Routing #30 79-80

Resolution #29
1979-1980

Res: Proposed Revisions to the Major in Chemistry

TO: PRESIDENT ALBERT W. BROWN

FROM: THE FACULTY SENATE Meeting on 4/14/80 (Date)

RE: X I. Formal Resolution (Act of Determination)
___ II. Recommendation (Urging the fitness of)
___ III. Other (Notice, Request, Report, etc.)

SUBJECT:
Proposed Revision to the Major in Chemistry

(see attached)

Signed Robert G. Kemperling (m.p.a.) Date Sent 4/15/80
(For the Senate)
Robert G. Kemperling, President, Faculty Senate

. . . . . .

TO: THE FACULTY SENATE

FROM: PRESIDENT ALBERT W. BROWN

RE: I. DECISION AND ACTION TAKEN ON FORMAL RESOLUTION

a. Accepted. Effective Date 4-17-82

b. Deferred for discussion with the Faculty Senate on ___

c. Unacceptable for the reasons contained in the attached explanation

II., III. a. Received and acknowledged

b. Comment:

DISTRIBUTION: Vice Presidents: Douglas

Others as identified:

Distribution Date: 4/17/80

Signed: Albert W. Brown
(President of the College)

Date Received by the Senate: ___

Proposed Revision to the Major in Chemistry

These changes were adopted by a majority vote in Chemistry Department Staff meeting February 26, 1980.

Submitted for review by the Dean, Faculty of Natural and Mathematical Sciences on March 6, 1980.

J. Emory Morris
Acting Chairman
Chemistry Department

X Approved ____ Disapproved

Derek L. Hill
Dean, Faculty of
Natural and Mathematical
Sciences

The Chemistry Department at Brockport offers students who wish to major in chemistry three options:

1. The major in chemistry

This program provides fundamental grounding in general and inorganic chemistry, analytical chemistry, organic chemistry, and physical chemistry. This program has required 30 credits in chemistry since chemistry majors were first offered at Brockport. It is appropriate for students with a variety of career goals including government service, business, primary or secondary school teaching, pre-medicine/pre-dentistry and all the broad range of career paths open to liberal arts graduates.

2. The major in chemistry with American Chemical Society Certification

This program provides a more thorough course of study in the broad range of chemical science and aims to meet the needs of students intending to pursue a professional career as a practicing chemist (either by direct entry into a technical position at the bachelor's level or after graduate study in chemistry or the closely related sciences.) The Chemistry faculty is governed in this second track by the guidelines of the American Chemical Society Committee on Professional Training (ACS-CPT); this Committee functions as an accrediting agency for undergraduate chemistry programs and maintains a listing of approved undergraduate chemistry programs. Brockport has been on this list since 1972; we are subject to re-evaluation by the Committee by annual report and by self-study at 5 year intervals. Brockport certifies to the Committee those of our graduates who complete a program which the Brockport faculty has designed to meet the objectives of the guidelines of the ACS-CPT. These Certified graduates are immediately eligible for full membership in the American Chemical Society. Non-certified graduates may become Associate Members, and, after 3 years' experience in chemistry, may become Full Members. Certified graduates are much more readily hired in technical jobs and are much better prepared for graduate work in chemistry.

The ACS-CPT requires that schools on the approved list offer students the opportunity to become certified graduates; we are not obligated, however, to require all graduates to do so. Some college and university chemistry departments have elected to offer only an ACS certifying major, but we continue to believe that Brockport students are best served by having two options.

3. In addition, the chemistry faculty has described a Biochemistry track; this is a formal advisement description of our judgment as to the program suited to the student whose interests are chemical and whose goals are biochemistry, pharmacology, toxicology and/or related biochemical specialties. Brockport students also regularly prepare themselves to work in these areas by completing double majors in Chemistry and Biology (approximately 30 credits in each). The Biochemistry track is a chemistry major with explicit advisement on electives. With appropriate choices a student on the biochemistry track can become an ACS Certified graduate. Until very late in her/his student career a student on the Biochemistry track can readily opt to complete both chemistry and biology majors or easily turn away from biochemistry to either "straight chemistry" or "straight biology".

The Changes Proposed for the Major in Chemistry

1. To require a 1 credit course in Chemical Safety.
2. To require a 1 credit (2 semesters of participation) in Chemistry Seminar.
3. To require three credits of elective instead of two. To accommodate students with double majors, an appropriate advanced course in another area of science or mathematics may be substituted by petition.
4. To revise CHM 205-206 to include more descriptive chemistry and to change its name to College Chemistry I, II.

The Rationale

1. Safety requirement: Heightened consciousness of safe practice and of hazards associated with use of chemicals and with chemical experimentation is incumbent on all persons so employed (while they are students and on the job). The following paragraph is reproduced from the most recent (1978) revision of the Committee on Professional Training's Guidelines. It reinforces our judgment that a formal course in Chemical Safety is a necessary part of our undergraduate chemical programs.

