmospheric chemistry, radiation transfer, and planetary atmospheres. This course is intended primarily for students who have passed the written qualifying examination in atmospheric sciences, although other students may enroll with permission of the faculty seminar leader. Prerequisite: Department permission Fall, 1 credit, repetitive

ESC 696 Special Problems in Mechanics
Conducted jointly by graduate students and one or more members of the faculty. 3 credits, repetitive

ESC 698 Practicum in Teaching
3 credits, repetitive

ESC 699 Dissertation Research
Variable and repetitive credit
Graduate Engineering Building E-210

Chairperson: Thomas T. Liao
Engineering Building E-210 (516) 632-8770
Graduate Studies Director: Arthur W. Gilmore
Engineering Building E-210 (516) 632-8770

Degree Requirements
Refer to the following sections specific to each of the three concentrations. In general, students are expected to complete two core courses for six credits, five required courses specific to the concentration for 15 credits, and three electives for nine credits.

M.S. Program in Technological Systems
(See course titles and descriptions below)

Common Core Courses (6 credits)

EST 581 Methods of Socio-Technological Decision Making
Application of decision-making techniques to analyze problems involving technology, particularly its social impacts. Areas of study include decision making under uncertainty, decision making in a passive vs. active environment, sequential decisions, estimating payoffs, forecasting, and technology assessment. These systems-analysis techniques are used to formulate and solve a variety of socio-technological problems. Prerequisite/Corequisite: CEN 580 or permission of instructor
Fall, 3 credits

EST 582 Systems Approach to Human-Machine Systems
Applications of systems concepts (input-output, feedback, stability, information analysis) to the analysis of dynamic systems involving technology and society. Areas of study include automatic compensation of systems through use of feedback; stability and instability of urban systems, transportation, epidemics, and economics; and systems for men, including communication and prosthetics. Prerequisite/Corequisite: CEN 580 or permission of instructor
Spring, 3 credits

Core Requirements for Industrial Management Concentration (15 credits)

EMP 500 Financial Accounting
This course provides an understanding of basic accounting concepts of assets, liabilities, equity, revenues, expenses, and profit. Practice will be furnished in organizing these concepts in the preparation and interpretation of financial statements for business and nonprofit entities. Fall, 3 credits

EMP 501 Behavioral and Organizational Aspects of Management
This course provides an understanding of the management process by analyzing organizational behavior. Topics include behavior in two-person situations, factors influencing attitudes and changes in organizational behavior, group influence on behavior, formal and informal organizational structures, conflict and conflict resolutions, and the dynamics of planned change. Fall, 3 credits

EMP 502 Management Accounting and Financial Decision Analysis
Fundamentals of managerial accounting with emphasis on cost accounting terms, concepts, ratio and break-even analysis, financial structure, cost analysis, opportunity costs and return calculations, replacement of assets, portfolio theory. Prerequisite: EMP 500 or equivalent
Spring, 3 credits

EMP 504 Quantitative Methods in Management
A rapid introduction to the application of modern mathematical concepts and techniques in management science. Algebraic operations, mathematical functions and their graphical representation, and matrix operations are reviewed. Topics covered include the following: break-even analysis; mathematics of interest, annuity, and mortgage; traffic flow and other systems of linear equations; algebras and simplex methods of

Core Courses (6 credits)

EST 581
EST 582

Industrial Management Concentration
Required courses:
(15 credits)
EMP 500
EMP 501
EMP 502
EMP 504
EMP 517

Environmental and Waste Management
Required courses:
(15 credits)
EST 583
EST 590

Educational Computing Concentration
Required courses:
(15 credits)
EST 565
EST 570
EST 571
EST 583

Suggested Electives (9 credits)

DTS courses:
EMP 503
EMP 506
EMP 509
EST 520
CEN 580
EST 587
EST 588
EST 589
EST 591

Suggested Electives (9 credits)

DTS courses:
EST 520
CEN 580
EST 585
EST 587
EST 588
EST 589
EST 591

Suggested Electives (9 credits)

DTS courses:
CEN 580
EST 583
EST 588
EST 591
EST 592

Note:
Entering students are presumed to have essential communications, computer, and mathematical skills. Otherwise prerequisite study in these areas will be required.

*See other department listings for additional possible electives
linear programming; probability; statistics of
acceptance testing; Markov chain modeling of
market transitions; queuing models. Simple
management-oriented examples are used to
introduce mathematical formulations and exten-
sions to more general problems.
Prerequisite: MAT 120 or equivalent
Fall, 3 credits

EMP 517 Quality Management
Quality is now being recognized as of strategic
importance for manufacturing and service organ-
izations. This course will provide opportunity for
the students to explore numerous aspects of the
quality system approach to management, rather
than statistical quality control techniques. Special
attention will be given to the tailoring of the sub-
ject material to the actual situations existing in
the students' organizations. Development of
specific policies, objectives, and goals will take
place, accompanied by the tools necessary to
measure their accomplishment and impact.
Spring, 3 credits

Suggested Electives for Industrial
Management Concentration (9 credits)

EMP 503 Legal and Regulatory Aspects of
Management
EMP 506 Production and Operations
Management
EMP 508 Case Studies in Organizational
Behavior
EMP 509 Management Information Systems
EST 520 Computer Applications and
Problem Solving
CEN 580 Socio-Technological Problems
EST 587 Today's Technology: Impact
on Education and Economics
EST 588 Technical Communication for
Management and Engineering
EST 589 Technology-Enhanced Decision
Making

Required Courses for Educational
Computing Concentration (15 credits)

EST 565 Personal Computers in
Learning Environments
This course will provide exposure to and experi-
ence with several of the "personal" microcom-
puters. These new machines, with a cost range
of $800 to $2,000, are appearing in schools and
other learning environments. The intent of this
course is to cover topics on basic specifications
and characteristics of several machines, an in-
troduction to the commercial programs that are
available for these machines, and how to use
them in the classrooms. It is expected that at the
end of the course the students will be able to
develop a working program that could be used
in a classroom.
Prerequisite: EST 563
Spring, 3 credits

EST 570 Design of Computer
Courseware
The purpose of this course is to develop in the
student the capability to develop computer
courseware modules in the student's discipline.
Existing courseware modules will be described to
illustrate the structure requirements of such
modules. After each exposure, each student will
select topics for courseware development from
her/his discipline and will concentrate on module
development under the individual guidance of
the instructor. Students will implement the pro-
grams in microcomputers in the Laboratory for
Personal Computers in Education.
Prerequisite: EST 565 or permission of instructor
Spring, 3 credits

EST 571 Computer-Based Educational
Technologies
This course emphasizes the design and evalua-
tion of computer-based educational technology
systems. The uses of personal computers, intel-
ligent video disks, games, and other devices in
education are examined. Students will learn
state-of-the-art technology, contemporary uses,
strategies for matching these technologies to the
needs and characteristics of learners, ways of
introducing these systems into learning environ-
ments, and the evaluation of their effectiveness.
Prerequisite: EST 565 or permission of instructor
Spring, 3 credits

EST 583 Computer Literacy
Students will develop a basic understanding of
digital computers—how they work and their
applications. Emphasis will be placed on applica-
tions and the social implications of the use of
computers in education, business, artificial
intelligence and robotics, medicine, and govern-
ment. Actual experience with the computer will
include introduction to programming, algorithmic
problem formulation, and running existing
programs.
Spring and fall, 3 credits each semester

EST 590 Seminar for MS/TSM Students
A forum for the discussion of research methods,
project ideas, and preparation of a proposal. A fin-
al product of this seminar is an approved master's project proposal. Each student also
leads a discussion about an important tech-
nology-society problem or issue such as safety
of nuclear power plants, impact of video games,
and the MX controversy. Each student will work
with a faculty advisor on background research
and preparation of the master's project proposal.
Fall, 3 credits

Suggested Electives for Educational
Computing Concentration (9 credits)

EST 520 Computer Applications and
Problem Solving
CEN 580 Socio-Technological Problems
EST 585 Technology in Learning Systems
EST 587 Today's Technology: Impact
on Education and Economics
EST 588 Technical Communication for
Management and Engineering
EST 589 Technology-Enhanced Decision
Making

EST 591 Independent Study in Technology
and Society

Suggested Electives for Environmental
and Waste Management Concentration
(9 credits)

EMP 504 Quantitative Methods in
Management Methods
EMP 509 Management Information Systems
EST 520 Computer Applications and
Problem Solving
CEN 580 Socio-Technological Problems
EST/EMP 588 Technical Communication
for Management and Engineering
EST 589 Technology-Enhanced Decision
Making

Description of Elective Courses

EMP 503 Legal and Regulatory
Aspects of Management
This course provides a survey of business and
regulatory laws. Topics discussed include con-
tracts, sales, and forms of business organiza-
tions. An overview is provided of antitrust, en-
vironmental, and civil rights legislation and their
impact on business.
Spring, 3 credits

EMP 506 Production and Operations
Management
This course deals with the design, planning, and
organization of resources to develop and manu-
facture new products or to bring new
services on line. The factors affecting product
and process design, project planning, facility loca-
tion and layout, operations scheduling, job
analysis, inventory control, material requirements
planning, and quality control will be identified
and related through analytical and modeling
techniques.
Summer, 3 credits

EMP 508 Case Studies in Organizational
Behavior
Application of behavioral science principles and
research to the solution of intraorganizational
problems on three levels of behavior: interper-
sonal situations including superior-subordinate
as well as peer relationships, dynamics of work
groups from viewpoints of both leadership and
collaboration roles, problems of group organi-
zational self-systems, and the organization as an
entity. Relevant behavioral science theory and
research will be studied through collateral read-
ing, supplemented by case studies to the solution of day-to-day problems as well as
longer-range behavioral issues faced by organi-
zations. These studies will be approached from
various viewpoints such as discussion, analysis,
and diagnosis, organizational situation, role play-
ing, and experiential techniques.
3 credits

EMP 509 Management Information Systems
The flow of data in industrial and governmental
organizations. How information is stored, anal-
yzed, and disseminated for various management
tasks. The physical and logical organization of
computer data processing systems. Principles
of file processing, data base management, and
information systems design.
Spring, 3 credits

EST 520 Computer Applications and
Problem Solving
A problem-solving course for managers that uses
applications software to address such
managerial problems as planning, forecasting,
and MIS requirements. The major applications
software packages that will be used are Lotus
123, DBASE III, and the Harvard Total Project
Manager. Students will learn to create spreadsheets and data files, making use of the features
found in the software that will optimize solutions needed to solve business problems.

**Spring, 3 credits**

**EST 580 Socio-Technological Problems**
A series of case studies of current socio-technological problems encompassing such areas as health service delivery, water supply, population, emergency medical care, auto safety, noise pollution, and the energy crisis. The problem in each case is studied individually and alternatives are developed in the areas of education, legislation, and technology with consideration of the corresponding technological, economic, and social consequences involved.

Fall, 3 credits

**EST 585 Technology in Learning Systems**
This course is designed to provide educators with an overview of how technology is being used to improve instruction. Specific areas of study include a systems approach to the design of learning environments, use of technology in conventional classroom and for individualizing instruction of the performance of student learning. Future educational uses of technology as well as present applications will be discussed.

Fall, 3 credits

**EST 587 Today's Technology, Impact on Education and Economics**
This course will involve the student in studies of the social, economic, and educational implications of four selected areas: electronics, transportation, energy, and health sciences. Classroom time will be supplemented by visits to appropriate facilities in each area, and individual projects will be assigned.

Summer, 3 credits

**EST 588 Technical Communication for Management and Engineering**
The ability to communicate technical ideas clearly and effectively is critical to success in management and engineering. Personal hours and money are wasted when confused, distorted, or mumbo-jumbo writing and speaking obscure the information they are intended to convey. This course will provide managers, engineers, and other technical professionals with practical methods for making their memos, reports, and correspondence clear, comprehensible, and persuasive. They will learn strategies for communicating with both non-specialist and technical audiences, stating their purpose clearly, organizing points most effectively, and expressing ideas concisely and precisely. Special attention will be given to technical presentations, and communicating in meetings.

Spring, 3 credits

**EST 589 Technology-Enhanced Decision Making**
This course will examine the use of technological devices, especially computers as aids in decision making. A treatment will be given of the cognitive science and artificial intelligence methods used in the structure and operation of some systems that support human decision making. Medical diagnosis systems, business and industrial planning systems as well as computer-aided dispatch systems will be discussed. In addition, the application of high technology in aviation control systems will be examined.

Prerequisite: EST 581
Corequisite: EST 582 or permission of instructor
Fall, 3 credits

**EST 591 Independent Study in Technology and Society**
The primary objective of independent study is to provide a student with opportunities to interact with faculty members who can be of assistance in his/her master's project. Students should consult individually with faculty members on workload and credit(s).

Prerequisite: EST 590
Fall and spring, 1 to 3 credits

**EST 592 Energy-Environmental Technology Assessment**
Case studies of technologies for energy production and use, emphasizing their "cradle to grave" impacts on the environment and on waste generation. Typical topics: nuclear power and radioactive waste; electron generation from fossil fuels; solar energy and energy conservation technologies; energy-environmental aspects of transportation technologies; energy balance in analysis; energy and Long Island.

3 credits (Not offered in 1988-89)

**EST 593 Risk Assessment and Hazard Management**
A case-study approach to the assessment of risk and the management of natural and technological hazards, with emphasis on those that can harm the environment. The course focuses on technological hazards involving energy, transportation, agriculture, natural resources, chemical, nuclear technology, and biotechnology, and on natural hazards such as climatic changes, droughts, floods, and earthquakes. The first part of the course consists of readings on risk assessment and hazard management and discussions of published case studies. During the second part of the course, students conduct their own case studies and use them as the basis for oral and written reports.

Prerequisite: EST 581
Spring, 3 credits

**EST 594 Institutional, Ethical, and Methodological Issues in Environmental Management and Policy**
Diagnosis of disagreements about environmental and waste problems. Institutional factors include: interests of industry, environmental, and governmental stakeholders; legal-regulatory context; negotiation and public participation. Ethical factors include: fairness in siting NIMBY facilities; environmental risk ethics; end-use analysis. Methodological factors include: evaluating (a) competing scientific theories and environmental models, (b) analytical methodologies (e.g. for estimating probabilities and unknowns, and for ranking facility sites or technology options), and (c) claims as to true overall impacts on risk, cost, energy use, and environmental quality of policy alternatives.

Prerequisite: Permission of instructor
Prerequisite or corequisite: EST 581
Fall, 3 credits

**EST 595 Principles of Environmental Systems Analysis**
This course is intended for students interested in solving environmental engineering principles relevant to solving environmental and waste management problems. Concepts include compartmental models, state spaces, optimization, risk assessment, and numerical and analytical solutions to differential equations.

Fall, 3 credits

**EST 596 Simulation Models for Environmental and Waste Management**
This course is intended for students interested in developing computer models for technology assessment and for environmental and waste management. Concepts developed in EST 595, Environmental Systems Engineering and Analysis, will be applied to real-world problems. Techniques in model development will be presented in the context of applications in surface and ground water management, acid rain, and health risks from environmental contamination.

(EST 597 may be taken in lieu of EST 596.)

**EST 597 Waste Management: Systems and Principles**

(EST 596 may be taken in lieu of EST 597)

3 credits

**EST 598 Teaching Practicum**
Designed to give graduate students who wish it, some teaching experience.

3 credits

(Note: These credits cannot be counted as part of the 30 credits required for the degree)

**EST 599 Special Projects and Topics**
A technology assessment laboratory for emerging problems and focused research. May be run as a hands-on, group research study of an important environmental or waste problem affecting Long Island (perhaps to provide an assessment to a regulatory agency). (EST 590 may be taken in lieu of EST 599.)

Spring, 3 credits
Marine Sciences Research Center

Acting Dean: M.J. Bowman
Endeavour Hall 145 (516) 632-8700

Graduate Studies Director: Henry J. Bokuniewicz
Endeavor Hall 211 (516) 632-8674
Degree Requirements
Requirements for the M.S. Degree in Marine Environmental Sciences

In addition to the minimum Graduate School requirements, the following are required:

A. Core courses (Biological, Chemical, Geological, and Physical Oceanography) with at least a B average; or demonstration of proficiency to the satisfaction of the instructor. Any student who receives two Cs that have not been offset by two As will not be allowed to register for the following semester and may be asked to leave the program.

B. MAR 547 Oceanographic Problem Solving. All students must pass one semester of MAR 547. A maximum of two credits of MAR 547 can be counted toward the Graduate School's 30-credit requirement for the M.S. degree.

C. Seminar MAR 580 (two semesters).

D. An advisor by the end of the first year.

E. Master's research proposal due by end of first year, signed by advisor and two readers.

F. A minimum of six credits in specialty courses (excluding MAR 501, 502, 503, 506, 547, 555, and 580) selected by the student and his/her advisor and approved by the advisor.

