

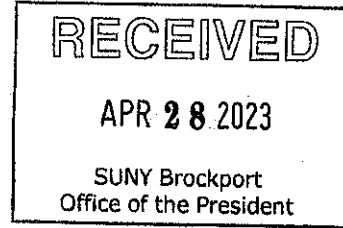


**SUNY  
BROCKPORT**

350 New Campus Drive  
Brockport, New York 14420  
585-395-2586 \* 585-395-2006 (fax)  
senate@brockport.edu  
brockport.edu/collegesenate

Resolution 2022-23 #34  
College Senate

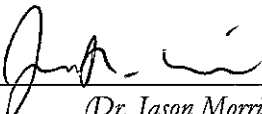
Supersedes Res #: \_\_\_\_\_

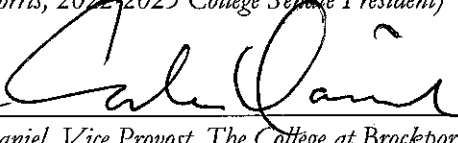


TO: Dr. Heidi Macpherson, College President  
FROM: The College Senate:  
RE: → I. Formal Resolution (*Act of Determination*)  
II. Recommendation (*Urging the Fitness of*)  
III. Other, For Your Information (*Notice, Request, Report, etc.*)

SUBJ: **Actuarial and Data Science major** (#41\_22-23UC)

Implementation Effective Date\*\*: \_\_\_\_\_

Signed:  Date: 4/26/23  
(Dr. Jason Morris, 2022-2023 College Senate President)

Signed:  Date: 4/26/23  
(Dr. Eileen Daniel, Vice Provost, The College at Brockport)

**\*\*Implementation of resolution requires final approval from SUNY- State Education Department.**

YES  NO

**Please fill out the bottom portion and follow the distribution instructions at the end of this page.**

TO: Dr. Jason Morris, College Senate President  
FROM: Dr. Heidi Macpherson, College President  
RE: → I. Decision and Action Taken on Formal Resolution (circle choice)  
a. Accepted  
b. Deferred for discussion with the Faculty Senate on \_\_\_/\_\_\_/\_\_\_  
c. Unacceptable for the reasons contained in the attached explanation.  
d. Comments:

Signed:  Date: 5/9/23  
(Dr. Heidi Macpherson, President, The College at Brockport)

**DISTRIBUTION:**  
The College Senate will forward the resolution signed by the College Senate President to the Vice Provost for determination as to whether the implementation of the resolution requires final approval from SUNY-State Education Dept. The Vice Provost will then forward the resolution with that designation to the College President. Upon approval, the College President will forward copies of resolutions to his/her staff who will, in turn, forward copies to their staff and to the College Senate. The College Senate Office will post resolutions to the College Senate Web at <http://www.brockport.edu/collegesenate/resolutions>.





# College Senate SUNY BROCKPORT

## RESOLUTION PROPOSAL COVER PAGE

**DEADLINE FOR SUBMISSIONS: January 31**

For full consideration during the academic year. Your proposal will be made into an ADA compliant PDF, will receive page numbering and a routing number, and will be forwarded onto the appropriate committee chair(s).

<b>Routing Number</b> <i>Routing # assigned by Senate Office</i>	<b>41_22-23UC</b>
<b>This Proposal Replaces Resolution</b>	
<b>Revision Date(s)</b>	
<b>Anticipated Effective Date:</b>	

### Proposal title

A new **Actuarial and Data Science** major to replace tracks within the Mathematics major

### Proposal summary

The Mathematics Department proposes to replace its Actuarial Mathematics and Statistics tracks with a standalone major in Actuarial and Data Science and make some small curricular updates to reflect new guidance from the Society of Actuaries.