"There should be strong emphasis upon instruction in chemical safety, maintenance of safety devices, and observation of standard safety practices in the laboratory, including the regulations of the U.S. Occupational Safety and Health Administration. Special facilities should be available for the handling, storage and disposal of hazardous chemicals. The toxicity of some of the more common chemicals (e.g., CCl_4 and benzene) is a special problem warranting specific and systematic instruction of both teaching assistants and students. Eye protection for everyone engaged in laboratory work should be required. Experiments that risk fire, explosions, or exposure to toxic materials should not be allowed without special planning for protection from those hazards. Showers and eye baths should be provided in all laboratories where any hazardous chemical may be used."

2. Seminar requirement: See attached yellow sheet for a rationale and a description of this revised course.

3. From the beginning (1966) of a chemistry major at Brockport, three credits of elective were required. In 1977 the required course, CHM 303. Quantitative Analysis, was changed to 4 credits to provide a course more suited to the needs of our students. In order to keep to 30 credits for the major we sacrificed one credit of elective. Since we believe some additional work (beyond the survey course in each of the divisions of chemistry) is necessary we are unwilling to abandon a requirement for elective credit. Since, with the added requirements of Chemical Safety and Chemistry Seminar we are forced to exceed 30 credits to provide an elective, we have decided to reinstitute the elective requirement of 3 credits. (Students have a variety of options for fulfilling this elective requirement, chosen from 1, 2, 3 or 4 credit courses, and including those required in the ACS Certification program.)

4. The swinging pendulum in chemical education now favors inclusion of more descriptive inorganic chemistry in the curriculum. We have rejected designing a new course and adding yet another requirement, but we are in agreement that more descriptive chemistry is needed. CHM 205-206 seems the appropriate place to include it. The change of name to College Chemistry seems an appropriate title and gives this first chemistry course for science majors a name similar to that of the first course in physics for science majors (PHS 201-202. College Physics.)

Changes Proposed for the ACS Certification Program

1. The newly required courses for the major in chemistry are added; namely, Chemical Safety and Chemistry Seminar I, II.

2. The requirement of Inorganic Chemistry is replaced by the option of choosing either Inorganic Chemistry or Biochemistry.

3. One additional credit in a chemistry laboratory course is required, but choice of which laboratories is expanded.

4. The range of options for electives is expanded by accepting an appropriate course from any other natural and mathematical science.

The Rationale

1. The chemistry major remains the core of the ACS certified program and the proposed changes there are clearly appropriate for students intending to become practicing chemists.

2. Previously the ACS-CPT guidelines required Inorganic Chemistry. With the 1978 revision to the guidelines ACS-CPT now accepts either Biochemistry or Inorganic Chemistry. We favor providing flexibility where ever possible.

3. The guidelines call for at least 500 hours of laboratory instruction, of which at least 425 must be "structured" (i.e., course) laboratories. With the Brockport 14 week calendar and the suspension of classes for Jewish Religious Holidays we have not been able to provide 500 hours with the existing requirements. More importantly we believe our students need additional structured laboratory experience. The new laboratory requirement increases by one credit the number of hours of laboratory work required. A student completing this program would then have approximately 530 to 550 clock hours of laboratory work (according to the class schedule). The requirement is stated so that students have to achieve some breadth in advanced laboratory work but also have some choice among the advanced laboratory courses available to them.

Changes Proposed for the Biochemistry Track

No changes are proposed except that Chemical Safety and Chemistry Seminar will be required as for all chemistry majors. The new elective requirement for the chemistry major is already exceeded in the biochemistry track.

A comparison of the present requirements and proposed revised requirements appears on the accompanying pink sheet.

Effective Date

The new requirements will be effective for all students entering Brockport on or after September 1, 1980.

3.	Completion of CHM 414. Instrumental Analysis	3 cr	
	CHM 416. Instrumental Analysis Laboratory	1 cr	
4.	Completion of CHM 431. Inorganic Chemistry (now includes Laboratory)	4 cr	

5. Completion of six semester hours of upper level chemistry electives in addition to the above courses. The combination of PHS 310 and PHS 311, or an advanced course in mathematics or physics for which calculus is a pre-requisite may be substituted for one Chemistry elective.

It is strongly recommended that the student also develop a reading knowledge of scientific German or Russian.

4. Completion of CHM 414. Instrumental Ana
CHM 416. Inst. Anal. Lab.

5. Completion of CHM 431. Inorganic Chemistry 3c
(now lecture only)
or of CHM 421. Biochemistry 4 c

6. Completion of six semester hours of electives chosen from CHM 399, 413, 415, 421, 422, 424, 431, 432, 442, 443, 451 and 499. Three credit of elective may be satisfied by an advanced course in mathematics or physics for which calculus is a pre-requisite, or, by petition to t Chemistry Department, a relevant upper divisio course in another of the Natural and Mathemati Sciences.

It is strongly recommended that the student al develop a reading knowledge of scientific Germ or Russian and proficiency in computer programming with either BASIC or FORTRAN.

III. Biochemistry Track

The only change is the additional requirement o the two courses Chemical Safety and Chemistry Seminar.