G. Sea experience or appropriate field experience.

H. Oral presentation of thesis work.

I. Submission of approved thesis.

Requirements for Ph.D. Degree in Coastal Oceanography

In addition to the minimum Graduate School requirements, the following are required:

A. Demonstrated proficiency in one approved foreign language.

B. Departmental examination.

C. Ph.D. degree dissertation proposal approved by three MSRC faculty.

D. Sea experience or appropriate field experience.

E. Seminar MAR 580 (two semesters).

F. An advisor by the end of the first year.

G. Practicum in teaching.

H. Oral qualifying examination.

I. Formal advancement to candidacy.


K. Submission of approved dissertation.

L. Residence. Normally at least two consecutive semesters of full-time study.

Courses

MARINE ENVIRONMENTAL SCIENCES COURSES

MAR 501 Physical Oceanography
Part I—Course examines physics of ocean circulation and mixing on various scales with strong emphasis on profound effects of earth’s rotation on motions and distribution of properties. Part II—Introduction to physics of estuaries and other coastal water bodies. Prerequisite: Concurrent enrollment MAR 555 or permission of instructor. Fall, 4 credits

MAR 502 Biological Oceanography
A broad treatment of energy and nutrient cycling in coastal and open ocean environments. Introduction to organisms and habitats. Includes student lab project to develop research skills. Prerequisite: Enrollment in Marine Environmental Sciences program or permission of instructor. Fall, 4 credits

MAR 503 Chemical Oceanography
Introduction to chemical oceanography. Topics include origin and history of seawater, major and minor constituents, dissolved gases, the carbon dioxide system, distribution of properties in the world ocean, isotope geochemistry, and the relationship of ocean basin characteristics to the distribution of marine sediment and the development of coastal features. Prerequisite: Enrollment in Marine Environmental Sciences program or permission of instructor. Spring, 4 credits

MAR 506 Geological Oceanography
An introduction to the geological oceanography of the world ocean with emphasis on the physical environment; discussions of the physical processes controlling the structure and evolution of the ocean basins, shelf, continental margins, and the distribution of marine sediment and the development of coastal features. Prerequisite: Enrollment in Marine Environmental Sciences program or permission of instructor. Spring, 4 credits

MAR 510 Modeling Techniques in Chemical Oceanography
Derivation of solutions to advection-diffusion-reaction equations for marine sediments and other chemical constituents, including calculation of the effects of oceanography and atmospheric conditions on these systems. Prerequisite: Approval of instructor. Fall, 3 credits

MAR 513 Marine Biochemistry
Survey of biochemical features and adaptations characteristic of the marine biota. Specific topics to be discussed will include salinity, temperature, and pressure adaptations, nutrition and functional aspects of marine life, and marine toxins. Prerequisite: Organic chemistry, biochemistry. Spring, 3 credits

MAR 515 Phytoplankton Ecology
Phytoplankton ecology consists of a diversity of phytoplankton and their ecological and physiological characteristics. Includes study of phytochemistry, photosynthesis, ecology, and factors controlling growth of phytoplankton. Prerequisite: General biology. Spring, 3 credits

MAR 517 Experimental Design and Analysis for Environmental Data
Experience in designing experiments of the type conducted in the field. Use of statistical tools to manipulate, analyze, and interpret environmental data and to analyze underling statistical principles by providing students with extensive opportunities for data analysis. Prerequisite: Biometry or upper level statistics course. Fall, 3 credits

MAR 519 Geochemistry Seminar
This course will explore topics in low temperature geochemistry as chosen by the instructors and participants. The seminar series will be organized around a theme such as early diagenesis, estuarine geochemistry, or aquatic chemistry. Students will be required to lead one of the seminars and to participate in discussions. Prerequisite: MAR 503 or permission of instructor. Fall, 2 credits

MAR 522 Environmental Toxicology
The ecological and human health effects of toxic chemicals, especially chlorinated hydrocarbons, will be examined. Toxicological principles, carcinogenesis, and economic and polical considerations are included. Spring, 3 credits

MAR 523 Marine Botany
Introduction to seaweeds and seagrasses. Reproductive biology and taxonomy are discussed in terms of eco­­­logy, physiology, and distribution of seaweeds in temperate and tropical waters. Special trips to rocky shore communities and a regional conference on algae are required part of the course. Prerequisite: General botany, enrollment in Marine Environmental Sciences program, or permission of instructor. Spring, 3 credits

MAR 525 Marine Ecology—Critical Reading
Meets one evening every other week for an in­­­formal group discussion of scientific papers selected by common interest. Objectives are to practice critical reading and to broaden exposure to marine ecology literature. Fall and spring, 1 credit.

MAR 531 Regional Planning Applied to Marine Sciences
This course will introduce the theories, techniques, and literature of regional planning with special emphasis on planning methods related to the marine environment. Fall, alternate years, 3 credits

MAR 532 Case Studies in Coastal Planning
This course will address the application of regional planning, with marine sciences input, in the development of governmental programs for coastal zone management, water quality control, and management. Long Island case studies will be the basis for this course. Prerequisite: MAR 531. Spring, alternate years, 3 credits

MAR 534 Aquaculture
Biological, economic, practical, social, and legal aspects of culturing marine and freshwater organisms, including molluscs, crustaceans, and finfish. Basic principles of aquaculture and successful and failures with selected species. Field trips and the preparation and evaluation of aquaculture proposals. Spring, 4 credits

MAR 536 Environmental Law
Course covers legal, political, and economic implications of the National Environmental Policy Act and other statutes relating to protection of air, water, and natural resources; litigation strategies available to promote environmental protection; practical advice to scientists responsible for developing environmental impact statements. Fall, alternate years, 3 credits

MAR 537 Primary Productivity in the Sea
Review of classic and current research on primary production by marine microalgae and macroalgae. Topics include photosynthesis and growth, nutrients, temporal and spatial variability, competition, and predation. Students will carry out original research projects. Fall, 3 credits

MAR 539 Computer Analysis
Basic introduction in the use of computers for analysis of research data. Analytical programs
available on the university's UNIVAC system are emphasized, although some microcomputer applications are discussed. Objectives of the course are to introduce potential problems in experimental design and data collection to discuss and conduct analyses of research data.

Prerequisite: Permission of instructor. Spring, 1 credit

MAR 540 Marine Microbial Ecology
An historical perspective of the field, aspects of nutrition and growth, microbial metabolism and trophic dynamics and relationships with other organisms. Emphasis on role of microorganisms in marine environments such as salt marshes, estuaries, coastal pelagic ecosystems, and the deep sea, as well as microbial contribution to geochemical cycles. Contemporary and classical methodologies covered.
Prerequisite: MAR 502 or permission of instructor. Spring, alternate years, 3 credits

MAR 544/GEO 544 Restricted Marine Environments: Ancient and Modern
An intensive and interdisciplinary study of restricted marine environments including anoxic basins and as they occur in the modern world and as they are represented in the geological record. The chemical, sedimentological, and paleocological importance of these unusual circulation systems will be examined.
Prerequisite: Previous coursework in stratigraphy. Spring, 3 credits

MAR 545 Coastal Sedimentary Environments
Survey of depositional environments from nearshore continental shelf through the backbarrier estuarine complex. Emphasis placed on depositional processes and products within such varied environments as tidal deltas, barrier islands, tidal flats and salt marshes, point bars and river deltas.
Prerequisite: Introductory course in stratigraphy and sedimentation or permission of instructor. Fall, 3 credits

MAR 547 Oceanographic Problem Solving
Course gives graduate students experience in integrating information from different disciplines to address important oceanographic problems. Sessions will be structured around problems of current interest to marine scientists and will involve active student participation in small working groups as well as short written essays to be critiqued by faculty.
Prerequisites: MAR 501, MAR 502 Fall, 2 credits

MAR 550 Topics in Marine Sciences
This is used to present special-interest courses, including intensive short courses by visiting and adjunct faculty and courses requested by students. Those given in recent years include Nature of Marine Ecosystems, Science and Technology in Public Institutions, Plutonium in the Marine Environment, and Problems in Estuarine Sedimentation.
Fall and spring, variable and repetitive credit

MAR 552 Directed Study
Individual study under the guidance of a faculty member. Subject matter varies according to the needs of the student.
Prerequisite: Consent of instructor. Fall, spring, and summer, variable and repetitive credit

MAR 553 Fishery Management
Survey of the basic principles and techniques for studying the population dynamics of marine fish and shellfish. Discussion of the theoretical basis for management of exploited fishes and shellfish, contrasting management in theory and in practice using local, national, and international examples. Includes lab exercises in the use of computer-based models for fish stock assessment.
Prerequisite: Calculus I or permission of instructor. Fall, 3 credits

MAR 555 Introduction to Mathematics for Marine Scientists
Course is designed to assist non-math/physics majors who take required core courses as well as advanced courses in our program. Topics covered are those essential to the use of calculus and integral calculus, (minimum) partial differential equations. Discussions include formulation of practical problems, i.e., application of differential equations.
Prerequisite: Calculus I or permission of instructor. Fall, 3 credits

MAR 556 Ecology of Fishes
Introduction to current research in the ecology of fishes. Topics such as population regulation, migration, reproductive strategies, predator-prey interactions, feeding behavior, competition, life history strategies, and others will be discussed.
Prerequisite: Familiarity with concepts of ecology or biological oceanography. Spring, 3 credits

MAR 558 Early Diagenesis of Marine Sediments
The course treats qualitative and quantitative aspects of the early diagenesis of sediments. Topics include diffusion and adsorption of dissolved species; organic matter decomposition and storage, and diagenesis of clay materials, sulfur compounds, and calcium carbonates. The effects of bioturbation on sediment diagenesis are also discussed. This course is identical to GEO 568.
Prerequisite: Permission of instructor. Fall, alternate years, 3 credits

MAR 559 Seminar
A weekly series of research seminars presented by visiting scientists and members of the staff.
Prerequisites: Fall and spring, noncredit course

MAR 560 Seminar
An assessment of recent developments in coastal ecology. Discussion of advances in the application of sedimentology, stratigraphy, and geomorphology to the study of coastal environments. Modern-ancient analogues will be emphasized where appropriate.
Prerequisite: Permission of instructor. Fall, 1-4 credits

MAR 567 Information for Environmental Management
The information needs of environmental managers are examined. To meet these needs, data must be transformed into information. The student will learn the use of microcomputers to organize and analyze information and to provide suitable output for environmental management.
Prerequisite: Graduate student status or permission of instructor. Fall, 3 credits

MAR 573 Special Topics—Chemical Oceanography
This course is designed for the discussion of topics of special interest on demand that are not covered in regularly scheduled courses. Examples of possible topics include carbonate chemistry, isotope chemistry, and microbial chemistry.
Prerequisite: Permission of instructor. Fall, spring, 1-4 credits

MAR 574 Special Topics—Physical Oceanography
The course is designed for the discussion of topics of special interest on demand that are not covered in regularly scheduled courses. Examples of possible topics include atmosphere-ocean interaction and diffusion or dispersion in the ocean.
Prerequisite: Permission of instructor. Fall, 1-4 credits

MAR 575 Special Topics—Geological Oceanography
The course is designed for the discussion of topics of special interest on demand that are not covered in regularly scheduled courses. Examples of possible topics include coastal processes, fluvial processes, physics of sediment transport, and groundwater flow.
Prerequisite: Permission of instructor. Fall, spring, 1-4 credits

MAR 576 Special Topics—Biological Oceanography
The course is designed for the discussion of topics of special interest on demand that are not covered in regularly scheduled courses. Examples of possible topics include grazing in benthic environment, coastal upwelling, the nature of marine ecosystems, and marine pollution processes.
Prerequisite: Permission of instructor. Fall, 1-4 credits

MAR 577 Special Topics—Coastal Zone Management
The course is designed for the discussion of topics of special interest on demand that are not covered in regularly scheduled courses. Examples of possible topics include microcomputer information systems, environmental law, coastal pollution, dredge spoil disposal, science and technology in public institutions, and coastal marine policy.
Prerequisite: Permission of instructor. Fall, 1-4 credits

MAR 580 Seminar
An assessment of recent developments in coastal ecology. Discussion of advances in the application of sedimentology, stratigraphy, and geomorphology to the study of coastal environments. Modern-ancient analogues will be emphasized where appropriate.
Prerequisite: Stratigraphy and sedimentary marine geology.
Spring, 2 credits

MAR 589 Research
Original investigation undertaken with the supervision of the advisor.
Prerequisite: Permission of instructor. Fall and spring, variable and repetitive credit

COASTAL OCEANOGRAPHY COURSES

OCN 563 Mathematical Marine Ecology
Course focuses on the use of mathematics in marine ecological problems. Topics include population dynamics, diffusion-reaction models, critical patch-size problems, biofluid mechanics, catastrophe-chaos problems, and animal swarming.
Prerequisite: MAR 555 or permission of instructor. Fall, 2 credits

OCN 603 Biology of Bivalve Molluscs
Introductory lectures followed by class discussion of selected readings from the primary literature, dealing with taxonomy, anatomy, feeding and filtration, reproduction, physiology, life histories, population dynamics, and ecology of suspension-feeding bivalve molluscs. Critical reading of the literature and participation in class discussion is expected.
Prerequisite: Invertebrate zoology or permission of instructor. Fall, 3 credits
OCN 610 Waves and Tides
Theory of surface and internal waves, wave generation and forecasting, tide theory, and analysis and predictions of tides and tidal currents.
Prerequisite: MAR 501 or permission of instructor.
Spring, alternate years, 3 credits

OCN 612 Dynamical Oceanography I
The first course in a two course series on basic methods and results in dynamical oceanography. This course will emphasize unstratified fluids. Topics covered will include but are not limited to basic conservation equations, effects of rotation, geostrophy, potential vorticity conservation, Ekman layers, and Ekman pumping.
Prerequisite: MAR 501 or permission of instructor.
Spring, 3 credits

OCN 615 Dynamical Oceanography II
Continuation of Dynamics I. Course will cover some of the basic effects of stratification. Topics will include potential vorticity for baroclinic motion and baroclinic instability.
Prerequisite: Dynamical Oceanography I.
Fall, 3 credits

OCN 619 Coastal Trapped Waves
Study of low frequency wave propagation on the continental shelf and around islands. Development of basic dynamics of edge waves, Kelvin waves, and shelf waves. Examples from experiments
Prerequisite: MAR 501, OCN 612, or permission of instructor.
Fall, alternate years, 2 credits

OCN 624 Oceanic Fronts, Physical Properties, and Biological Significance
Course content will include description of various types of fronts including planetary scale fronts, major current boundary fronts (e.g., Gulf Stream), shelf-break fronts, upwelling fronts, plume fronts, and tidal stirring fronts. This will be followed by basic frontal dynamics and circulation, time and space scales, design of observational programs, and sampling strategies.
Prerequisites: MAR 501 and 502.
Spring, 2 credits

OCN 650 Dissertation Research
Original investigation undertaken with the supervision of research committee.
Fall and spring, variable and repetitive credit

OCN 655 Directed Study
Individual studies under the guidance of a faculty member. Subject matter varies according to the needs of the student.
Prerequisite: Permission of instructor.
Fall, spring, and summer, variable and repetitive, 1-9 credits

OCN 666 Long-Period Waves
Development of properties of long-period waves from equations of motion and continuity. Examination of experimental evidence for their existence and characteristics. Wave-trapping effects of stratification on properties and propagation.
Prerequisite: MAR 501, OCN 612, or permission of instructor.
Fall, alternate years, 2 credits

OCN 670 Practicum in Teaching
Fall and spring, 1-3 credits, repetitive

OCN 674 Estuarine Oceanography
Physical and chemical properties of estuarine water and the classification of estuaries by geomorphological and hydrographical parameters. Kinematics and dynamics of motion and mixing in estuaries.
Prerequisite: MAR 501.
Spring, 3 credits

OCN 677 Benthic Ecology
Ecological interactions of benthic organisms with their habitat. There will be discussion of the nature of competition, predation and disturbance, and life history and feeding strategies. Most of the course will cover investigation of invertebrate fauna of coastal marine sediments, but there will be discussions of intertidal, abyssal, and lacustrine habitats.
Prerequisite: MAR 502, MAR 506, or permission of instructor.
Fall, alternate years, 2 credits

OCN 682 Mechanics of Ocean
Surface Waves
Review of hydrodynamic principles and the assumptions underlying various theoretical models of surface wave motion. Formulation and solution of the linear-problem solutions by superposition. Wave-bottom and wave-current interaction. Formulation of conservation relations for energy in the nearshore zone, and wave refraction.
Prerequisites: MAR 501 and MAR 555 or permission of instructor.
Spring, 3 credits
W. Averell Harriman School for Management and Policy

Dean: Gerrit Wolf
Harriman Hall 305 (516) 632-7175

Graduate Studies Director: Thomas Sexton
Harriman Hall 309 (516) 632-7181
Courses

FIlST YEAR

The first-year curriculum is required of all students and is designed to provide a commonly shared analytic base upon which the student builds a specialization in the second year. However, in instances where the student can demonstrate prior mastery of a particular area in the first-year curriculum, exemption is permitted and an advanced course in that area is taken.

PAM 512 Comparative Management
Historical, legal, political, and cultural perspectives on the roles and interrelationships of government, nonprofit organizations, and business. Spring, 3 credits

PAM 515 Data Analysis
The uses and limitations of mathematical techniques, especially in the development of a sophisticated approach to the use of data in advocating alternative policies, computer simulation of models, and regression analysis. Fall, 4 credits

PAM 517 Management Information Systems
This course focuses on the design of information systems to aid in the managerial decision making. Spring, 3 credits

PAM 532 Business Finance
Analysis of financial markets and the tools for operating in these markets. Spring, 3 credits

PAM 534 Public Finance
Normative and positive economic analysis of the public sector. Description and evaluation of the existing system of government taxes, expenditures, and transfers. Applied welfare economic analysis of types of market failure including public goods and externalities. Analysis of distortions to economic behavior caused by the imposition of taxes or subsidies. Equity and efficiency and optimal taxation. Spring, 3 credits

PAM 533 Economic Theory
The techniques and approaches of microeconomic reasoning are applied to issues of policy. The theory of the market and the price system is closely examined for the purpose of identifying those areas where neoclassical economics is helpful to the analyst and manager. Special attention is paid to cost-benefit analysis and models of economic behavior. Fall, 4 credits

PAM 535 Financial Accounting
Topics include cover budgeting and accounting techniques. Building on basic practices in the private sector, the course develops practices unique to public and nonprofit sectors, e.g., government agencies. Special topics include cash flow, management and debt financing and management. Fall, 3 credits

PAM 536 Financial Management
This course examines the financial and economic cases of a series of urban problems including transportation, employment, health, housing, and fiscal management. Macro- and microeconomic theory will provide the framework for analysis. Fall, 3 credits

PAM 541 Group Project
Under faculty supervision groups of students work for clients on policy issues in a variety of areas such as development, energy, housing, and health. The course is intended to provide students with an opportunity to apply the analytic skills they have learned in the classroom to real problems. Other purposes are to give them practice in writing, speaking, and working cooperatively in small groups, all of which are important skills for the policy analyst. Spring, 3 credits

PAM 543 Modeling Techniques
The course develops the mathematical and computational tools useful in the analysis of problems and applies them to areas ranging from the design of local service delivery to the modeling of national policy issues. Topics include linear and integer programming, networks, and queuing. Spring, 4 credits

PAM 564 Interpersonal Communications
This course is designed to strengthen writing and speaking skills and to familiarize students with the forms of communication used by policy analysts and managers. Major emphasis will be on the development of effective strategies for organizing materials, defining problems, analyzing issues, and structuring arguments, but there will also be extensive practice in writing under pressure, editing one’s own work, presenting material orally, and working in groups. Fall, 3 credits

SECOND YEAR

PAM 516 Applied Analysis
Application of knowledge from microeconomics, model building, and statistics to solving complex managerial and policy problems using PCs, standard programs, and actual data. Prerequisites: PAM 515, 533, and 543. Spring, 3 credits

PAM 518 Operations Research
Applications of operations research techniques. Among specific areas modeled are emergency services, sanitation, environmental protection, crime prevention, criminal justice, food banking, energy supply and demand, manpower scheduling, and education. Techniques discussed include linear programming, queuing theory, simulation, and Markov processes. Spring, 3 credits

PAM 522 Managerial and Professional Computing
This course covers advanced topics in personal computing for managers and analysts. Topics include spreadsheets, data bases, and higher-level programming. Fall, 3 credits

PAM 531 Political and Administrative Decision Making
Theory and practice of public sector decision making. Group decision models, bargaining and coalition theory, public choice, economic organization of public agencies, regulation, and externalities, and the role of formal planning. Fall, 3 credits

PAM 542 Technology and Public Policy
Designed to provide students interested in entering careers in public administration with an opportunity to deal with public policy and operational management issues that involve technology as a primary component. Spring, 3 credits

PAM 545 Family Policy
An overview of the history, principles, and domains of family policy. Specific areas of study will include the effects of the industrial revolution and other demographic and economic changes on family and state relations; the policy implications of feminism and other recent revolutions, such as those in the areas of medicine and technology; selected policy problems such as resource allocation, child care, child and spousal abuse, income security, and taxation; and cross-cultural perspectives on family policy. Fall, 3 credits