### Proposer information

Pierangela Veneziani, Mathematics Department, [pvenezia@brockport.edu](mailto:pvenezia@brockport.edu), ext. 5485

### Senate Office use only

	<b>Forwarded To</b>	<b>Dates Forwarded</b>
<input type="checkbox"/> <b>Executive Committee</b>		
<input type="checkbox"/> <b>Standing Committee</b>	<b>Standing Committee</b>	
<input type="checkbox"/> <b>Equity, Diversity and Inclusion Committee</b>		2/16/2023
<input type="checkbox"/> <b>Engagement &amp; Enrollment Planning &amp; Policies</b>	<b>Executive Committee</b>	
<input type="checkbox"/> <b>Faculty &amp; Professional Staff Policies</b>	<b>Senate</b>	
<input type="checkbox"/> <b>General Education &amp; Curriculum Policies</b>	<b>Passed GED's go to Vice Provost</b>	
<input type="checkbox"/> <b>Graduate Curriculum &amp; Policies</b>	<b>College President</b>	
<input type="checkbox"/> <b>Student Policies</b>	<b>OTHER</b>	
<input checked="" type="checkbox"/> <b>Undergraduate Curriculum &amp; Policies</b>	<b>REJECTED -WITHDRAWN</b>	

Notes (Senate Office use only):

## College Senate Curriculum Proposal

**Please check:**

Undergraduate     Graduate     Combined Degree Program     Accelerated Pathway

**Sponsoring department:**

Mathematics Department

**Program:**

B.A./B.S.

**New or Revised Program (Please check):**

New program     Revised or restructured program

**Proposal title (Same as on the cover page):**

A new **Actuarial and Data Science** major to replace tracks within the Mathematics major

**Proposal summary (Same as on the cover page):**

The Mathematics Department proposes to replace its Actuarial Mathematics and Statistics tracks with a standalone major in Actuarial and Data Science and make some small curricular updates to reflect new guidance from the Society of Actuaries.

**Rationale:**

The Mathematics Department currently offers an undergraduate degree program leading to a B.S./B.A. degree in Mathematics under a traditional track, Mathematics and Adolescence Education, Mathematics with Inclusive Adolescence Education, an Actuarial Mathematics track, and a Statistics track. The courses in the current Statistics track are all included in the current Actuarial Mathematics track; there are some additional courses in the Actuarial track aligned with industry requirements. We propose that the Actuarial Mathematics and Statistics tracks be discontinued and replaced with a standalone major in Actuarial and Data Science within the Department of Mathematics. The proposed major includes slight changes to required coursework to reflect updated guidance from the Society of Actuaries.

Data science and actuarial science are so closely linked that a single major for both paths is a consistent and understandable option. Both careers involve collecting and analyzing data by combining coding, mathematics, and statistics to support sound decision-making. A new single major would equip students with the core knowledge in statistical computing, mathematics tools, and statistics analysis and modeling. As students in the major near graduation, they can decide whether to complete the required coursework and initial exam preparation to become an Associate of the Society of Actuaries or whether to choose electives focused on particular skills in data science.

There are no additional resources needed for the proposed new major.

The rationale at the basis of the proposal is as follows.