Proposed Revision to the Major in Chemistry

February, 1980

Present Requirements

The Major in Chemistry

CHM 205-206	Prin. Chem. I, II	8 cr
CHM 303	Analytical Chem.	4 cr
CHM 305-306	Organic Chem. I, II	8 cr
CHM 405-406	Phys. Chem. I, II	6 cr
CHM 408-409	Phys. Chem. Lab I, II	2 cr
	Elective(s) [Upper level Chemistry courses]	2 cr
		30 cr

MTH 201-202-203	Calculus I, II, III	9 cr
*PHS 201-202	College Physics I, II	8 cr
	OR	
*PHS 111-112	General Physics I, II	6 cr
		15-17 cr

*PHS 201-202 are strongly recommended in preference to PHS 111-112.

Proposed Revision

CHM 205-206	College Chemistry I, II	8 cr
CHM 301	Chemical Safety	1 cr
CHM 303	Quantitative Analysis	4 cr
CHM 305-306	Organic Chemistry I, II	8 cr
CHM 400-401	Chemistry Seminar I, II	1 cr
CHM 405-406	Physical Chemistry I, II	6 cr
CHM 408-409	Physical Chem. Lab I, II	2 cr
	*Elective(s)	3 cr
		33 cr

MTH 201-202-203	Calculus I, II, III	9 cr
PHS 201-202	College Physics I, II	8 cr
		17 cr

*3 credits of electives from CHM 341, CHM 342, CHM 343, CHM 399 and the 400 level in chemistry. Students completing two majors may, by petition to th Chemistry Department, substitute a relevant upper division course in another natural or mathematical science for 3 credits of chemistry elective.

II. ACS Certification Program

1. Completion of the required courses of the chemistry major
2. Completion of CHM 341. Advanced Organic Chem. Lab 1 cr

1. Completion of the required courses of the chemistry major
2. Completion of CHM 341. Advanced Organic Chem. Lab I 1 c
3. Completion of 2 credits of advanced laboratory courses chosen from
   - CHM 342. Advanced Organic Chem. Lab II 1 c
   - CHM 424. Biochemistry Laboratory 1 c
   - CHM 432. Inorganic Chemistry Laboratory 1 c
   - [CHM 343. Identification of Organic Compounds in Mixtures 1 c may be substituted for CHM 343.]

   Total Advanced Laboratory required here 2 c

Rationale: One of the significant shortcomings of our program is that our students have not been required to (nor forcefully suggested to) have any experience, much less become proficient, in oral presentation of technical, chemical topics (but some of our advanced elective courses do have oral presentation requirements). Employers regularly and publicly lament the lack of oral communication skills in the baccalaureate candidates they have to consider. Our students also seldom have the opportunity/need to venture into uncharted, technical areas (uncharted in the sense of not part of current course work); i.e., their listening and integrative skills may not be adequately challenged. Chemistry Seminar can provide some opportunities for these types of learning activities.

Chemistry Seminar should at least

1. provide explicit information on getting a job, such as resume preparation, job hunting, interview techniques
2. present outside speakers discussing research topics
3. present students giving literature-based technical reports
4. provide Brockport students who have been conducting research an optional forum to present their results (including practice presentations for ACS-Undergraduate Research Symposium papers).

If we have 10 to 15 seniors per year, all of these things cannot be accomplished in 12-14 weeks as we have been attempting to do.

CHM 400. Chemistry Seminar I.
Prerequisite: Majors or minors in chemistry; junior or senior standing

Preparation of a resume and other job seeking skills; current topics of interest in chemistry; preparation and delivery of an oral presentation of a current topic; evaluation of other oral presentations.
0 semester hours credit.

CHM 401. Chemistry Seminar II.
Prerequisite: CHM 400

Continuation of CHM 400. The seminar series runs throughout the year. Students are required to participate in both semesters; most student presentations will be scheduled in the second semester.
1 semester hour credit.

A typical organization for the revised Chemistry Seminar follows:

CHM 400:
Week 1. Organization; requirements
2. Brockport Faculty: topic
3.–4. Job seeking subjects
5. Brockport Faculty: topic
6-10 . Visitor: topic
11-13 . Student: topic
14. Visitor: topic

CHM 401:
Week 1-10. Student/Visitor: topic
11,12. Practice presentations ACS Undergraduate Research Symposium
13,14. Student/Visitor: topic

It is to be expected that 6 to 10 visitors and 10 to 15 students will present seminars. Brockport Faculty may substitute for visitors and each student is expected to make one 30 to 45 minute presentation based either on literature or on literature plus her/his own research results. Students registered for independent study (research) but not registered for seminar will be encouraged but not required to attend seminar regularly.

Required student products:
1. a suitable resume; a list of potential employers with addresses; a letter of inquiry for employment; practice, mock interviews with faculty will be optional
2. For all topics as a listener: One page written summary of main points and critique of presentation for organization, clarity, style, slides, and overall success in communication.
3. For all topics as a speaker: A typed report on the topic presented (normally approximately equivalent to a script) with an appropriate bibliography. An appropriate abstract must be submitted two weeks before speaking date.