PAM 551 Business Planning
This course covers the essentials of business planning, both for small businesses and large corporations. Spring, 3 credits

PAM 552 Advanced Data Analysis
Advanced statistical techniques for analyzing data in the context of management decision making. Classical approaches to hypotheses testing, estimation, regression, and time series analysis are discussed and contrasted with exploratory procedures. Statistical decision analysis is presented and illustrated by examples chosen from the field of management. Emphasis throughout is on application of statistical concepts. Spring, 3 credits

PAM 555 Techno Policy Seminar
Two topics in public policy are examined in depth, chosen from among energy, transportation, health, criminal justice, child welfare, and educational finance. A range of tools is provided and evaluated. Fall, 3 credits

PAM 556 New Ventures
This course focuses on the essential qualities of successful new enterprises. Examples of both successful and failed new ventures are reviewed. Students develop a business plan for their own new venture and present it to venture capitalists. Fall, 3 credits

PAM 578 Theory and Management of Nonprofit Organizations
The purpose of the course is to develop an understanding of the role of nonprofit organizations in the U.S. economy, the public policy issues affecting the nonprofit sector, and the problems of managing nonprofit organizations. The scholarly literature on nonprofit organizations is examined, and case studies of problem solving and program development in the nonprofit sector are analyzed. Fall, 3 credits

PAM 579 Nonprofit Management
This course provides general knowledge of the operations and management of organizations and special familiarity with the characteristics and management problems of nonprofit organizations. Fall, 3 credits

PAM 580 Entrepreneurship and Strategy for Nonprofit Organizations
This course presents the principles and techniques of strategic management by which an organization sets and implements its long-range direction. This includes the processes of environmental scanning; self-assessment of organizational purpose and competitive advantage; and synthesis of organizational mission, plans, and strategic initiatives. Special attention is given to the student in the entrepreneurship process through which programs, resources, and new organizations are developed in the nonprofit sector, and to the subject of profitmaking ventures by nonprofit organizations. Extensive use is made of case studies. Spring, 3 credits

PAM 581 Management of Organizations in Public Sector
How can organizations in the public sector be made more effective? Focus of the course is on the concept of appropriateness of fit of managerial structure. Theory is drawn from Taylorism, the Hawthorne studies, job redesign, management by objectives. Fall, 3 credits
PAM 502 Business-Government Relations
This course covers topics in the regulation of business, the lobbying of government, joint ventures, and contracting. Spring, 3 credits

PAM 583 Cases on Business-Government Relations
This is a research-oriented course in which students first study a number of case histories in the areas of regulation, lobbying, business promotion, procurements and government-business partnerships, and then each student develops a case study from original sources. Prerequisite: PAM 582 Fall, 3 credits

PAM 585 Program Evaluation
How to design experiments that will provide valid inferences for program effectiveness. Accumulating evidence, combining data from mixed sources, monitoring performance, and modifying existing programs, cost/benefit analysis, survey, research, and other analytical methods. Examples from criminal justice, municipal services, educational innovation, health care. Fall, 3 credits

PAM 589 Production Management
Analysis and management of manufacturing and service operations industry and government. Examines problems in business such as inventory, quality control, automation, scheduling, and productivity. Spring, 3 credits

PAM 591 Special Topics in Policy Analysis and Public Management
Designed to accommodate innovative subject matter on an experiment basis and to provide the opportunity of offering courses taught by visiting faculty. Fall and spring, 3 credits each semester, repetitive

PAM 592 Energy Policy
An overview of the major international and domestic energy issues, emphasizing the difficulties of policy formulation and interactions with national security and economic development concerns. Spring, 3 credits

PAM 593 The Legal Process
This course will teach students basic theories and principles of substantive and administrative law. Students will learn the basics of law to the planning, analysis, and management of public systems. They will also experience where and how to find the law they will need for professional practice as public sector policy makers and implementers. It is not a pre-law course as such; it is a professional course. Fall, 3 credits

PAM 595 Individual Directed Research in Policy Analysis and Public Management
Designed to accommodate independent research projects on an individual basis with faculty guidance. Fall and spring, variable and repetitive credit

PAM 596 Small Group Studies in Policy Analysis and Public Management
Designed to accommodate ad hoc small group student research projects on an experimental basis. Projects will be designed by PAM faculty and students. Topics will be announced at the beginning of each semester. Fall and spring, 1-3 credits each semester

LABOR/MANAGEMENT STUDIES CURRICULUM
For Graduate Students—Full-Time or Part-Time:
Students enrolled in a master's degree program at Stony Brook who complete a six-course, 18-credit program will receive the New York State Advanced Certificate in Labor/Manage-

PAM 504 New Developments in Human Resource Administration
This is an advanced course, designed to examine new developments in and concerns in human resource administration. The course focuses on such topics as Japanese methods of increasing productivity and their adaptation to the American workplace; developing union/management cooperation for productivity; methods of training to bring the disadvantaged into the workplace; impact of the computer revolution on the personnel field; specialized personnel needs of the new workforce in a high-tech and service economy. Crosslisted with CES 513. Prerequisite: PAM 505/ICES 515. Fall, 3 credits

PAM 505 A Survey of Human Resources Administration
This is the mandated course in the human resource sector of the Labor/Management Studies curriculum. The major elements of personnel administration are presented: an overview of human resource functions; recruitment, selection, and placement; job classification and development; designing and evaluating benefit systems; employee supervision, counseling, discipline, and grievance handling; and the legal framework of human resource administration. The course concludes with an overview of the human resource approaches specific to union and non-union environments. Crosslisted with CES 516. Spring, 3 credits

PAM 506 A Survey of Labor Relations
This is the mandated course in the labor relations section of the Labor/Management Studies curriculum. It addresses the historical development of labor unions in the United States; the evolution of the legal framework governing labor relations today; the major elements of collective bargaining and dispute resolution techniques used in both the private and public sectors of America's workplace. A discussion of the future of labor relations in the workplace as a result of both traditional and modern human resource techniques concludes the class. Crosslisted with CES 516. Fall, 3 credits

PAM 507 Contemporary Issues in Labor Relations
Collective bargaining in America: areas of union growth, stability, and decline. Examination of current labor-management agreements in the key areas of wages, productivity, retirement and health plans, employee security, and career advancement. The chief problems emerging in current negotiations in both the private and public sectors will be examined. Crosslisted with CES 518. Prerequisite: PAM 506/ICES 516 Spring, 3 credits

PAM 508 The Crisis of Dec-Industrialization
This course explores the economic, political, and ethical questions posed by the unprecedented rate of migration of American industry in recent years. The early migration of the textile industry to the decline of our smokestack industries is examined, followed by the new and enterprising responses of communities and unions to plant closure and migration, and the replacement of jobs by the growth of high-tech and service economy. The role of tax laws and government programs in inhibiting migration and assisting labor/communitybuyouts; the new American dedication to sustaining industrial competitiveness. Crosslisted with CES 520. Spring, 3 credits

PAM 509 Protest Movements in American Labor
Rebels, radicals, revolutionaries, and reformers have all focused upon the American worker as an instrument of social change in trying to shape the thought and action of the people to their particular philosophy. The programs and influence of such leaders as Eugene V. Debs, John Reed, Charlotte P. Gray, Martin Luther King, Big Bill Haywood, and Norman Thomas will be examined, as will such publications as Masses, Mother Earth, Messenger, and New Masses. The course concludes with an analysis of the effect of these efforts on today's American labor movement and social structure. Crosslisted with CES 522. Spring, 3 credits

PAM 510 In Addition to Wages: Employee Benefits
This course addresses an area of major social change: new developments in fringe benefit programs available to American workers. Topics include pensions, social security, savings and profit-sharing plans, and other benefits available to the individuals in the private, public, and not-for-profit sectors. Future fringe benefit programs and policies will also be explored. Crosslisted with CES 510. Prerequisite: PAM 505/ICES 515 Spring, 3 credits

PAM 511 Human Relations in the Workplace
This course focuses on improving the quality of work life for employees, as a value in itself, and as an incentive to greater productivity and reduced turnover. The importance of communication, providing opportunities for job enrichment and career development, employee assistance programs, recreational programs, developing the joint participation of employees and management is the hallmark of the well managed corporation. Crosslisted with CES 511. Spring, 3 credits

PAM 514 Collective Bargaining and Arbitration in the Public Sector
The history, procedures, and problems of public sector labor relations, and comparisons with the private sector. The role of public, the role of politics in public sector bargaining. Students will role play the negotiation of a public sector contract; prepare: bargaining package, negotiating mediation, fact-finding, arbitration. They will also prepare, present, and critique a public sector grievance case from its shop origins to its final disposition by arbitration. Crosslisted with CES 514. Prerequisite: PAM 506/ICES 516 Fall, 3 credits

PAM 517 Women, Work, and Dollars
The course addresses the economic and social struggle of women to achieve workplace equality. It includes an examination of their labor force participation: remuneration of women, segregated employment patterns, special problems of pink collar and professional women, and analysis of the corporate environment, the role of affirmative action in removing formal and informal barriers to progress. The new campaigns for equal pay, techniques for establishing a fair wage, contacting union officials, and a solution to sex discrimination, alternative definitions of success, and women's contribution to the world of work. Crosslisted with CES 517. Spring, 3 credits

PAM 519 Grievance Handling and Arbitration
Grievance and arbitration procedures in a variety of private and public sector labor agreements will be examined in terms of contract cases, practical procedures, and problems characteristic of different employment sectors. Dispute settlement between parties themselves will be explored, and the final recourse to arbitration examined in terms of arbitrator selection,
case preparation, presentations at hearings, and analysis of awards. Crosslisted with CES 519.

**Prerequisite:** PAM 506/CES 516

**Spring, 3 credits**

PAM 521 From Bullets to Ballots: A History of Industrial Relations in America

The growth and development of labor unions from craft guilds in an agricultural society to present-day national and industrial organizations. The early struggles of workers to organize, the development of labor legislation, the evolution of unions as a major political force, and the advent of public sector unions and their impact on workplace issues. The course examines the uncertain future of unions as the country moves from a production to a service-oriented economy. Crosslisted with CES 521.

**Spring, 3 credits**

PAM 523 Human Resource Management in the Individual Firm or Organization—Workshop

This course is designed for human resource practitioners who wish to prepare themselves for higher-level executive positions: planning for the personnel function relative to organizational purpose and size of workforce; developing recruiting plans, job classifications, and wage schedules; establishing benefit systems; training supervisors; systematizing employee supervision and evaluation methods. Finally, the class will develop such motivational incentives as career development job enrichment, and employee assistance programs, and learn how to devise model affirmative action and employee safety procedures. Crosslisted with CES 523.

**Spring, 3 credits**

**PAM 524 Labor Negotiations Workshop**

This is an advanced class in the negotiation of labor agreements in the private and public sectors. Through case studies and presentations students acquire an understanding of the attitudes and strategies of both negotiating parties; evaluation of economic and political environment; gathering of essential information; determination of bargaining style and strategy; role playing of negotiations using sample contracts. Guest lecturers critique class performance, offering suggestions for improving negotiation skills. Crosslisted with CES 524.

**Prerequisite:** PAM 506/CES 516

**Spring, 3 credits**

**PAM 525 Labor Relations Law**

The course will explore the legal interrelationships in selected areas among employers, employees, unions, and government. Topics will include the evolution of labor relations law and the practical implications of legislation, court decisions, and regulatory procedures governing labor/management relations in both the public and private sectors. Crosslisted with CES 525.

**Prerequisite:** PAM 506/CES 516

**Fall, 3 credits**

**PAM 526 Job Evaluation and Compensation Systems**

An advanced course providing students with both theory and specific knowledge of job evaluation and compensation systems, including union issues, comparable worth, and legal requirements. Includes preparation of job analysis, descriptions, specifications, and evaluations; theory of compensation systems as they relate to job satisfaction and employee morale; development of wage and salary surveys, internal and external equity pay scales, performance based pay systems, and salary administration procedures. An analysis of incentives—bonuses, stock options, salary deferrals, and special benefits—will complete the course. Crosslisted with CES 526.

**Prerequisite:** PAM 505/CES 515

**Spring, 3 credits**
Anatomical Sciences
(HBA)

Chairperson: Maynard Dewey
Health Sciences Center BHS T-8, Room 060 (516) 444-2350
Graduate Studies Director: Ilan Spector
Health Sciences Center BHS T5, Room 191 (516) 444-3133

Degree Requirements
M.S. Degree Requirements
Graduate Studies in Anatomical Sciences normally does not accept students whose goal is a master's degree. In exceptional instances, a student already in the program may be awarded an M.S. degree upon completing an approved course of study, including a minimum of 30 graduate credit hours, passing a comprehensive examination, and/or submitting and defending a master's thesis.

Requirements for the Ph.D. Degree
In addition to the minimum requirements of the Graduate School, the following are required:

A. Formal Course Requirements
Successful completion of an approved course of study is required.

B. Candidacy (Preliminary) Examination
At the discretion of the department, the preliminary examination may be oral or written, or both, and may consist of a series of examinations. Students will normally apply for the examination after completing the major portion of coursework, but not later than the end of the fifth semester of coursework. Foreign language proficiency tests, if required, must be passed before permission can be granted to take the preliminary examination.

C. Advancement to Candidacy
The school's recommendation with respect to candidacy for the Ph.D. degree will be based upon satisfactory completion of the above requirements. Advancement to candidacy is granted by the Vice Provost for Research and Graduate Studies.

D. Research and Dissertation
The general requirements of the Graduate School regarding the dissertation examination will be followed.

E. Minimum Residence
Two years of full-time graduate study are required.

Courses
HBA 530 Microscopic Structure of the Human Body
A lecture and laboratory course designed to fulfill the need of medical, dental, and graduate students for a basic understanding of the cytology and histology of the human body. All material will be presented with the goal of integration of structure and function. Presentations will be in formal lectures and self-study laboratory sessions.
Prerequisite: Permission of instructor
Fall, 3 credits

HBA 531 Gross Anatomy of the Human Body
A course comprising (1) laboratories in which detailed dissection of the human body is undertaken and (2) lectures covering topics in gross anatomy including embryology, functional and topographic anatomy, clinical correlations, and introduction to radiology.
Prerequisite: Permission of instructor
Spring modules 7, 7 credits

HBA 534 Neuroanatomy for Medical Students
An overview of the structure and organization of the human central nervous system. Special emphasis on functional pathways. Laboratory included. Open only to full-time SUNY graduate students.
Prerequisite: Permission of instructor
Spring modules 7 and 8, 3 credits

HBA 536 Biological Clocks
A consideration of the temporal dimension of biological organization and of periodic phenomena which are a basic property of living systems. Topics include a survey of circadian rhythms; influence of light, temperature, and chemicals; use of the clock for adaptation to diurnal, tidal, and lunar cycles for direction finding (homing and orientation) and for day-length measurement (photoperiodism); chronopathology and chronopharmacology; aging and life cycle clocks; possible molecular mechanisms of the clock. Crosslisted with BCD 536.
Prerequisite: Permission of instructor
Spring, 3 credits

HBA 537 Physiology and Biochemistry of the Cell Cycle
An integrated view of the cell developmental cycle in prokaryotes and eukaryotes. Topics include cell cycle anatomy; measurements on fixed and living cells; kinetics of cell population growth; theory and methodology of batch, synchronized, and continuous cultures; general patterns of nucleic acid synthesis; regulation of enzyme activity during the cell cycle; temporal control of gene expression; development and function of cellular organelles during the cell cycle; and the control of cell division. Crosslisted with BCD 536.
Prerequisite: Permission of instructor
Fall, 3 credits

HBA 550 Advanced Regional Anatomy
A course in advanced human gross anatomy for graduate students or advanced undergraduates in biology, anthropology, and other life sciences.
Prerequisite: Permission of instructor
Fall and spring, 3-8 credits

HBA 552 Techniques in Electron Microscopy
A laboratory course with emphasis on how to fix and embed tissues, prepare ultrathin sections, process electron microscope photographs, and interpret ultrastructural details. Theory of electron optics will be discussed where applicable. Methods in routine maintenance of an electron microscope will also be stressed.
Prerequisite: Permission of instructor
Fall and spring, 1-4 credits

HBA 553 Aspects of Animal Mechanics
An introduction to biomechanics. Covers free-body mechanics and kinetics as applied to vertebrate locomotion. Considers the structure and physiology of muscle as it relates to adaptations of the musculoskeletal system.
Prerequisites: Introductory physics and biology or permission of instructor
Fall, even years, 2 credits

HBA 554 Primate Evolution
The taxonomic relationships of their evolutionary history as documented by the fossil record and structural and chemical evidence. Emphasis on primates prior to the origin of the human lineage. Laboratory included. Open to senior undergraduates.
Prerequisite: Permission of instructor
Spring, alternate years, 4 credits

HBA 555 Human Evolution
Survey of the fossil record of human evolution from the later Tertiary through the Pleistocene. The course will emphasize the reconstruction of a chronological and continuous cultures; general patterns of nucleic acid synthesis; regulation of enzyme activity during the cell cycle; temporal control of gene expression; development and function of cellular organelles during the cell cycle; and the control of cell division. Crosslisted with ANT 565.
Prerequisite: Permission of instructor
Spring, alternate years, 4 credits
HBA 566 Studies in Functional Morphology
Introduction to the theory and methods of functional morphology. Various methods of analysis and the application of experimental techniques such as electromyography or bone strain analysis are discussed as they pertain to the understanding of the interaction between form and function. Special emphasis is placed on the analysis of human and non-human primate morphology, and the application of this analysis to interpretation of the fossil evidence for human and non-human primate evolution.
Prerequisite: Permission of instructor
Fall, alternate years, 2 credits

HBA 580 Comparative Anatomy and Evolution of Mammals
The comparative anatomy, evolutionary history, and radiation of fossil and living mammals. A course requiring a major research project on any aspect of mammalian comparative anatomy. Supplemented by lectures and seminars on the evolutionary history and radiation of mammals. Comparative osteological and fossil cast collections will be utilized. Lecture/seminar series may be taken separately as HBA 581.
Prerequisites: Previous course in human or vertebrate anatomy and permission of instructor
Fall, alternate years, 4 credits

HBA 581 Evolution of Mammals
A course on the evolutionary history and radiation of mammals from the Mesozoic to the present from a paleontological and anatomical perspective. Particular emphasis will be placed on the origin of mammals and the origin, evolution, and anatomical diversity of modern and extinct orders of mammals.
Prerequisites: Previous course in human or vertebrate anatomy and permission of instructor
Fall, alternate years, 2 credits

HBA 582 Comparative Anatomy of Primates
The comparative anatomy of living primates. Laboratory dissection with emphasis on relating structural diversity to behavior and biomechanics.
Prerequisites: HBA 364, previous course in human or vertebrate anatomy, and permission of instructor.
Fall, 4 credits