1. The Bureau of Labor Statistics (BLS) projects data science positions to grow by 31% and actuary jobs by 24% from 2020-30, much faster than the average for all occupations. BLS also projects that 11.5 million new jobs in data science and statistics will be created by 2026.
2. Since their inception in 2015, the tracks in Actuarial Mathematics and Statistics have had a proven record in placing students as Actuaries and Data Scientists after graduation. Example of alumnus' positions are:
  - Institutional Research Analyst at Maria College
  - Data Analyst and Actuarial Analyst at Blue Cross Blue Shield
  - Data Analyst at Exelon, Pricing Analyst at Pods
  - Senior Actuarial Analyst at Cigna
  - Actuarial Analyst II at Highmark Blue Cross Blue Shield of Western New York
  - Quality Assurance Analyst at MetLife
  - Strategic Data Analyst at M&T Bank
  - Lead Business Analyst at Eaton
  - Sr Data Operations Analyst at LPL Financial
  - Financial Accounting Analyst CITI Finance
  - Compensation Analyst at Siemens PLM Software
  - Analyst at UPMC
  - Actuary at Liberty Mutual
  - Actuary at Independent Health
3. While both tracks include the statistical knowledge required of Actuaries and others applying mathematics to business, the term Data Science is a clearer fit to and reflection of students' skills and career paths more than the term Statistics.
4. The Mathematics Department designed the two tracks in Actuarial Mathematics and Statistics to be similar to one another but distinct from the traditional Mathematics major. A shift to a standalone major is a natural next step.
5. Tracks are not listed in the SUNY Program Registry; thus, keyword searches for "Actuarial Mathematics" or "Statistics" do not show SUNY Brockport as a result. With a standalone major in Actuarial and Data Science, SUNY Brockport will appear on the Inventory of Registered Programs leading to increased visibility of our program to prospective students and their parents. The new standalone program will be a beacon for students interested in applying sought-after mathematics skills to industry.
6. While the Actuarial and Data Science major aims to launch students into rewarding professional fields without the need for a graduate degree, students in the major are also well prepared for graduate programs in Actuarial Studies, Statistics, or Data Science if they so choose.
7. In line with one of the goals of the school's strategic goals, a standalone Actuarial and Data Science major would have interdisciplinary appeal to students interested in applying quantitative analysis to issues in the physical, natural, behavioral, and social sciences.
8. A major in Actuarial and Data Science at SUNY Brockport would be unique among public institutions in the Greater Rochester area. Only the University of Rochester, a private university, offers an undergraduate degree in Data Science. SUNY Geneseo offers an undergraduate degree in Data Analytics, but the emphasis is on business with only four credits of mathematics.
9. An undergraduate major in Actuarial and Data Science would be unique among SUNY comprehensives; only the University at Albany offers an undergraduate program, and it is in Actuarial Mathematics.

Below we present the current and proposed programs separately and then a side-by-side comparison. Following, we present a table showing how the program prepares students to seek candidacy as an Associate of the Society of Actuaries.

**Current Statistics and Actuarial Mathematics Tracks within the Mathematics major:**

<i>Course number</i>	<i>Course title</i>	<i>Prerequisites</i>	<i>Credit hours</i>
<b>Courses required for both the Statistics and Actuarial Tracks</b>			
CSC 203	Problem Solving with Objects	CSC 120 and MTH 122 or higher; both frequently met in high school	4
MTH 201	Calculus I	MTH 122, frequently met in high school	4
MTH 202	Calculus II	MTH 201	4
MTH 203	Calculus III	MTH 202	4
MTH 281	Discrete Mathematics I	MTH 122 or MTH 201/202/203	4
MTH 255	Differential Equations	MTH 202	3
MTH 324	Linear Algebra	MTH 202 and MTH 281	3
MTH 346	Probability and Statistics I	MTH 202 and MTH 281	3
MTH 446	Probability and Statistics II	MTH 203 and MTH 346	3
MTH 441	Statistical Methods	MTH 446	3
MTH 442	Statistical Computing	MTH 446	3
MTH 447	Time Series	MTH 243 or MTH 346	3
MTH 457	Real Analysis	MTH 324	3
<b>Subtotal</b>			<b>44</b>
<b>Additional course required for the Statistics track</b>			
MTH XXX	Mathematics elective		3
<b>Total for the current Statistics track</b>			<b>47</b>
<b>Additional courses required for the Actuarial Mathematics track</b>			
ECN 201	Principles of Economics – Micro	MTH 111	3
ECN 202	Principles of Economics - Macro	MTH 111	3
MTH 452	Financial Mathematics	MTH 202 or MTH 203	3
MTH 453	Actuarial Mathematics	MTH 346	3
<b>Total for the current Actuarial Mathematics track</b>			<b>56</b>

Note that MTH 201 Calculus I, MTH 202 Calculus II, MTH 281 Discrete Mathematics I, MTH 324 Linear Algebra must be completed with a grade of C or better.