HBA 590 Projects in Anatomical Sciences
Individual laboratory projects closely supervised by faculty members to be carried out in staff research laboratories.
Prerequisite: Permission of instructor
Fall and spring, 1-6 credits each semester, repetitive

HBA 656 Cell Biology
An introduction to the structural organization of cells and tissues as they relate to function. Emphasis on cell organelle structure and function in specialized cells in tissues. Covers the organization and interaction of cells in tissues and comparative examples of tissues from vertebrates and invertebrates. Crosslisted with BCD 656.
Prerequisite: Baccalaureate degree in science or permission of instructor
Spring, 3 credits

HBA 657 Developmental Biology
The developing systems at all levels from the morphological to the molecular utilizing material from both animal and plant kingdoms. Emphasis on molecular and cellular approaches to the basic principles of development, the mechanisms of storage, recruitment and utilization of genetic information during early embryogenesis, molecular and cellular aspects of pattern formation, mechanisms of cell and tissue interaction during development, and regulation of gene expression during terminal differentiation. Crosslisted with BCD 657.
Prerequisite: Permission of instructor
Fall, 3 credits

HBA 658 Phenetic and Cladistic Methods for Classification
Introduction to quantitative phenetic and cladistic approaches to discovering patterns in multivariate data, with emphasis on the classification of organisms. Students will also gain practical experience in the use of several relevant computer program packages.
Prerequisite: Graduate level course in univariate biometrics.
Spring, 4 credits

HBA 660 Mammalian Neuroanatomy
Structural organization of the mammalian central nervous system. Lab uses material from rat, cat, and monkey.
Spring, 2 credits

HBA 661 Methods in Research
Students are involved in research projects supervised by staff members in their research laboratories.
Prerequisite: Permission of instructor
Fall and spring, 1-12 credits, repetitive

HBA 690 Graduate Seminar
Seminars by graduate students on current literature in the areas of the anatomical sciences.
Prerequisite: Permission of instructor
Fall and spring, 1 credit each semester

HBA 692 Advanced Topics in Anatomical Sciences Literature
Tutorial readings in anatomical sciences with periodic conferences, reports, and examinations arranged with the instructor.
Prerequisite: Permission of instructor
Fall and spring, 1-2 credits, repetitive

HBA 694 Thesis Research
Original investigation under supervision of thesis advisor and committee.
Prerequisite: Permission of thesis advisor
Fall and spring, 1-9 credits, repetitive

HBA 695 Practicum in Teaching
Practice instruction in the teaching of anatomical sciences carried out under faculty supervision.
Prerequisite: Permission of instructor
Fall and spring, 1-4 credits, repetitive
Molecular Microbiology
(HBM)

Chairperson: Eckard Wimmer
Life Sciences Building, Room 280 (516) 632-8787
Graduate Studies Director: Patrick Hearing
Life Sciences Building, Room 214 (516) 632-8813

Degree Requirements

Requirements for the Ph.D.
Degree, Graduate Studies in Molecular Microbiology

The predoctoral training program offers its students the opportunity to study questions in virology, bacteriology, immunology, biochemistry, and cell and developmental biology utilizing the experimental approaches of the molecular biologist and geneticist. Instruction and course planning involve faculty members from the Department of Microbiology, selected members from the departments of Biochemistry, Pathology, and Pharmacology, and from two outside institutions, Cold Spring Harbor Laboratory and Brookhaven National Laboratory. The general philosophy of the program is that a successful research career in the diverse and heterogeneous area of molecular biology requires a broadly based background, familiarity with at least all of the above areas, and a frame of mind that is receptive to new approaches.

In addition to the minimum requirements of the Graduate School:
A. Each predoctoral trainee is assigned a faculty advisory committee whose primary responsibility is to ensure that the student’s coursework is properly balanced. These committees monitor the student’s progress during the training period and are especially active during the first year before a research advisor has been selected.
B. Students participate in a laboratory rotation in their first year in which they spend two months in each of two or three laboratories learning relevant techniques and research approaches, and all students participate in weekly intra-program seminars where reports on original research in molecular microbiology and in the literature are discussed. There is an active seminar program of outside speakers who present topics relevant to molecular microbiology, and there is a yearly symposium held to discuss ongoing research and recent progress in the field. This is held early in the fall in order to introduce new students to the faculty, to other students, and to the areas of ongoing research within the department.
C. Though it may vary for any particular student, a typical course of study for the first two years will be as follows:

1. First Year
   Fall
   Introductory Biochemistry (lab rotations)
   Molecular Genetics Seminar
   Experimental Microbiology (lab rotations)
   Microbiology Seminar
   
   Spring
   Graduate Genetics or Biology of Cancer (alternate years)
   Animal Virology
   Experimental Microbiology (lab rotations)
   Microbiology Seminar

2. Second Year
   Fall
   Molecular Biology of the Cell
   Molecular Aspects of Immunology
   Biochemistry of Macromolecules (mini-course)
   Graduate Research Seminar
   Microbiology Seminar
   
   Spring
   Graduate Genetics or Biology of Cancer (alternate years)
   Readings in Microbiology Literature
   Graduate Research Seminar
   Microbiology Seminar

D. The written qualifying exam is taken at the end of the second year of study. The thesis proposal is orally defended in the third year.

Courses

HBM 503 Molecular Genetics
Introduces the classical work and current developments in lower and higher genetic systems. Covers gene structure and regulation in prokaryotic and eukaryotic organisms, mutational analysis and mapping, transposable elements, and biological DNA transfer mechanisms. Bacteriophage as well as lower and higher eukaryotic systems are used to illustrate aspects of molecular genetic structure and function.
Prerequisite: Permission of instructor
Fall, 3 credits

HBM 504 Biochemistry of Macromolecules
The study of the chemical and physical properties of nucleic acid components. Covers the principles of mutagenesis, sequence analyses, formation and melting of 2° and 3° structure, nuclelease action, and the function of RNA structure in RNA processing. Examples implicating primary and secondary structures of nucleic acid in gene regulation will be given. Includes the methods of (automated) oligonucleotide and oligopeptide synthesis and the use of these oligomers in molecular biology.
Prerequisite: Permission of instructor
Fall, 1 credit

HBM 509, 510 Experimental Microbiology
An introduction to modern microbiological research. The student rotates through two professors’ laboratories, spending approximately one-half semester in each. The selection of laboratories is made in consultation with the student’s advisory committee. By taking part in ongoing projects the student will learn experimental procedures and techniques and become acquainted with research opportunities in the department.
Prerequisites: Matriculation in a graduate program and permission of the graduate studies director.
Fall and spring, 1-8 credits each semester

HBM 522 Biology of Cancer
A short course with the emphasis on cancer as a disease of man. Lectures address human cancer as seen by the clinician and as basic research relates to human disease. This course provides students a link between courses in cell and molecular biology and the application of this basic information to tumor management.
Spring of even-numbered years, 1 credit

HBM 531 Medical Microbiology
Information derived from molecular and experimental cellular biology will be presented to provide a foundation for understanding the basic aspects of the growth, regulation, structure, and function of viruses and prokaryotic and eukaryotic cells. The properties of the infectious agents will be correlated to human diseases caused by these agents. Laboratory experiments will demonstrate basic techniques to identify and quantitate microorganisms.
Prerequisite: Permission of instructor
Spring modules, 1-4 credits
HBM 599 Graduate Research
Original investigations under faculty supervision.
Prerequisite: Permission of instructor
Fall and spring, 9 credits each semester

HBM 611 Molecular Biology of the Cell
The topics covered include composition and structure of the plasma membrane, ion transport, endocytosis and exocytosis, cellular organelles, protein trafficking, nucleus and chromatin structure and function, cytoskeleton, cell cycle, cell communication, and intracellular signal transduction. The course is organized as discussions of required reading material led by the instructor and an expert in the field under discussion.
Prerequisites: Matriculation in the Molecular Microbiology or Genetics graduate program
Fall, 3 credits

HBM 612 Animal Virology
Describes the molecular mechanisms used by animal viruses to replicate nucleic acids and control gene expression. Several viruses are covered in great experimental detail to illustrate the methodology used to investigate viruses. Attributes of all major virus groups are considered. Focus on original data rather than on review articles.
Prerequisite: Permission of instructor
Spring, 3 credits

HBM 621, 622 Short Courses in Microbiology
On occasion the department will present short courses covering topics in microbiology at an advanced level. Classes will meet one or two periods for three to five weeks. Announcement of the courses will be made by sending notices to university departments.
Prerequisite: Permission of instructor
Fall and spring, 1 credit

HBM 690 Microbiology Seminar
A weekly meeting devoted to current work in the department. Enrolled students present seminars each week throughout the semester.
Prerequisite: Permission of instructor
Fall and spring, 1 credit each semester, repetitive

HBM 691 Readings in Microbiology Literature
Readings in microbiology literature covering areas of molecular biology and genetics.
Prerequisite: Permission of instructor
Spring, 1 credit

HBM 694 Dissertation Research in Microbiology
For the student who has been admitted to candidacy. Original research will be under the supervision of the thesis advisor and advisory committee.
Prerequisite: Permission of thesis advisor
Fall and spring, 1-9 credits

HBM 800 Full-Time Summer Research
Full-time laboratory research projects supervised by faculty members.
Prerequisites: Permission of instructor and full-time graduate student status
Summer, 0 credits
Degree Requirements

In addition to the minimum degree requirements of the Graduate School, the following are required:

A. All students must complete all or parts of the Oral Biology and Pathology Oral Systems course. M.S. students must, in addition, complete graduate courses selected from offerings within and outside the department. Ph.D. students are generally required to complete six course offerings at the graduate level.

B. To become a Ph.D. candidate, the student must pass an advancement-to-candidacy examination. To do this, the student must prepare a detailed written proposal in the format of a National Institutes of Health research grant application. A public seminar is presented by the student to the advisory committee, the department, and the university community at large, in which the student defends the proposal. This is followed by a further defense by the student before his/her advisory committee. A determination on advancement to candidacy is then made and forwarded to the Vice Provost for Research and Graduate Studies for official approval.

C. The candidacy examination is used to examine the student's ability to handle the intellectual and communicative processes involved in carrying out independent research.

D. An original research thesis is required for completion of both the M.S. and Ph.D. degrees. The format is similar to the advancement-to-candidacy examination in that the student defends the thesis at a public seminar followed by a second examination by the student's dissertation committee. If recommended for approval, this determination is submitted to the Vice Provost for Research and Graduate Studies, who makes the final decision to award the degree.

E. Each student has the opportunity to engage in various aspects of the teaching program of the department and a major effort is made to assist students to attend and present papers at various scientific meetings.

Courses

HBO 500 Biology of the Oral Mineralized Tissues
This course deals with the basic chemistry, crystallography, ultrastructure, and metabolism of the calcium phosphates involved in the formation and physiological and pathological resorption of the various mineralized tissues found in or associated with the oral cavity (enamel, dentin, cementum, bone). Ectopic calcifications and calculus formation will be examined.
Prerequisites: Oral Biology and Pathology or its equivalent and permission of instructor
Fall and spring, 3 credits each semester

HBO 510 Salivary Metabolism and Secretion
Consideration is given to the normal and abnormal structure and function of the glandular systems found in the oral cavity. The composition, regulation, and function of the secretions from the major and minor salivary glands will receive particular attention.
Prerequisites: Oral Biology and Pathology or its equivalent and permission of instructor
Fall and spring, 3 credits each semester

HBO 520 Oral Microbial Systems
Consideration is given to the structural composition, metabolism, and environmental relationships of the bacterial systems formed on and in association with the oral hard and soft tissues. Specific and mixed bacterial populations and their role in oral disease will be dealt with.
Prerequisites: Oral Biology and Pathology or its equivalent and permission of instructor
Fall and spring, 3 credits each semester

HBO 530 Molecular Biology and Pathology of the Periodontium
This course deals with the ultrastructure and biochemical composition of the periodontal tissues, the microbial interrelations with the organic and inorganic components of the periodontal tissues, the biochemical dynamics of gingival inflammation and wound healing, and the metabolic processes responsible for the composition and flow of gingival crevice fluid.
Prerequisites: Oral Biology and Pathology or its equivalent and permission of instructor
Fall and spring, 3 credits each semester

HBO 535 Epithelial Keratinization and Differentiation
A consideration of the role of stabilization of gene expression in the development and maturation of mammalian cells and tissues. Differentiation in skin and cartilage will be considered in detail. Alterations in the differentiative process of these tissues which may result in pathological disorders will be discussed.
Prerequisites: Permission of instructor required; HBO 531 suggested; students must have had background in cellular biochemistry
Fall and spring, 3 credits each semester

HBO 545 Sugar and Man
This course will examine the societal and biologic factors which influence the role played by sugar in the development of human disease. Topics will include the chemistry and metabolism of sugar, the sweet taste, the place of carbohydrates in the diet, and sucrose substitutes. Special emphasis will be given to the role of sugars in oral disease.
Prerequisites: Oral Biology and Pathology or its equivalent and permission of instructor
Fall and spring, 3 credits each semester

HBO 550 Molecular Basis of the Morphogenesis and Pathogenesis of the Oral and Related Tissues
This course deals with the basic mechanism involved in differentiation, growth and development, and tumor formation as they relate to the biology and pathology of the oral apparatus.
Prerequisites: Oral Biology and Pathology or its equivalent and permission of instructor
Fall and spring, 3 credits each semester

HBO 560 Oral Biology and Pathology I
This course is the first of four comprehensive courses on molecular structure, biochemical and physiological function, developmental anatomy, and pathology of the various systems that constitute the oral apparatus. The course consists of the following two units of instruction: (1) the embryological development of the face and oral cavity and (2) the biology and pathology of the oral mineralized tissues.
Prerequisites: Undergraduate degree in basic science and permission of instructor
Fall and spring, 3 credits each semester

HBO 561 Oral Biology and Pathology II
This course is the second of four comprehensive courses on molecular structure, biochemical and physiological function, developmental anatomy, and pathology of the various systems that constitute the oral apparatus. The course consists of the following two units of instruction:
(1) the biology and pathology of the periodontal structures and (2) the microbiology of the oral cavity.

**Prequisites:** Undergraduate degree in basic science and permission of instructor

**Fall and spring, 3 credits each semester**

**HBO 562 Oral Biology and Pathology III**

This course is the third of four comprehensive courses on molecular structure, biochemical and physiological function, developmental anatomy, and pathology of the various systems that constitute the oral apparatus. The course consists of the following two units of instruction: (1) the biology and pathology of the salivary glands and their products and (2) the biology and pathology of the oral mucous membranes.

**Prequisites:** Undergraduate degree in basic science and permission of instructor

**Fall and spring, 3 credits each semester**

**HBO 563 Oral Biology and Pathology IV**

This course is the last of four comprehensive courses on molecular structure, biochemical and physiological function, developmental anatomy, and pathology of the various systems that constitute the oral apparatus. The course consists of the following two units of instruction: (1) the biology and pathology of the oral sensory systems and (2) the biology and pathology of the oral motor systems.

**Prequisites:** Undergraduate degree in basic science and permission of instructor

**Fall and spring, 3 credits each semester**

**HBO 569 Research Projects in Oral Biology and Pathology**

Individual laboratory projects closely supervised by faculty members to be carried out in their research laboratories.

**Prequisites:** Student must be enrolled in a master's or doctoral program

**Fall and spring, 3 credits each semester**

**HBO 590 Oral Biology and Pathology Seminars**

Research seminars by students, staff, and visiting scientists.

**Prequisite:** Permission of instructor

**Fall and spring, 1 credit each semester, repetitive**

**HBO 694 Dissertation Research in Oral Biology and Pathology**

Original investigation undertaken with the supervision of a member of the staff.

**Prequisite:** Permission of thesis advisor

**Fall and spring, 1-12 credits each semester**

**HBO 695 Oral Biology and Pathology Teaching Practicum**

Practice instruction in the teaching of oral biology and pathology at the undergraduate level carried out under faculty orientation and supervision.

**Prequisite:** Permission of instructor

**Fall and spring, 1-4 credits each semester**
Degree Requirements
In addition to the minimum requirements of the Graduate School, the following are required:

A. Course Requirements
   1. HBA 530: Microscopic Anatomy of the Human Body
   2. HBC 531: Principles of Biochemistry (optional)
   3. HBY 531: Introduction to Mammalian Physiology
   4. HBM 503: Molecular Genetics
   5. HBP 531: General Pathology
   6. HBP 622: Clinical Pathologic Correlations: Gross Pathology
   7. BEE 532: Biometry
   8. BMO 520: Graduate Biochemistry I
   9. Choice of one:
      HBP 554: Advanced Immunology
      HBM 511: Molecular Biology of the Cell
      HBM 612: Animal Virology

Courses
HBP 511 Pathobiology for Graduate Health Care Practitioners
A general introduction to the principles of immunology for professional students including definition of antigens and antibodies, specificity of the immune response, serological quantitation of proteins and hormones, immunoglobulin structure, the genetics of immunoglobulin synthesis, cellular cooperation in the immune response, hypersensitivity, tolerance, transplantation. Open to advanced undergraduate students.
Prerequisites: Advanced courses in biology and biochemistry and permission of instructor.
Fall, 3 credits

HBP 531 General Pathology
Introduction to the nature and causes of disease, death, reaction to injury, and repair. Analysis of associated structural changes in cells and tissues, with reference to their functional correlates.
Prerequisites: Histology, gross anatomy, physiology, and biochemistry, prior or concurrent microbiology, and permission of instructor.
Spring, 6 credits with lab, 3 credits without lab

HBP 532 Medical Immunology
Principles of immunology for graduate students in the biological sciences including definition of antigens and antibodies, specificity of the immune response, serological quantitation of proteins and hormones, immunoglobulin structure, the genetics of immunoglobulin synthesis, cellular cooperation in the immune response, hypersensitivity, tolerance, transplantation. Open to advanced undergraduate students.
Prerequisites: Advanced courses in biology and biochemistry and permission of instructor.
Fall, 2 credits

HBP 533 Immunology
Principles of immunology for graduate students in the biological sciences including definition of antigens and antibodies, specificity of the immune response, serological quantitation of proteins and hormones, immunoglobulin structure, the genetics of immunoglobulin synthesis, cellular cooperation in the immune response, hypersensitivity, tolerance, transplantation. Open to advanced undergraduate students.
Prerequisites: Advanced courses in biology and biochemistry and permission of instructor.
Fall, 2 credits

Pathology
(HBP)

Chairperson: Frederick Miller
Health Sciences Center, BHS T-9, Room 140 (516) 444-3000

Graduate Studies Director: Ellinor I.B. Peerschke
Health Sciences Center, BHS T-9, Room 140 (516) 444-2601

Prerequisites: Histology, gross anatomy, physiology, and biochemistry, prior or concurrent microbiology, and permission of instructor.

Spring, 6 credits with lab, 3 credits without lab

HBP 531 General Pathology
Introduction to the nature and causes of disease, death, reaction to injury, and repair. Analysis of associated structural changes in cells and tissues, with reference to their functional correlates.
Prerequisites: Histology, gross anatomy, physiology, and biochemistry, prior or concurrent microbiology, and permission of instructor.
Spring, 6 credits with lab, 3 credits without lab

HBP 532 Medical Immunology
Principles of immunology for graduate students in the biological sciences including definition of antigens and antibodies, specificity of the immune response, serological quantitation of proteins and hormones, immunoglobulin structure, the genetics of immunoglobulin synthesis, cellular cooperation in the immune response, hypersensitivity, tolerance, transplantation. Open to advanced undergraduate students.
Prerequisites: Advanced courses in biology and biochemistry and permission of instructor.
Fall, 2 credits
HBP 563 Histochemistry Lab
A laboratory course designed to familiarize students with histochemical techniques used in diagnosis and research in pathology and the biomedical sciences. Includes staining of tissue macromolecules, enzyme histochemistry, immunocytochemistry, and autoradiography. Stresses tissue preparation techniques for ordinary and electron optical systems.
Prerequisites: HBP 531 or 533 and permission of instructor
Fall, alternate years, 3 credits

HBP 590 Seminars in Immunology
A series of monthly seminars focusing on research in progress by the participants, current journal articles in the field of immunobiology, and prepared reviews of specified areas in the general field.
Prerequisite: Permission of instructor
Fall and spring, 1 credit per semester

HBP 622 Clinical Pathologic Correlations: Gross Pathology
Correlative exercises in clinical pathology and human gross anatomic pathology including surgical biopsy material. Open to students in medical sciences.
Prerequisite: Systems pathology, general pathology course, permission of instructor
Fall, variable credits, 1-3 per semester

HBP 690 Seminar in Pathology
Seminar in major topics in experimental pathology by students, staff, and visiting scientists.
Prerequisites: Permission of instructor; open only to pathology graduate students
Fall and spring, 1-4 credits per semester

HBP 691 Journal Club in Pathology
Critical discussion of selected topics in experimental and descriptive pathology with presentation of papers from the literature.
Prerequisite: Permission of instructor
Fall and spring, 2 credits

HBP 694 Thesis Research in Pathology
Original investigation under the supervision of a staff member.
Prerequisite: Permission of instructor
Fall and spring, variable and repetitive credit, 1-12 per semester

HBP 695 Teaching Practicum in Pathology
Practice instructions in the teaching of pathology carried out under faculty orientation and supervision.
Prerequisite: Permission of instructor
Fall and spring, repetitive, 1-4 credits per semester
Pharmacological Sciences (HBH)

Chairperson: Arthur P. Grollman
Health Sciences Center, T-7, Room 140 (516) 444-3080
Graduate Studies Director: Daniel Bogenhagen
Health Sciences Center, T-8, Room 193 (516) 444-3068

Degree Requirements
Requirements for the Ph.D. Degree in Pharmacological Sciences

In addition to the minimum Graduate School requirements, the following are required:
A. Core courses in graduate biochemistry, medical pharmacology, neuropharmacology, and laboratory techniques.
B. One track course such as biochemical pharmacology, toxicology, genetic toxicology, or medicinal chemistry and two electives.
C. Four semesters of student seminar.
D. Completion of the qualifying examination for advancement to candidacy.
E. Preparation and defense of the Ph.D. dissertation.

Courses

HBH 531 Principles of Medical Pharmacology
Basic principles that underlie actions of drugs on physiological processes with particular reference to therapeutic and toxic actions. Primarily for medical, dental, and graduate students.
Prerequisites: Physiology, biochemistry, and permission of instructor
Spring modules, 5 credits

HBH 533 Graduate Orientation in Pharmacology
Basic principles that underlie actions of drugs on physiological processes. A supplementary course in pharmacology for graduate students (required for pharmacology graduate students, elective for others). Group discussion of current research topics in pharmacology. Attendance in HBH 531 is required.
Prerequisite: Permission of instructor
Spring, 6 credits

HBH 535 Clinical Pharmacology
A series of selected topics of clinical applications of drug therapy. This course is required by the graduate nursing program. Topics include therapeutic uses of drugs in cardiovascular, respiratory, endocrine, and gastrointestinal systems, as well as in the treatment of neoplastic, neurological, and psychiatric disorders. Lectures/discussions of clinical cases with significant class participation.
Prerequisite: HBH 531 or equivalent
3 credits

HBH 541 Medicinal Chemistry
Major themes deal with (a) the pharmacological principles that govern drug action, (b) selectivity and molecular mechanisms of drug action, and (c) the relationship of molecular structure to biological activity with emphasis on functional groups stereochernistry and charge distribution. Some aspects of drug synthesis, involving both naturally occurring and synthetic substances, are dealt with.
Fall, even years, 3 credits

HBH 543 Principles of Toxicology
An examination of basic concepts of modern toxicology. Emphasis on biochemical and pathobiology of toxicants. Topics discussed include absorption and metabolism of toxicants, organ toxicology, mutagenesis, teratogenesis, chemical carcinogenesis, inhalation and pulmonary toxicology, insecticide toxicology, radiation toxicology, metal and environmental toxicology, evaluation of toxicity, epidemiology, and other toxicology-related areas.
Prerequisite: Open to graduate students only; permission of instructor
Fall, odd years, 3 credits

HBH 545 Biochemical Laboratory Techniques
An introduction to the theoretical principles and experimental techniques used in modern biochemistry. Lectures and demonstrations will be used to present topics in laboratory computers, chromatography, mass spectrometry, protein sequencing, cloning technology, sedi­mentation, electrophoresis, ligand binding, and nuclear magnetic resonance. Procedures for the safe handling of toxic chemicals and radioisotopes will also be discussed.
Prerequisite: Permission of instructor
Fall, 3 credits

HBH 555 Neuropharmacology
An advanced course for graduate students interested in developing an understanding of neuropharmacology and research on this topic. Following a general introduction to the nervous system, synaptic and chemical transmission, three themes—receptors, receptors as channels, and G-protein-coupled receptors—will be developed. Recent advances in cell and molecular biology provide the framework for instruction and discussion.
Prerequisite: Permission of instructor
Fall, 3 credits

HBH 560 Topics in Biochemical Pharmacology
A literature-based course focusing on major research areas of molecular and biochemical pharmacology. Examines important drugs, hormones, and neurotransmitters to illustrate how effector molecules interact with and modify the biochemistry of living systems. Topics include the hormonal regulation of gene expression, interactions of drugs and regulatory proteins with nucleic acids and enzymes of nucleic acid metabolism, the central role of adenylate cyclase in cellular regulation, biochemical and molecular actions of mu­tagens and teratogens, and regulation of cellular function by peptides and proteins. Emphasis on the specificity of drug-receptor interactions and the consultation with the pharmacist to biochemical response in the target cell.
Prerequisite: Graduate biochemistry
Spring semester, 3 credits

HBH 564 Genetic Toxicology
An advanced course covering VDRA damage in prokaryotic and eukaryotic systems, focusing on molecular mechanisms of cytotoxicity, mutagenesis, and carcinogenesis, and emphasizing biochemical and genetic aspects of DNA repair.
Prerequisite: Permission of instructor
Fall, 3 credits

HBH 565 Epidemiology and Statistics
Presents methods, designs, and indices used in epidemiological studies and covers common statistical procedures for estimation and comparison, such as the t-test, chi-squares, linear regression, and correlation. Special topics include survivorship analysis, dose-response curves, and biological assay procedures.
Spring, 3 credits

HBH 570 Biochemical and Molecular Aspects of Parasitology
Lectures on the biology, pharmacology, immunology, and epidemiology of major tropical diseases of man, with special emphasis on biochemical and molecular mechanisms of action of therapeutic agents. Covers selected tropical diseases. In alternate years, the course will consist of a series of seminars presented by participants and invited speakers and will consider potentially attractive subjects for research, applying biochemical and molecular methods to tropical and related pathogens.
Prerequisite: Graduate biochemistry
Spring semester, 3 credits

HBH 580 Selected Topics in Pharmacology
Student seminars and readings on topics to be arranged with the staff.
Prerequisite: Permission of instructor
Fall and spring semesters, variable credits

HBH 590 Pharmacology Seminars
Advanced research seminars by staff and visiting lecturers.
Prerequisite: Permission of instructor
Fall, spring, 1 credit

HBH 599 Graduate Research in Pharmacological Sciences
Original research projects under faculty supervision.
Prerequisite: Permission of instructor
Fall, spring, variable credit
HBH 686 Minicourse: Advanced Seminars in Pharmacological Sciences
A series of five to six lectures by members of the Stony Brook faculty in conjunction with distinguished outside speakers on topics of current importance in pharmacology and related areas of biochemistry, molecular biology, and cell biology.
Fall, spring, 1-2 credits

HBH 694 Thesis Research in Pharmacology
Original investigation undertaken as part of the Ph.D. program under supervision of thesis adviser and committee.
Prerequisite: Permission of thesis adviser
Fall, spring, variable credit

HBH 800 Full-time Summer Research
Full-time laboratory research projects supervised by staff members.
Prerequisites: Permission of instructor and full-time graduate student status
Summer, no credits
Physiology and Biophysics (HBY)

Chairperson: Simon J. Pilkis
Health Sciences Center, T-6, Room 140 (516) 444-2287
Graduate Studies Director (516) 444-2287

Degree Requirements
In addition to the minimum Graduate School requirements, the following are required:
A. Completion of HBY 531, HBY 550, HBY 551, HBY 552, HBY 590, HBY 591, HBY 690, HBY 694, HBY 695.
B. Satisfactory completion of the preliminary examination at the end of second year of study.
C. Submission of a thesis research proposal by end of third year.
D. Participation in the teaching practicum.
E. Submission of an approved dissertation and successful oral defense.
F. Completion of all requirements within seven years.

Courses
HBY 506 Transport
Molecular and ion transport mechanisms in microorganisms, higher cells, and cellular organs. Emphasis will be placed on the molecular basis of transport functions, their genetic and physiological control, and energy coupling mechanisms in active transport. Membrane structure, chemical composition, and biosynthesis will be considered in terms of their role in membrane transport. Crosslisted with BMO 506. Spring, even years, 2 credits

HBY 531 Introduction to Mammalian Physiology
An introduction at the graduate level to physiology, with emphasis on human physiology. The principles of cellular physiology are presented, followed by an introduction to the circulatory, respiratory, gastrointestinal, renal, endocrine, and nervous systems. Prerequisite: Admission to medical or dental school or permission of instructor. Fall modules, 5 credits

HBY 550 Molecular Endocrinology
Deals principally with hormonal regulation of intermediary metabolism and gene expression in a variety of tissues. Covers intercellular and intracellular signaling mechanisms (cAMP, Ca2+, IP3, etc.), the molecular mechanism of hormonal action, covalent modification of enzyme activity, hormonal control of gene expression, and general mechanisms of enzyme regulation including both membrane-bound and cytoplasmic enzymes. Prerequisites: Physiology and biochemistry Fall or spring, 3 credits

HBY 551 Biomembranes
A survey of biological membranes. Major topics to be considered include the structure and assembly of biomembranes, the mobility of the membrane components, molecular neurobiology, membrane transport, the chemosynthetic hypothesis, and receptors on biological membranes. Prerequisite: An undergraduate course in physical chemistry. Spring, even years, 3 credits

HBY 552 Physiology of Excitable Membranes
Topics to be covered in this course include the resting potential, the basis of the action potential, linear cable properties, and synaptic transmission. Model systems studied in detail include squid axon, the neuromuscular junction, and the cardiac Purkinje fiber. Prerequisites: Physics, physical chemistry, and calculus. Spring, odd years, 3 credits

HBY 555 Applied Math for Electrophysiologists
The derivation and solution of ordinary differential equations is taught in the context of circuit theory and equivalent circuit representations of cells and tissues. Nonlinear circuits, linearity, and piecewise linearization, Fourier series, Fourier transforms, and Laplace transforms. Introduction to diffusion, heat flow, cable theory, and noise analysis. Prerequisites: Calculus through differential equations; physics. Spring, odd years, 3 credits

HBY 590 Special Topics in Physiology and Biophysics
Student seminars and tutorials on advanced topics to be arranged through consultation with faculty members. Prerequisite: Permission of instructor. Fall and spring, 1-2 credits each semester, repetitive

HBY 591 Physiology and Biophysics Research
Original investigation undertaken with a member of the staff. Prerequisite: Permission of instructor. Fall and spring, 1-12 credits each semester, repetitive

HBY 690 Seminar in Physiology and Biophysics
Seminars and discussions on major topics in physiology and biophysics by students, staff, and visiting scientists. Prerequisite: Permission of instructor. Fall and spring, 1-2 credits each semester, repetitive

HBY 694 Thesis Research in Physiology and Biophysics
Original research undertaken with the supervision of a member of the staff. Prerequisite: Permission of thesis advisor. Fall and spring, 1-12 credits each semester, repetitive

HBY 695 Practicum in Teaching in Physiology and Biophysics
Practical experience and instruction in the teaching of physiology and biophysics carried out under faculty supervision. Prerequisite: Permission of instructor. Fall and spring, 1-4 credits each semester, repetitive

HBY 800 Full-time Summer Research
Full-time laboratory research projects supervised by staff members. Prerequisites: Permission of instructor and full-time graduate status. Summer, 0 credits
Guide to the Preparation of Theses and Dissertations

I
Introduction
The submission of a thesis or dissertation is the last step in the program leading to the award of your degree. Your manuscript is a scholarly statement of the results of a long period of research and related preparation. The final copies become official and permanent records available to all for close scrutiny and study. Doctoral dissertations are published in microfilm form, and the abstracts are published in Dissertation Abstracts International. Microfilming techniques and interlibrary loan services have made theses and dissertations more accessible than ever before. Thus, theses and dissertations are visible reflections of the quality of work produced by students, advisors, departments, and the Graduate School. It is important, therefore, that your work not be marred by careless errors in form.

This brief guide describes the acceptable form for master's theses and doctoral dissertations at the State University of New York at Stony Brook. All questions regarding the quality of the research and writing of a thesis or dissertation should, of course, be directed to your advisor or dissertation director and the supervising committee. If, after reading these guidelines carefully, you still have questions about acceptable format or important deadlines, direct these questions to the Graduate School (516-632-7040) before the final draft is typed.

The following guidelines were designed to cover only doctoral dissertations and those master's theses that are filed with the Graduate School. Consult with your departmental graduate advisor if there are any questions about using this guide for internship reports, special reports, practica, or theses that are filed only in your department, as is required in certain degree programs.

II
Important Dates and Procedures
For the exact deadlines to submit your defended and approved thesis or dissertation to the Graduate School, consult the current Academic Calendar and your department's posting. Graduate students are urged to complete their theses/dissertations and defenses as early as possible during their final semester. You are responsible for ensuring that changes suggested by one committee member are approved by all committee members as soon as possible. If you wait until the last minute, there may not be enough time to make necessary changes in the content or form of your manuscript and to obtain approval of changes from all committee members. Such delays may result in the postponement of graduation until the next awarding date.

The following are general Graduate School procedures that are based on Library, Graduate School, and microfilming requirements. Format regulations are minimal to allow the freedom of choosing individual disciplinary formatting. Also refer to the final checklist appended to the end of this guide.

1. Register for at least one credit during the semester in which you intend to graduate.
2. Complete the degree application packet, obtain your graduate program director's signature on the back of the blue application, and bring the packet to the Office of Records for filing. The Program Director's signature does not imply academic clearance; it signifies only that your department is aware of your intention to graduate and that your completion papers should be prepared in time for graduation. Consult the current Academic Calendar and your department's posting for deadlines. This date is usually three months prior to graduation.
3. Submit an original and three copies (original and four copies for Engineering and Basic Health Sciences students) of your defended, committee-approved thesis or dissertation to the Graduate School Office. You must provide the following items when you file your thesis/dissertation with the Graduate School Office:
   a) Original and three copies (original and four copies for Engineering and Basic Health Sciences students) of the thesis or dissertation. Each of these should be placed in a clean manila envelope large enough to accommodate it. An extra copy of your title page should be taped to the front of each envelope for identification. There must also be numerical identification of each envelope's contents (i.e., original, official copy 1, etc.) If your manuscript is longer than 500 pages, each copy must be divided into two equal parts, labeled appropriately as Part I and Part II, for binding into two volumes.
   b) You are responsible for the cost of binding (in the case of doctoral dissertations, binding, and microfilming). Appropriate fees should be in the form of a bank or postal money order or certified personal check. These are the only forms of payment that will be accepted.
   c) Master's Candidates: One extra copy of the committee approval page is required.

Doctoral Candidates: One extra copy of committee approval page, title page, and abstract. Additionally, doctoral candidates will be asked to complete the following forms and submit them with the dissertation. These forms are available in the Graduate School and may be picked up at any time.

1. National Research Council's Survey of Earned Doctorates
2. University Microfilms Agreement
3. Exit Questionnaire
4. Ph.D. Employment Form

Note: The completion statement, indicating successful completion of all degree requirements, is normally sent directly to the Graduate School office from your department after your thesis/dissertation is accepted by the Graduate School.

See Final Checklist in Section XI, page 149.

III
Parts of the Thesis/Dissertation
The completed manuscript falls into three parts: the preliminary pages, the text, and the reference material. The internal arrangement of the text and reference material will be decided in consultation with your thesis/dissertation advisor. Whichever form of organization you decide to adopt, be sure to follow it consistently throughout the thesis or dissertation.

The preliminary pages should be arranged in the following sequence. These pages, unless otherwise indicated below, are numbered in lower-case Roman numerals centered at the bottom of the page within the margin limit.
Order of Pages and Sections

a. Title Page: Unnumbered but included in the page count. (See sample, Figure 1.)
b. Copyright Page (optional): Unnumbered and not included in the page count. (See Section IX, Microfilm and Copyrighting.)
c. Thesis or Dissertation Committee Approval Page: Page ii of your manuscript. (See sample, Figure 2.)
d. Abstract: Page iii of your manuscript. (See sample, Figure 3, noting the word limit.)
f. Table of Contents: List all parts of the thesis or dissertation that follow the Table of Contents page. Make sure all major divisions are included.
g. List of Illustrations: Include symbols, figures, tables, illustrations, etc.
h. Preface (optional): Unnumbered but counted. May include the acknowledgments. No part of the thesis or dissertation essential to an understanding of the main body of the text should be included in the Preface.
i. Acknowledgments (optional): Unnumbered but counted.
j. Vita, Publications, and Fields of Study (optional): Apply to doctoral dissertations only.
k. Text: Begin Arabic numbering (see Pagination). The introduction (optional) and the main body of the thesis or dissertation should consist of well-defined divisions, such as parts, chapters, sections, etc., as well as footnotes (see Footnotes).
l. Bibliography: See Section VI, Footnotes, and List of References and Bibliography.
m. Reference Material: If appropriate, a glossary or a list of abbreviations devised specifically for use in the thesis or dissertation should be included. "List of References," or some similar phrase, should be used to head a list of publications which have been cited in the text. A bibliography may list publications that have been cited in the text. A bibliography may list publications you have consulted or to which the reader should refer, whether or not they have been cited in the text.
n. Index (optional): Last portion of this section.
o. Appendix (optional).

Figure 1
Sample Title Page
Use the term "thesis" if you are a master's candidate. Use the term "dissertation" if you are a doctoral candidate.
Use the complete name for the degree (e.g., Master of Arts, Master of Science, Master of Music, Doctor of Philosophy, etc.)

Your degree program should be stated by its officially approved name. If you wish, departments within programs may be mentioned in parentheses under the name of the program. (Note: "Degree program" in this guide refers to programs that have been sanctioned by Albany and the State Department of Education. Campus-approved degree programs are not to be used.) For example,

Biological Sciences (Ecology and Evolution)

Do not place statements of acknowledgment on the title page. If you wish to acknowledge separately the auspices under which your research has been carried out and/or funded you may include a paragraph on a separate unnumbered page following the abstract or include it in your acknowledgment page.

The date at the bottom of the title page is the month (May, August, or December) and year in which the diploma is to be awarded.

Figure 2
Sample Committee Approval Page
Typing your full legal name, centered, on the line above main statement. Initials should not be used.

In the body of the main statement use the term "thesis" if you are a master's candidate. Use the term "dissertation" if you are a doctoral candidate.

Type signature lines according to the number of members on your committee. Underneath each line, fully identify the member by typing his or her name, title, and department. In addition, include the discipline and affiliation of the outside member.

The first line is reserved for your thesis/dissertation advisor. The second line is reserved for the chairperson of the defense. These two designators must not be the same person. Committee members should sign in permanent black ink. India ink is considerably more permanent than other inks and is most preferred. But some pens such as Bic black and Scripto permanent black are also acceptable; felt-tip ink is not.

Sample
State University of New York
At Stony Brook
The Graduate School

[Your full name above line]

We, the [thesis/dissertation] committee for the above candidate for the __________ degree, hereby recommend acceptance of this [thesis/dissertation].

[Type the number of lines you need. Under each line, type member's name, title, and department.]

[Reserved for Dissertation Director]

[Reserved for Chairperson of Defense]

[Last line reserved for outside member. Include discipline and affiliation]

This [thesis/dissertation] is accepted by the Graduate School
Figure 3
Sample Abstract Page
On the abstract page, use your full legal name. Do not use initials.

The abstract should consist of a short statement of your research, a brief exposition of the methods and procedures employed in gathering the data, and a condensed summary of the findings of your study.

The doctoral abstract may consist of several pages but is limited to 350 words. It will be published in Dissertation Abstracts International without further editing or revision, therefore special care should be taken in its preparation. The following method will be used for counting words. There should be a maximum of 2,450 typewritten characters per abstract. Count the number of characters (including spaces and punctuation) in a line of average length and multiply by the number of lines. In an average abstract, there will be about 70 characters per line with a maximum of 35 lines. However, if it is to be supplemented it with a 350-word summary. This summary will serve as the required extra copy actually used for the publication.

There is no word limit for master's thesis abstracts. However, if it is to be copyrighted, a 150-word limit should be observed.

The date on the abstract is only the year the degree is awarded.

The abstract begins on page iii of the preliminary pages. Continue lower-case Roman numeral pagination throughout the abstract.

Table of Contents

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Introduction</td>
</tr>
<tr>
<td>II. Theory</td>
</tr>
<tr>
<td>III. Apparatus</td>
</tr>
<tr>
<td>IV. Flux Detector</td>
</tr>
<tr>
<td>V. Experiment</td>
</tr>
<tr>
<td>VI. Conclusion</td>
</tr>
<tr>
<td>References</td>
</tr>
<tr>
<td>Appendix 1</td>
</tr>
<tr>
<td>Appendix 2</td>
</tr>
</tbody>
</table>

IV. Printing Methods

An original and three copies (an original and four copies for Engineering and Basic Health Sciences students) of the approved thesis or dissertation must be submitted to the Graduate School before the deadline. See Important Dates and Procedures in Section II. In addition, for doctoral candidates one extra copy of the title page, committee approval page, and abstract are required. Master's candidates need supply only one extra copy of the committee approval page. The graduate school will arrange for binding the copies and provide microfilming services. The binding process usually takes about three months. See Section X for distribution.

There are four approved methods for the preparation of the manuscript. The one you select will depend upon the number of copies you wish to have for your use in addition to the official copies, the cost, and the kinds of material to be reproduced.

1. Computer/Word Processor

Pica or elite typefaces may be used, but no smaller than elite will be acceptable. Proportional spaced typefaces may be used, provided that the average character spacing is no smaller than 15 per inch. The right-hand margin may be justified or ragged. All official copies of the manuscript must be produced on 8 1/2" x 11" white, 16-20 pound bond paper of at least 25 percent rag content. The printing must be clean and letter-quality. Dot matrix is usually not acceptable, but a ruling on near-letter-quality printfaces may be obtained from the Graduate School on presentation of a full-page print sample.

If a thesis is typeset rather than typed, a typeface of no smaller than 12 point may be used for the text of the thesis. For tabular material, bibliographies, and lists of references 10-point typefaces may be used.

There are three duplicating procedures from which to choose: 1) print the entire required number of copies on a printer. There is 16-20 pound paper available in continuous feed form that may be purchased from a commercial stationer. Bear in mind that the edges of the tear sheets must be smooth; 2) print your original on regulation paper and photocopy the required number of copies on regulation paper; 3) print your copy on any type of paper and photocopy the required number of copies on regulation paper from which one will be used as the "original."

The Quick-Copy Center on campus is available to you. For a reasonable rate (currently $3 cents a copy), photocopying and collating is done and regulation paper is used. This service is fast and dependable. It is located in the print shop on the first floor of the Administration Building. Their service is on a first-come, first-served basis, but it is suggested that you telephone (2-6220) for an appointment during a deadline.

2. Ribbon and Photocopy Process

Type the manuscript on white, 16-20 pound bond paper of at least 25 percent rag or cotton content using an electric
writer and a carbon film ribbon. All additional copies are photocopied from the original typescript on regulation paper. See above information on the Quick-Copy Center.

3. Multilith Process 1
Type the manuscript on white paper. This copy is given to a commercial processor who will make a multilith master by a photographic process. The desired number of copies is obtained from this master. The copies must be prepared on 16 to 20 pound bond paper of at least 25 percent rag or cotton content. You may retain the original manuscript and the processed master.

4. Multilith Process 2
Type the manuscript on a multilith master stencil. All copies are obtained from the stencil master. If you use this process there will be no original and you will file all official copies on 16 to 20 pound bond paper of at least 25 percent rag or cotton content.

Published Material
If approved by your advisor and thesis/dissertation committee, reports of research undertaken during graduate study that have been published in appropriate media may be accepted in their printed form as part of your manuscript.

The pages from the published materials themselves must be reproduced by one of the above acceptable methods. As closely as possible standard margins of 1-1/2" should be maintained on these pages; this may necessitate enlargement or reduction of the materials. If there is a need to use oversized materials, see instructions for oversized materials in this section.

Non-Typed Material
In preparation for any of the above processes, if symbols, equations, formulas, accent marks, etc., are drawn by hand, they must be done in permanent black ink (B; black and Scripto permanent black will be accepted); felt tip pens or ballpoints are not to be used. This requirement also applies to signatures on the committee approval page. If Multilith Process 2 is used, you should obtain information from the commercial processor on the special procedures to be followed for hand drawings.

Photographs
Photographs, either singles or composites, must be within the required margins of 1-1/2". Captions may be included on the photographs themselves, or, if space permits, on the same page, rather than on a facing caption page.

Multilith reproduction of photographs may be used. Copies may also be prepared on single-weight matte finish photographic paper. Glossy photographs guaranteed by the photographer not to crack or break are acceptable, as well as photographs on resin-coated polychromat paper. If you intend to glue your photographs onto regulation paper, you will need as many prints of each photograph as there will be copies of the manuscript.

Color photographs may be used, but keep in mind that they will appear in black and white on reproduced copies, so that color alone must not be relied upon for illustrative or interpretive purposes, unless a color photocopier is used or you provide a separate print for each copy.

The negative is required for each single or composite picture. The negatives are submitted with your manuscript, each in a separate envelope on which you list your name, department, name of your dissertation director, title of your manuscript, and the figure (or plate, etc.), and page number of the photograph within the manuscript.

If the print is an enlargement or reduction from the original negative, the ratio of enlargement or reduction must also be noted on the envelope. If negatives are not available for inclusion, a typewritten statement informing the Graduate School where they are located should be supplied to be kept on file. If negatives do not exist, as in the case of polaroid photographs, a typewritten statement to this effect is required.

Drawings
All drawings must be produced to the highest standards of draughtsmanship, using permanent black ink. Drawings may be made directly onto regulation paper. A more common method is to draw them on vellum-type paper and then have copies multilithed or photocopied. Copies prepared this way are permissible in the original manuscript.

Oversized Material
When materials are included in the manuscript that are larger than the standard size page (8-1/2" x 11"), they should first be reduced as much as possible, consistent with their use. Charts and graphs may often be reduced in size by a photographic process or on a photocopiering machine with a reducing feature. Form letters, questionnaires, or other printed material should be kept within the required margins when reproduced. Whenever material is enlarged or reduced to meet the margin requirements, it is acceptable to include these reproduced pages in your original copy.

If your material is oversized and cannot be reduced, you may fold the material to manuscript size. The maximum dimensions of materials which may be bound into the manuscript are 17" x 22" before folding. The fold should be made in a pleating fashion, and the folded edges should not be less than 1/2" from either edge of the manuscript so that they will not be cut or sewn in binding. Note in the following diagram at Point A that a strip of the material on the top left side remains clear of the folds to allow it to be bound in, leaving the folded area free to be opened. The maximum dimensions for the material, when folded, are 8" x 10".

Oversized material larger than 17" x 22" should be folded and inserted into a pocket and placed at the end of your manuscript. Special pockets may be purchased at a commercial stationery or you may construct your own by cutting down the open end of a manila envelope. When such a special pocket is required, the reference to the material it contains should be made in the text. In the list of figures, illustrations, tables, etc., the following note should be made: Plates 1 through (last plate number) in pocket in back cover. The oversized materials themselves should not be assigned page numbers, but your name and the title of your thesis or dissertation should appear on each sheet in the lower right-hand corner.

Graphs
You may use any graph paper as long as the official copies are reproduced on regulation paper and within the required margins. If you wish the grid to reproduce, use red-lined graph paper.

Maps
You should consult with your advisor concerning the appropriateness of maps being included in your thesis or dissertation. Maps should be folded according to the instructions for oversized material, above.

Units
For scientific work, SI units must be used except where there is good reason not to do so, for example, where it is the accepted practice of workers in the field to use other units.

Overall Appearance
The text of the thesis or dissertation must be clear and grammatical. Grossly illiterate work will not be accepted. Interlineations, crossed out letters or words, strikeovers, pencil markings, and visible or extensive erasures or corrections will not be accepted in the final copies submitted for deposit. No material may be secured in your manuscript by paper clips, staples, or adhesive tape.

V
Physical Specifications
A thesis or dissertation reflects the quality of work produced by the author, the advisor, the department, and the Graduate School. Therefore, it is important that the
final manuscript is properly collated and not marred by poor spelling, sloppy punctuation, or other careless errors. To avoid these problems you are urged to use qualified professional typists who are acquainted with this guide. If you need assistance in contacting a qualified typist, a list of recommended typists is kept in the Graduate School Office. Before you give your manuscript to a typist, you should contact the typist and discuss his or her experience, time schedule, and fees. Keep a copy of any material given to a typist.

Paper
Official copies of the thesis or dissertation must be prepared on white, unpunched, 16-to-20 pound bond paper of at least 25 percent rag or cotton content. Onion skin or easy-erase paper will not be accepted. Use 8½” x 11” paper.

Typefaces
Pica or elite typefaces may be used, but no type smaller than elite will be acceptable. Use a good quality, all-black ribbon. If using a standard electric typewriter, several spools of ribbon should be rotated in use to obtain an even impression. On a typewriter with a one-time ribbon, use a good-quality acetate black ribbon.

Whether using a typewriter or computer, the same machine must be used for the entire dissertation or thesis since the manuscript will be rejected if it lacks visual uniformity. Exceptions will be made in the case of format style, when larger type is used in preparing the rest of the manuscript.

Corrections
Keep corrections to a minimum. No interlineations, crossing out of letters or words, strikeouts, pencil markings, or extensive erasures are permitted. Correction strips treated with corrective powder and correction fluid, when properly applied, are satisfactory. However, they should be used sparingly. Do not cover errors with any type of correction tapes.

Spacing and Indentation
The body of your manuscript should be double spaced. There are some machines that produce the equivalent of double spacing with a space and a half. The first line of each paragraph should be indented five spaces. The first line of the text of each chapter or major division should be six spaces below the last line of the chapter title or section heading. Refer to instructions in Section VI on spacing for quotations, footnotes, references, and appendices.

Margins
All margins of the text — top, bottom, right, and left — should measure 1½ inches from the edges. The pages are usually trimmed at the bindery, so it is important to adhere to these specifications.

Hyphenation
Avoid dividing words at the end of more than two successive lines of text. Do not divide the word at the end of the last line of text on any page.

Pagination
Page numbers must be typed. Hand numbering will be cause for rejection. With the exceptions of the title page, optional preliminary pages, and some photographic paper, every page in the manuscript must be consecutively numbered. This includes figures, tables, photographs, illustrations, etc., as well as the caption pages facing such material numbered in the upper left hand corner. Photographic paper onto which type will not adhere need not be numbered but must be counted. See information on the order of pages and sections under Section III for numbering optional preliminary pages. As a further exception, oversized sheets that are placed in a special pocket in the back cover are not assigned page numbers (see information on oversized material under Section IV).

Each numbered page of the preliminary parts of the thesis or dissertation is numbered on the center of the page, one inch from the bottom edge, in lower case Roman numerals beginning with page ii, the committee approval page. Your main text and reference material are numbered at the upper left hand corner of the caption side (see information on captions under Section VI).

Letter suffixes such as 10a, 10b, 10c, etc., are not permitted. If it becomes necessary to make additions to your completed manuscript, you may add them in the form of an addendum at the end. No punctuation of any kind should be used with page numbers.

VI
General Format Information

Footnotes
If the nature of your footnotes allows, they should be placed at the bottom of the page. This form is especially convenient for students and scholars who use microfilm copies of the study. Each entry should be contained in its entirety on the page and not continued on to the next page. If your footnotes contain extensive commentary (as opposed to simple references), they may be placed at the end of the chapters or at the end of the manuscript. If you place footnotes at the end of the chapters, there should be, in place of the first footnote you would otherwise put on the bottom of the page, a note indicating the inclusive pages where the footnotes may be found. You need do this only once in each chapter that will have footnotes.

Each footnote should be single spaced if it continues beyond one line, and double spaced between each entry. If footnotes are placed at the bottom of the page, they should be separated from the main part of the text by an unbroken line which extends the length of 20 spaces from the left margin. This line should begin two spaces beneath the last line of your text.

The form of footnotes themselves could be that customarily employed in publications addressed to the discipline concerned. Parenthetical notations in your text are also permissible. (i.e., author’s name, year, page number etc.), as long as they are detailed in your bibliography. You are urged to check your footnotes and bibliography very carefully to avoid complaints from librarians and scholars about inaccurate or poorly organized entries.

Quotations
The recommended practice is to include prose quotations of fewer than six lines as regular running lines of text, enclosed within quotation marks. If the quotation exceeds six lines, single space the entire quotation, beginning two lines below the last line of the regular text. Indent the quotation on both the left and the right margins for a centering effect. Paragraphs within the indented quotation should be indented an additional four spaces. No quotation marks are used for quotations thus set off from the regular text.

A quotation within a quotation should be enclosed within single quotation marks whether it appears as a running line of the text or is set apart.

Quotations of poetry not exceeding one line may be included in the running line of text, enclosed within quotation marks. More than one line should be set apart from the text in the same way as prose quotations of more than six lines. Quotations of poetry set off from the text should be centered on the page.

List of References and Bibliography
Prepare your list of references and bibliography using the form of citation that is standard in your field or the form prescribed in any standard manual of style. Single space each entry if it continues beyond one line, and double space between each entry.

Appendices
The text in appendices may be single or double spaced. Single spacing is recommended, but if the text of the appendix is extensive, double spacing may prove to be more readable.
Figures
Figures and tables may be placed in groups either following chapters or at the end of your manuscript. They may also be interspersed throughout the text of your manuscript. Your decision should be based on what would produce the most clarity for your reader. Drawings may be on the top of the figure, and the caption type paper and then have copies photocopied. Copies prepared this way are permissible in the original manuscript. Figures and tables must be captioned. If a page must be turned to read a figure or table, the edge to be bound should be at the top of the figure, and the caption should appear at the bottom (which is along the right-hand margin when the manuscript is in normal reading position), allowing for regulation margin of \( \frac{1}{2} \). All captions must be listed in the List of Figures or Tables in the preliminary pages (see sample Table of Contents). For figures or tables which have parts, such as a, b, c, etc., you must caption each part.

If your figure or table is too large to allow room for a caption, prepare a caption page which would precede the figure or table and appear to the reader face to face with the figure or table. Indicate the page number of the figure itself and not the facing caption page in the List of Figures and Tables.

Captions
Unless the caption or identifying legend appears on the page with the figure or illustration, captions should be placed on a page facing the figure or illustration. The text of the caption should be centered on the page, double spaced, with the page number in the upper left hand corner, as indicated above in the pagination section. If the caption is on the same page as the figure or illustration, it may be single spaced and should be printed either at the top or bottom of the page. If the page must be turned to be read, the top will be the bound edge and the caption will appear at the bottom, which is the right-hand margin in the normal reading position. When preparing a caption page for a figure or illustration that must be turned to be read, the caption page should be typed so that, when turned, it may be easily read above the figure or illustration page.

VII Permissions for Copyrighted Material
The filing of a thesis or dissertation in a library is generally presumed to constitute publication in a legal sense. The reproduction of a dissertation by University Microfilms is similarly regarded as a form of publication. Consequently, you are expected to conform with the provisions of the copyright law with regard to quoting from copyrighted material. For this reason, University Microfilms requires that you subscribe to the following statement which appears on the agreement form:

The author hereby certifies that the use of any copyrighted material in the manuscript beyond brief excerpts is with the permission of the copyright owner, and will save and hold harmless University Microfilms from any damage which may arise from such copyright violations.

Subscription to this section does not mean that you must ask permission from the copyright owners for every quotation or prose passage of approximately 150 words, nor does the quotation of a few lines of verse in a work of scholarship or criticism call for permission; however, these general considerations do not absolve you from your responsibility in the matter of copyrighted materials. If you quote continuously or extensively from a particular author, especially in such fields as fiction, drama, poetry, or criticism, or if you reproduce maps, charts, statistical tables, or other similar materials that have been copyrighted, you must write to the copyright owner(s), describe the use to which you are putting the material, and request permission to include it in your thesis or dissertation. This practice also applies if you cite your own published work(s) and your publisher holds the copyright.

For your protection, a statement listing such materials should be included in your thesis or dissertation under Acknowledgments. The statement should indicate 1) that permission has been granted for their use, and 2) the source(s) of the permission (see also the information on published material, Section IV, p.).

If your published material lists a co-author, and if the co-author is listed by reason of having directed and supervised the research which serves as the basis of the thesis or dissertation, list only your name as the author, and not the other's name. If you have not directed or supervised the research, list only your name as the author in the preliminary pages of your thesis or dissertation. In the Acknowledgments you will state, "The text of this (thesis/dissertation) (in part/full) is a reprint of the materials as it appears in (names of publications). The co-author(s) listed in the publication(s) directed and supervised the research which forms the basis for this thesis or dissertation."

It is your responsibility to resolve any copyright problems arising from the use of published material.

If you own the copyright of the published material, you must supply a copyright page showing the following information for each publication:

Copyright by (name of authorcopyright owner)
Copyright Registration Number: __ (obtain this number from copyright certificate)
(year copyright was obtained)

For a master's thesis, when the copyright owner is other than yourself, a written statement from the copyright owner(s) is submitted when the thesis is filed, granting you permission to use the copyrighted material and for the State University of New York at Stony Brook to reproduce the material by photocopy or in microfilm on a one-at-a-time basis.

For a doctoral dissertation, when the copyright is other than yourself, a written statement from the copyright owner(s) is submitted when the dissertation is filed, granting you permission to use the copyrighted material and authorizing University Microfilms to sell microfilm copies on a one-at-a-time basis.

No thesis or dissertation incorporating reprinted material that has been copyrighted will be accepted without appropriate authorization.

VIII Assembling your Thesis/Dissertation for Deposit with the Graduate School
You are urged to deposit the final copies of your thesis or dissertation as early as possible during the semester in which you expect to receive your degree. Consult the Graduate School for deadline dates.

After you have successfully passed your defense or colloquium, obtain the signature of each of your committee members on the committee approval page. The signatures must be in black ink. Photocopy the appropriate number of copies of this page so that there will a copy for every manuscript. Present the original and copies of this page as separate items when you file your thesis or dissertation.

Assemble your manuscript by placing the original and three copies (original and four copies in the case of Engineering and the Basic Health Sciences students) in strong Manila clamshell envelopes of appropriate size. The copies must be unbound and unperforated. You can then bring the envelopes to the Graduate School for the signature of the Associate Vice Provost and for filing. An extra copy of the title page should be affixed to the outside of each envelope to serve as an identifying label. Mark one envelope "original" and the others "copy" as appropriate. If your manuscript is over 500 pages, it
should be divided into two equal parts, labelled appropriately as Part I and Part II, for binding into two volumes.

Your official copies will be examined by the Graduate School to determine whether they meet the requirements outlined in this guide. After the Associate Vice Provost for Graduate Studies signs the committee approval page your department will be notified. If you have completed all other requirements for the degree, your department will send the Graduate School a completion statement.

After your thesis or dissertation has been deposited with the Graduate School you may not withdraw it from the university until the circulating copy has been bound, catalogued, and placed on the shelf in the library. The archival copy may not be withdrawn at any time, but may be consulted in the library.

Distribution
The original copy of your thesis or dissertation is placed in the Library Archives, unbound, and used for interlibrary loans. One bound copy is placed on the shelves in the Library Thesis Room. One bound copy is given to your department library, and, in the case of the Engineering and Basic Health Sciences students, one copy is designated for each respective dean’s office.

There is no other official distribution. If you wish to distribute bound copies to your advisor or committee members, these are to be considered personal copies. Your personal bound copies will be sent to your department. You should leave instructions for their distribution with your department’s secretary.

IX
Microfilming and Copyrighting
The Graduate School will send the original manuscript of all doctoral dissertations to University Microfilms International in Ann Arbor, Michigan, where they will be microfilmed, and the Abstract published in Dissertation Abstracts International. A master microfilm of each dissertation is assigned a publication number and then kept on deposit. You will be issued your publication number directly from UMI approximately four months after you file your dissertation. This number is used to order your microfilm copies. When the original manuscript is returned to campus, it is deposited in the Main Library Archives. The original of master’s theses are not microfilmed. They are sent directly to the Archives from the Graduate School. To order a photocopy of a thesis, contact the Preservation Officer in the Library. There is a fee for this service.

Students in the Ph.D. in Music Composition program should consult the Department of Music Graduate Program Director for separate guidelines on publication of their compositions with the American Music Center.

Microfilm Agreement
When you file your dissertation you will be required to sign an agreement form with UMI, at which time you may take the option for copyrighting your dissertation (see information on copyrighting in this section). This form is part of the doctoral Exit Questionnaire packet, available in advance from the Graduate School.

Fee
There is a fee (currently $40.00) for microfilm publication. This fee includes the publication of your abstract in Dissertation Abstracts International. Payment is to be in the form of a certified personal check (your bank will certify your check, usually for a fee), or a bank or postal money order, made payable to University Microfilms International. Before preparing your check or purchase order, confirm the current fee with the Graduate School.

Copyrighting Your Doctoral Dissertation
Since your doctoral dissertation will be published in microfilm form by University Microfilms, it is important to decide whether you want the protection of a copyright. The danger of fraudulent reproduction or improper use of a dissertation is not likely to be very great. Whether or not your dissertation should be copyrighted depends on the nature of the materials and your plans for its future publication or revision. In deciding the matter, the following considerations are pertinent.

Whether or not the dissertation is copyrighted, you retain the right to publish all or any part of your dissertation by any means at any time, except by reproduction from a negative microfilm as described in the Microfilms Agreement Form which you sign. It is important to note that, as the author, you will be unable to obtain copyright for the publication of your dissertation in another form at some later date unless you have obtained copyright at the time of first publication by University Microfilms, or unless the dissertation has been so thoroughly and completely revised as to constitute a new work.

The university does not have a mandatory policy on copyrighting doctoral dissertations. You may, however, take the option to copyright your dissertation by completing the copyright section on the Microfilm Agreement Form. If you decide to copyright, University Microfilms will obtain a copyright for your dissertation in your name. The present fee for this service is $20.00 and includes the $10.00 registration fee imposed by the Copyright Office in Washington, D.C., and the cost of two positive microfilm copies deposited in the Library of Congress. This $20.00 fee may be included with the $40.00 microfilm fee, making a total of $60.00, payable to University Microfilms. The certificate of registration will be mailed to you approximately five months after University Microfilms receives your dissertation.

A copyright page should be placed in your dissertation following the title page. In the center of the page, just above the bottom margin, type the following:

Copyright by
(your full name)
(current year)

Copyrighting your Master’s Thesis
Copyrighting your master’s thesis is optional. However, you may copyright your manuscript independently through the Copyright Office of the Library of Congress, Washington, D.C. 20557 (phone 703-557-8700).

If you decide to copyright your manuscript, a copyright page should be placed in your thesis following the title page. In the center of the page, just above the bottom margin, type the information shown for a doctoral dissertation that is to be copyrighted.

X
Binding your Thesis/Dissertation
After you have filed your original and three copies (original and four copies for Engineering and Basic Health Sciences students) the Graduate School will arrange for binding of the copies in a standardized fashion for distribution to the Thesis Room of the library and to your department library. In the case of Engineering and Basic Health Sciences, a bound copy is retained in each respective dean’s office. The original remains unbound in the Library Archives. Ph.D. students in music composition will submit their compositions already bound. Consult with your graduate program director for special guidelines.

The fee for binding is currently $7.65 per copy. There is a minimum charge of $15.30 ($22.95 for Engineering and Basic Health Sciences students). If your manuscript is over 500 pages it will be bound in two volumes, at the cost of $15.30 for two volumes. Additional personal copies may also be bound at the same rate. Payment for binding all copies is due when official copies are filed with the Graduate School. You must obtain either a certified personal check (your bank will certify your check) or a money order which may be purchased at any bank or post office. Make
Copyright fee (optional, doctoral candidates only) made payable to University Microfilms International; may be combined with above fee.

Binding fee, made payable to West Book-Binding, Inc. (Do not include the original when figuring your binding cost.)

**Thesis/Dissertation**

Original and three copies (original and four copies for Engineering and Basic Health Sciences students) prepared on 16- to 20-pound bond paper with 25 percent rag or cotton content.

The original and each copy in a clasp envelope with a copy of the title page affixed to the front of the envelope. Every page consecutively numbered.

Preliminary pages prepared according to sample pages shown in this guide.

Copyright page (optional, doctoral candidates only) placed directly after title page, unnumbered and uncounted, in the form shown in this manual. Copyright request signed in Microfilm Agreement.

**Microfilming**

Microfilming of the dissertation in composition is not required. Candidates in composition may, at their discretion, choose to have the dissertation submitted to University Microfilms International for microfilming, in which case the general Graduate School guidelines for submitting such dissertations must be followed. Whether or not the dissertation is submitted to University Microfilms, the abstract will be submitted to *Dissertation Abstracts International* with this statement:

This Dissertation is available for consultation at and on inter-library loan from the Music Library at the State University of New York at Stony Brook.

**Physical Specifications of the Score.**

The three unbound copies should be submitted on high-quality, acid-free paper. The copying process must be one that does not result in excessively acidic paper (which browns and deteriorates quickly). For this reason, the diazo process — also known as azoild and blueprint — is not acceptable.

A photoreproduction process such as Xerox is acceptable if done on high-quality acid-free paper. Shaded background, lack of sharp contrast between the print and the background, streaking, or spotting will be cause for rejection of the photoreproduced copy. If you have doubts about the visual clarity of the copies, you should submit a sample of the copy produced by the machine you intend to use to the Graduate School for a judgment. The music librarian is able to supply names of music copying services that use the photoreproduction process. If you are considering any copying process other than photoreproduction, you must receive approval from the music librarian.

All margins — top, bottom, right, left — should measure 1 1/2 inches from the edges. The pages may be trimmed during the binding, so it is important to adhere to these specifications. Sheets punched for spiral binding are not acceptable. For preservation purposes, absolutely no adhesive tapes, glue, or paste should be used anywhere on the score.

For scores accompanied by pre-recorded electronic music, a statement that an electronic tape accompanies the score should appear prominently on the score.

**Specifications of the Electronic Music Tape**

Tape on which the work is recorded should be of archival quality, at least 1.0 mil thick. Cassette tapes are not acceptable. Tapes should be sent to the bindery and bound for deposit in the Music Library. The other
copy remains unbound in the University Archives. You may submit and pay for additional personal copies for binding when you file the official copy.

To determine the cost of binding the dissertation, you must make an appointment to show your official copy to the music librarian, who will ascertain the cost. The current maximum charge for binding the library copy is $28.00. In the rare case that a binding charge is greater than the maximum, the library will pay the additional amount.

Payment for binding all copies is due at the time the official copy is filed at the Graduate School. You should obtain a certified personal check or a money order. The check must be made payable to the bindery, currently Wert Bookbinding, Inc. Verify the name of the current bindery with the Graduate School. The Graduate School will not accept cash or any other form of payment.
Directories
STATE UNIVERSITY OF NEW YORK

General Statement

State University's 64 geographically dispersed campuses bring educational opportunity within commuting distance of virtually all New York citizens and comprise the nation's largest centrally managed system of public higher education.

When founded in 1948, the university consolidated 29 state-operated, but unaffiliated, institutions. In response to need, the university has grown to a point where its impact is felt educationally, culturally, and economically the length and breadth of the state.

More than 370,000 students are pursuing traditional study in classrooms or are working at home, at their own pace, through such innovative institutions as Empire State College, whose students follow individualized and often nontraditional paths to a degree. Of the total enrollment, more than 100,000 students are 24 years or older, reflecting State University's services to specific constituencies, such as refresher courses for the professional community, continuing educational opportunities for returning service personnel, and personal enrichment for more mature persons.

State University's research contributions are helping to solve some of modern society's most urgent problems. It was a State University scientist who first warned the world of potentially harmful mercury deposits in canned fish, and another who made the connection between automobile and industrial exhaust combining to cause changes in weather patterns. Other university researchers continue important studies in such wide-ranging areas as immunology, marine biology, sickle-cell anemia, and organ transplantation.

More than 1,000 public service activities are currently being pursued on State University campuses. Examples of these efforts include special training courses for local government personnel, state civil service personnel, and the unemployed; participation by campus personnel in joint community planning or project work; and campus-community arrangements for community use of campus facilities.

A distinguished faculty includes nationally and internationally recognized figures in all the major disciplines. Their efforts are recognized each year in the form of such prestigious awards as Fulbright-Hayes, Guggenheim, and Danforth Fellowships.

The university offers a wide diversity of what are considered the more conventional career fields, such as business, engineering, medicine, teaching, literature, dairy farming, medical technology, accounting, social work, forestry, and automotive technology. Additionally, its responsiveness to progress in all areas of learning and to tomorrow's developing societal needs has resulted in concentrations which include pollution, urban studies, computer science, immunology, preservation of national resources, and microbiology.

SUNY programs for the educationally and economically disadvantaged have become models for delivering better learning opportunities to a once forgotten segment of society. Educational Opportunity Centers offer high school equivalency and college preparatory courses to provide young people and adults with the opportunity to begin college or to learn marketable skills. In addition, campus-based Educational Opportunity Programs provide counseling, developmental education, and financial aid to disadvantaged students in traditional degree programs.

Overall, at its 34 two-year EOCs, four-year campuses and university and medical centers, the university offers 3,600 academic programs. Degree opportunities range from two-year associate programs to doctoral studies offered at 12 senior campuses.

The 30 two-year community colleges operating under the program of State University play a unique role in the expansion of educational opportunity. They provide local industry with trained technicians in a wide variety of occupational curricula, and offer transfer options to students who wish to go on and earn advanced degrees.

The university passed a major milestone in 1985 when it graduated its one-millionth alumnus. The majority of SUNY graduates pursue careers in communities across the state.

State University is governed by a Board of Trustees, appointed by the Governor, which directly determines the policies to be followed by the 34 state-supported campuses. Community colleges have their own local boards of trustees whose relationship to the SUNY board is defined by law. The state contributes one-third to 40 percent of their operating costs and one-half of their capital costs.

The State University motto is: "To Learn—To Search—To Serve."

Campuses

University Centers

State University of New York at Albany
State University of New York at Binghamton
State University of New York at Buffalo
State University of New York at Stony Brook

Colleges of Arts and Science

State University College at Brockport
State University College at Buffalo
State University College at Cortland
State University of New York Empire State College
State University College at Fredonia
State University College at Geneseo
State University College at New Paltz
State University College at Old Westbury
State University College at Oneonta
State University College at Oswego
State University College at Plattsburgh
State University College at Potsdam
State University College at Purchase

Colleges and Centers for the Health Sciences

State University of New York Health Science Center at Brooklyn
State University of New York Health Science Center at Syracuse
State University of New York College of Optometry at New York City
State University of New York (Health Sciences Center at Buffalo University Center)*
State University of New York (Health Sciences Center at Stony Brook University Center)*

Colleges of Technology

State University of New York College of Technology at Alfred
State University of New York College of Technology at Canton
State University of New York College of Agriculture and Technology at Cobleskill
State University of New York College of Technology at Delhi
State University of New York College of Technology at Farmingdale
State University of New York College of Agricultural and Technology at Morrisville
State University of New York College of Technology at Utica/Rome** (Upper-division and master's programs)
(Fashion Institute of Technology at New York City)***

* The Health Sciences Centers at Buffalo and Stony Brook are operated under the administration of their respective University Centers.
** This is an upper-division institution authorized to offer baccalaureate and master's degree programs.
*** While authorized to offer such baccalaureate and master's degree programs as may be approved pursuant to the provisions of the Master Plan in addition to the associate degree, the Fashion Institute of Technology is financed and administered in the manner provided for community colleges.
Specialized Colleges
State University of New York College of Environmental Science and Forestry at Syracuse
State University of New York Maritime College at Fort Schuyler

Statutory Colleges***
New York State College of Agriculture and Life Sciences at Cornell University
New York State College of Ceramics at Alfred University
New York State College of Human Ecology at Cornell University
New York State School of Industrial and Labor Relations at Cornell University
New York State College of Veterinary Medicine at Cornell University

Community Colleges
(Loosly sponsored two-year colleges under the program of State University)
Adirondack Community College at Glens Falls
Broome Community College at Binghamton
Cayuga County Community College at Auburn
Clinton Community College at Plattsburgh
Columbia-Greene Community College at Hudson
Community College of the Finger Lakes at Canandaigua
Corning Community College at Corning
Dutchess Community College at Poughkeepsie
Erie Community College at Williamsville, Buffalo, and Orchard Park
Fashion Institute of Technology at New York City
Fulton-Montgomery Community College at Johnstown
Genesee Community College at Batavia
Herkimer County Community College at Herkimer
Hudson Valley Community College at Troy
Jamestown Community College at Jamestown
Jefferson Community College at Watertown
Mohawk Valley Community College at Utica
Monroe Community College at Rochester
Nassau Community College at Garden City
Niagara County Community College at Sanborn
North Country Community College at Saranac Lake
Onondaga Community College at Syracuse
Orange County Community College at Middletown
Rockland Community College at Suffern
Schenectady County Community College at Schenectady
Suffolk County Community College at Selden, Riverhead, and Brentwood
Sullivan County Community College at Loch Sheldrake
Tompkins Cortland Community College at Dryden
Ulster County Community College at Stone Ridge
Westchester Community College at Valhalla

Board of Trustees
Donald M. Blinken, B.A., Chairperson . . . . New York City
Judith Davidson Moyers, B.S., Vice Chairperson Garden City
George L. Collins, Jr., M.D. ................. Eden
D. Clinton Dominick, A.B., LL.B. ......... Newburgh
Francisco Duarte, Jr., M.D. .............. Albany
Judith Lasher Duken, B.S., M.S., and C.A.S. . . . . Plattsburgh
Arnold B. Gardner, A.B., LL.B.......... Buffalo
Gurston D. Goldin, A.B., M.S., M.D. New York City
John L.S. Holoman, Jr., B.S., M.D. East Elmhurst
Nan Johnson, B.A., M.A. .............. Rochester
Victor Marrero, B.A., LL.B. .......... New York City
Edward V. Mele, B.A. ............. Barne veil
Edgar A. Sandman, A.B., J.D. . . . . . . . . . Albany
Darwin R. Wales, B.A., LL.B. . . . . . Binghamton
Bruce R. Johnstone, Ph.D.,
Chancellor of the University
Jerome B. Komisar, Ph.D.,
Executive Vice Chancellor
Joseph C. Burke, Ph.D.,
Provost
Harry K. Spindler, M.P.A.,
Senior Vice Chancellor
Sanford H. Levine, J.D.,
University Counsel and Vice Chancellor for Legal Affairs
Martha J. Downey, M.A.,
Secretary of the University

STATE UNIVERSITY OF NEW YORK
AT STONY BROOK

Members of the Council
Subject to the powers of State University trustees defined by law, the operations and affairs of the State University at Stony Brook are supervised locally by a ten-member Council. Nine are appointed by the Governor; the tenth, a student member with all the rights and responsibilities of the other members, is elected by the student body. All positions are listed correct as of July 1, 1988.

Andrew E. Ullmann
Chairperson
Cold Spring Harbor

Jeffrey A. Altman
Manhattan

Aaron B. Donner
Bay Shore

Joel H. Girsky
Dix Hills

James L. LaRocca
Huntington

Greta M. Rainsford
Hempstead

Jeffrey A. Sachs
Hewlett

Ena D. Townsend
Central Islip

Eliana Villar
Woodbury

* The Health Sciences Centers at Buffalo and Stony Brook are operated under
the administration of their respective University Centers.
** This is an upper-division institution authorized to offer baccalaureate and
master's degree programs.
*** While authorized to offer such baccalaureate and master's degree programs
as may be approved pursuant to the provisions of the Master Plan in addition
to the associate degree, the Fashion Institute of Technology is financed and
administered in the manner provided for community colleges.
**** These operate as "contract colleges" on the campuses of independent
universities.
Officers of Administration

All positions are correct as of June 1988.

John H. Marburger, Ph.D.
President

Jerry R. Schubel, Ph.D.
Provost

Emile Adams, B.A.
Associate Vice President for Student Affairs

Tuncay Aydinalp, M.S.C.E.
Assistant Vice President for Physical Facilities

Stan Altman, Ph.D.
Deputy to the President

Dallas Bauman, Ph.D.
Assistant Vice President for Residence Life

Malcolm Bowman, Ph.D.
Acting Dean and Director, Marine Sciences Research Center

Richard Brown, B.A., C.P.A.
Acting Vice President for Campus Finance and Management

Paul W. Chase, M.A.
Assistant Vice President for Enrollment Management Services

Denise Coleman, M.A.
Associate Vice President for University Affairs

Ronald G. Douglas, Ph.D.
Dean, Physical Sciences and Mathematics

Paul J. Edelson, Ph.D.
Dean, School of Continuing Education

Daniel H. Forbush, B.A.
Associate Vice President for University Affairs

Daniel M. Fox, Ph.D.
Assistant Vice President for Health Sciences (Academic Affairs)

David Glass, Ph.D.
Special Advisor to the Provost

Karol K. Gray, B.A.
Acting Assistant Vice President for Campus Finance and Management, Acting Controller

Carl E. Hanes, Jr., B.S.C.
Deputy to the President

Stewart Harris, Ph.D.
Dean, College of Engineering and Applied Sciences

Don Ihde, Ph.D.
Dean, Humanities and Fine Arts

Aldona Jonaitis, Ph.D.
Vice Provost for Undergraduate Studies

E. Ann Kaplan, Ph.D.
Director, Humanities Institute

Alex H. King, D.Phil.,
Associate Vice Provost for Graduate Studies

Richard Koehn, Ph.D.
Dean, Biological Sciences

Jurgen Krause, B.A.
Assistant Vice President for Human Resources

Paul Madonna, D.Ed.
Assistant Vice President for Campus Finance and Management

Daniel Melucci, M.S., C.P.A.
Assistant Vice President for Campus Finance and Management, Budget Director

Marion E.T. Metivier, B.A.
Special Assistant to the President for Affirmative Action

Joan Moos, Ph.D.
Associate Vice Provost for Undergraduate Studies

Lynn King Morris, Ph.D.
Director, Foreign Student Affairs

Frank Myers, Ph.D.
Dean, International Programs

D. Terence Netter, M.A., L.S.T., M.F.A.
Director, Fine Arts Center

Egon Neuberger, Ph.D.
Dean, Social and Behavioral Sciences

William T. Newell, Jr., M.B.A.
Executive Director, University Hospital

J. Howard Oaks, D.M.D.
Vice President for Health Sciences

Lester G. Paldy, M.S.
Director, Center for Science, Mathematics, and Technology Education

Frederick R. Preston, Ed.D.
Vice President for Student Affairs

John Reeves, D.Ed.
Director, Division of Physical Education and Athletics

Shelia Reilly, M.A.
Assistant Vice President for Health Sciences

Robert F. Schneider, Ph.D.
Associate Vice Provost for Research and Acting Vice Provost for Computing and Communications

John Brewster Smith, M.S.
Dean, Library Services and Director of Libraries

Susan Squier, Ph.D.
Associate Provost

Samuel Taube, Ph.D.
Assistant Vice President for Student Affairs

Patricia J. Teed, Ph.D.
Vice President for University Affairs
Benjamin Walcott, Ph.D.
Associate Provost

Richard Wueste, J.D.
Assistant Vice President for Institutional Services

Gerrit Wolf, Ph.D.
Dean W. Averell Harriman School for Management and Policy

**Office of Research Administration**
Barbara L. Harris, B.S.
Associate for Sponsored Programs

Francis P. Hession, B.S.
Manager for Advanced Technology

Katherine L. MacCormack, M.S.W.
Associate for Sponsored Programs

Judy F. Matuk, M.S.
Staff Officer for University Assurances

Marie Murphy, M.P.A.
Associate for Sponsored Programs

Kathryn S. Rockett, M.B.A.
Assistant Vice Provost for Research

Peter M. Saal, M.S./L.S.
Assistant for Sponsored Research Information

Robert F. Schneider, Ph.D.
Associate Vice Provost for Research

**The Graduate School**

*Professional Staff*

Robert L. Lichter, Ph.D.
Vice Provost for Research and Graduate Studies

Alexander H. King, D.Phil.
Associate Vice Provost

Myrna C. Adams, M.A., J.D.
Assistant Vice Provost (Student recruitment, minority affairs, student support services)

D. Ann Carvalho, M.A.
Assistant Vice Provost (Admissions and records)

Wendy Katkin, Ph.D.
Assistant Vice Provost (Fellowship and Awards)

Phyllis A. Reed, M.A.
Assistant to the Provost (Degree completion, theses and dissertations)

**Office Staff**

Eugene Reierson, Office Manager
Sheila Levine, Secretary
Miriam Caulfield, Secretary
Debbie Kloppenburg, Secretary
Included in the index are the official degree programs that are registered with the New York State Department of Education, the degrees offered, and the HEGIS registration numbers. Enrollment in other than registered approved programs may jeopardize a student's eligibility for certain student aid awards.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic dishonesty</td>
<td>12</td>
</tr>
<tr>
<td>Academic Probation</td>
<td>11</td>
</tr>
<tr>
<td>Academic Regulations and Procedures</td>
<td>8</td>
</tr>
<tr>
<td>Administration</td>
<td>154</td>
</tr>
<tr>
<td>Advancement to Candidacy</td>
<td>10</td>
</tr>
<tr>
<td>Anatomical Sciences</td>
<td>131</td>
</tr>
<tr>
<td>Anthropology, HEGIS 2202, M.A., Ph.D.</td>
<td>78</td>
</tr>
<tr>
<td>Applied Anthropology</td>
<td>78</td>
</tr>
<tr>
<td>Applied Linguistics, HEGIS 1505, M.A.</td>
<td>87</td>
</tr>
<tr>
<td>Applied Mathematics and Statistics, HEGIS 1799, M.S., Ph.D.</td>
<td>100</td>
</tr>
<tr>
<td>Art Criticism, HEGIS 1003, M.A.</td>
<td>32</td>
</tr>
<tr>
<td>Art, Studio, HEGIS 1002, M.F.A.</td>
<td>32</td>
</tr>
<tr>
<td>Astronomy</td>
<td>167</td>
</tr>
<tr>
<td>Award of Degree</td>
<td>18</td>
</tr>
<tr>
<td>Basic Health Sciences, HEGIS 1201, M.S., Ph.D.</td>
<td>130</td>
</tr>
<tr>
<td>Binding Theses and Dissertations</td>
<td>148</td>
</tr>
<tr>
<td>Biological Sciences M.A. Program</td>
<td>30</td>
</tr>
<tr>
<td>Biological Sciences, Division of</td>
<td>20</td>
</tr>
<tr>
<td>Biological Sciences, HEGIS 0401, M.A., Ph.D.</td>
<td>20</td>
</tr>
<tr>
<td>Board of Trustees</td>
<td>153</td>
</tr>
<tr>
<td>Candidacy</td>
<td>10</td>
</tr>
<tr>
<td>Career Development</td>
<td>6</td>
</tr>
<tr>
<td>CED</td>
<td>11</td>
</tr>
<tr>
<td>Cell Biology</td>
<td>21</td>
</tr>
<tr>
<td>Cellular and Developmental Biology</td>
<td>21</td>
</tr>
<tr>
<td>Chemical Biology</td>
<td>64</td>
</tr>
<tr>
<td>Chemical Physics</td>
<td>64</td>
</tr>
<tr>
<td>Chemistry, HEGIS 1905, M.S., Ph.D.</td>
<td>64</td>
</tr>
<tr>
<td>Child Care</td>
<td>7</td>
</tr>
<tr>
<td>Coastal Oceanography, HEGIS 1819, Ph.D.</td>
<td>123</td>
</tr>
<tr>
<td>College of Arts and Sciences</td>
<td>19</td>
</tr>
<tr>
<td>Comparative Literature</td>
<td>35-36</td>
</tr>
<tr>
<td>Computer Science, HEGIS 0701, M.S., Ph.D.</td>
<td>104</td>
</tr>
<tr>
<td>Conduct</td>
<td>11</td>
</tr>
<tr>
<td>Copyrighted Material in Theses and Dissertations</td>
<td>147</td>
</tr>
<tr>
<td>Copyrighting Theses and Dissertations</td>
<td>148</td>
</tr>
<tr>
<td>Council</td>
<td>153</td>
</tr>
<tr>
<td>Counseling</td>
<td>7</td>
</tr>
<tr>
<td>Course Changes</td>
<td>9</td>
</tr>
<tr>
<td>Dates and Procedures</td>
<td>142</td>
</tr>
<tr>
<td>Degree Requirements</td>
<td>14</td>
</tr>
<tr>
<td>Demontrations</td>
<td>12</td>
</tr>
<tr>
<td>Departments</td>
<td>9</td>
</tr>
<tr>
<td>Directories</td>
<td>151</td>
</tr>
<tr>
<td>Disabled Students</td>
<td>7</td>
</tr>
<tr>
<td>Dishonesty</td>
<td>12</td>
</tr>
<tr>
<td>Dissertation</td>
<td>142</td>
</tr>
<tr>
<td>Doctor of Arts in Foreign Language Instruction</td>
<td>16</td>
</tr>
<tr>
<td>Doctor of Musical Arts</td>
<td>17-18</td>
</tr>
<tr>
<td>Doctor of Philosophy</td>
<td>15</td>
</tr>
<tr>
<td>Dramaturgy, HEGIS 1007, M.F.A.</td>
<td>60</td>
</tr>
<tr>
<td>Earth and Space Sciences, HEGIS 1999, M.S., Ph.D.</td>
<td>67</td>
</tr>
<tr>
<td>Ecology and Evolution</td>
<td>23</td>
</tr>
<tr>
<td>Economics, HEGIS 2204, M.A., Ph.D.</td>
<td>81</td>
</tr>
<tr>
<td>Educational Records</td>
<td>12</td>
</tr>
<tr>
<td>Electrical Engineering, HEGIS 0909, M.S., Ph.D.</td>
<td>108</td>
</tr>
<tr>
<td>Engineering and Applied Science, College of</td>
<td>99</td>
</tr>
<tr>
<td>English as a Second Language</td>
<td>7</td>
</tr>
<tr>
<td>English, HEGIS 1501, M.A., Ph.D.</td>
<td>37</td>
</tr>
<tr>
<td>Foreign Language Instruction, HEGIS 1101, D.A.16, 42-45</td>
<td></td>
</tr>
<tr>
<td>Foreign Student Affairs</td>
<td>7</td>
</tr>
<tr>
<td>Formats for Theses and Dissertations</td>
<td>146</td>
</tr>
<tr>
<td>French</td>
<td>41</td>
</tr>
<tr>
<td>General Information</td>
<td>5</td>
</tr>
<tr>
<td>Genetics</td>
<td>25</td>
</tr>
<tr>
<td>Geological Sciences</td>
<td>67</td>
</tr>
<tr>
<td>German</td>
<td>45</td>
</tr>
<tr>
<td>Germanic Languages and Literatures, HEGIS 1103, M.A.</td>
<td>49</td>
</tr>
<tr>
<td>Grade Changes</td>
<td>11</td>
</tr>
<tr>
<td>Grading System</td>
<td>11</td>
</tr>
<tr>
<td>Graduate Council</td>
<td>9</td>
</tr>
<tr>
<td>Graduate Student Organization</td>
<td>6</td>
</tr>
<tr>
<td>Greivances</td>
<td>12</td>
</tr>
<tr>
<td>Guide to the Preparation of Theses and Dissertations</td>
<td>142</td>
</tr>
<tr>
<td>Gymnasium</td>
<td>6</td>
</tr>
<tr>
<td>Harriman School for Management and Policy</td>
<td>126</td>
</tr>
<tr>
<td>Health Sciences Center</td>
<td>130</td>
</tr>
<tr>
<td>Health Services</td>
<td>7</td>
</tr>
<tr>
<td>Hispanic Languages and Literatures, HEGIS 1105, M.S., Ph.D.</td>
<td>49</td>
</tr>
<tr>
<td>History, HEGIS 2205, M.A., Ph.D.</td>
<td>84</td>
</tr>
<tr>
<td>Humanities and Fine Arts, Division of</td>
<td>31</td>
</tr>
<tr>
<td>Intensive English Center</td>
<td>6</td>
</tr>
<tr>
<td>Italian</td>
<td>41</td>
</tr>
<tr>
<td>Leave of Absence</td>
<td>9</td>
</tr>
<tr>
<td>Liberal Studies, HEGIS 4901, M.A.</td>
<td>15</td>
</tr>
<tr>
<td>Libraries</td>
<td>6</td>
</tr>
<tr>
<td>Linguistics</td>
<td>87</td>
</tr>
<tr>
<td>Majors</td>
<td>12</td>
</tr>
<tr>
<td>Marine Environmental Sciences, HEGIS 0418, M.S.</td>
<td>123</td>
</tr>
<tr>
<td>Marine Sciences Research Center</td>
<td>122</td>
</tr>
<tr>
<td>Master of Arts</td>
<td>15</td>
</tr>
<tr>
<td>Master of Arts in Liberal Studies</td>
<td>15</td>
</tr>
<tr>
<td>Master of Fine Arts</td>
<td>15</td>
</tr>
<tr>
<td>Master of Music</td>
<td>15</td>
</tr>
<tr>
<td>Master of Science</td>
<td>15</td>
</tr>
<tr>
<td>Materials Science and Engineering, HEGIS 0915, M.S., Ph.D.</td>
<td>112</td>
</tr>
<tr>
<td>Mathematics 7-12, HEGIS 1701, B.S./M.A., M.A.</td>
<td>72</td>
</tr>
<tr>
<td>Mathematics, HEGIS 1701, M.A., Ph.D.</td>
<td>72</td>
</tr>
<tr>
<td>Matriculation</td>
<td>9</td>
</tr>
<tr>
<td>Mechanical Engineering, HEGIS 0910, M.S., Ph.D.</td>
<td>115</td>
</tr>
<tr>
<td>Microfilming Theses and Dissertations</td>
<td>148</td>
</tr>
<tr>
<td>Molecular Biology and Biochemistry</td>
<td>26</td>
</tr>
<tr>
<td>Molecular Microbiology</td>
<td>133</td>
</tr>
<tr>
<td>Music Composition</td>
<td>52</td>
</tr>
<tr>
<td>Music History</td>
<td>52</td>
</tr>
<tr>
<td>Music Performance, HEGIS 1004, M.M., Ph.D.</td>
<td>53</td>
</tr>
<tr>
<td>Music Theory</td>
<td>52</td>
</tr>
<tr>
<td>Music, HEGIS 1005, M.A., Ph.D.</td>
<td>52</td>
</tr>
<tr>
<td>Neuropsychology and Behavior</td>
<td>28</td>
</tr>
<tr>
<td>Non-Matriculated Status</td>
<td>11</td>
</tr>
<tr>
<td>Oral Biology and Pathology</td>
<td>135</td>
</tr>
<tr>
<td>Organization of Graduate Education</td>
<td>9</td>
</tr>
<tr>
<td>Parts of Theses and Dissertations</td>
<td>142</td>
</tr>
<tr>
<td>Pathology</td>
<td>137</td>
</tr>
<tr>
<td>Pharmacological Sciences</td>
<td>139</td>
</tr>
<tr>
<td>Philosophical Perspectives</td>
<td>57</td>
</tr>
<tr>
<td>Philosophy, HEGIS 1509, M.A., Ph.D.</td>
<td>57</td>
</tr>
<tr>
<td>Physical Sciences and Mathematics, Division of</td>
<td>63</td>
</tr>
<tr>
<td>Physical Specifications of Theses and Dissertations</td>
<td>145</td>
</tr>
<tr>
<td>Physics, HEGIS 1902, M.A., Ph.D.</td>
<td>74</td>
</tr>
<tr>
<td>Physiology and Biophysics</td>
<td>141</td>
</tr>
<tr>
<td>Planned Assembly and Demonstration</td>
<td>12</td>
</tr>
<tr>
<td>Political Science, HEGIS 2207, M.A., Ph.D.</td>
<td>89</td>
</tr>
</tbody>
</table>
Printing Methods for Theses and Dissertations .......................... 144
Probation ............................................................................. 11
Psychology, HEGIS 2001, M.A., Ph.D. ................................. 93
Public Order ......................................................................... 12
Records ................................................................................ 12
Registration .......................................................................... 9
Religious Absences, M.A. ...................................................... 12
Research Off Campus ............................................................. 10
Romance Languages and Literatures, HEGIS 1101, M.A....... 41
Russian ............................................................................... 46
School of Continuing Education .............................................. 11
Slavic Languages and Literatures ............................................ 45
Social and Behavioral Sciences, Division of ......................... 77
Sociology, HEGIS 2208, M.A., Ph.D. ..................................... 96
Spanish ............................................................................... 49
State University of New York .................................................. 152
Stony Brook Union ............................................................... 6
Student Services .................................................................... 6
Summer Institute in American Living ..................................... 6
SUNY Exchange Program ..................................................... 10
Teaching English to Speakers of Other Languages, HEGIS 1508 87
Technological Systems Management, HEGIS 4904, M.S. .... 119
Technology and Society .......................................................... 119
Theatre, HEGIS 1007, M.A. .................................................... 60
Thesis .................................................................................. 142
Thesis and Dissertation Checklist ........................................... 149
Transcripts ........................................................................... 12
Transfer of Credit .................................................................. 10
Union ................................................................................... 6
Urban and Policy Sciences, HEGIS 2214, M.S. ...................... 126
Veterans ............................................................................... 7
Waiver of Regulations .......................................................... 18
Withdrawal ............................................................................ 10