**Proposed Actuarial and Data Science major program:**

<i>Course number</i>	<i>Course title</i>	<i>Prerequisites</i>	<i>Credit hours</i>
<b>Programming core requirements</b>			
CSC 203	Problem Solving with Objects	CSC 120 and MTH 122 or higher; both frequently met in high school	4
<b>*or*</b>			
CYB 203	Programming in Python	CSC 120, frequently met in high school	
MTH 347	R Programming for Statistics	CSC 120 and MTH 122; both frequently met in high school	4
<b>Programming subtotal</b>			<b>8</b>
<b>Mathematics core requirements</b>			
MTH 201	Calculus I	MTH 122, frequently met in high school	4
MTH 202	Calculus II	MTH 201	4
MTH 203	Calculus III	MTH 202	4
MTH 281	Discrete Mathematics I	MTH 122 or MTH 201/202/203	4
MTH 255	Differential Equations	MTH 202	3
MTH 324	Linear Algebra	MTH 202 and MTH 281	3
MTH 457	Real Analysis	MTH 324	3
<b>Mathematics subtotal</b>			<b>25</b>
<b>Statistics core requirements</b>			
MTH 346	Probability and Statistics I	MTH 202 and MTH 281	3
MTH 446	Probability and Statistics II	MTH 203 and MTH 346	3
MTH 441	Statistical Methods	MTH 446	3
MTH 447	Time Series	MTH 243 or MTH 346	3
<b>Statistics subtotal</b>			<b>12</b>
<b>Elective</b>			
MTH 452 Financial Mathematics or MTH 453 Actuarial Mathematics or MTH 423 Data Science			<b>3</b>
MTH 492 Mathematics Internship or one Mathematics elective at 399 or higher			<b>3</b>
<b>Total required</b>			<b>51</b>

Note that MTH 201 Calculus I, MTH 202 Calculus II, MTH 281 Discrete Mathematics I, MTH 324 Linear Algebra must be completed with a grade of C or better.

Side-by-Side comparison:

EXISTING TRACKS		PROPOSED NEW MAJOR	
CSC 203 Problem Solving with Objects	4	CSC.203.Problem-Solving with Objects or CYB 203 Programming in Python	4
MTH 201 Calculus I	4	MTH 201 Calculus I	4
MTH 202 Calculus II	4	MTH 202 Calculus II	4
MTH 203 Calculus III	4	MTH 203 Calculus III	4
MTH 281 Discrete Mathematics I	4	MTH 281 Discrete Mathematics I	4
MTH 255 Differential Equations	3	MTH 255 Differential Equations	3
MTH 324 Linear Algebra	3	MTH 324 Linear Algebra	3
MTH 457 Real Analysis	3	MTH 457 Real Analysis	3
MTH 346 Probability and Statistics I	3	MTH 346 Probability and Statistics I	3
MTH 446 Probability and Statistics II	3	MTH 446 Probability and Statistics II	3
MTH 441 Statistical Methods	3	MTH 441 Statistical Methods	3
MTH 442 Statistical Computing	3	MTH 347 R Programming for Statistics	4
MTH 447 Time Series	3	MTH 447 Time Series	3
MTH elective (Statistics track only)	3	MTH elective	3
MTH 452 Financial Mathematics (Actuarial track only)	3	MTH 452 Financial Mathematics or MTH 453 Actuarial Mathematics or MTH 423 Data Science	
MTH 453 Actuarial Mathematics (Actuarial track only)	3	a recommended elective	
ECN 201 Principles of Economics – Micro (SOA Educational Credential)	3	an optional recommendation*	
ECN 202 Principles of Economics – Macro (SOA Educational Credential)	3	an optional recommendation*	
<b>Statistics total</b>	<b>47</b>	<b>Actuarial and Data Science major total</b>	<b>51</b>
<b>Actuarial Mathematics total</b>	<b>56</b>		

Notes:

- a. Python is one of the most frequently used programming language in data science, thus the new CYB 203 Programming in Python course was added as one of the statistical computing option.
- b. MTH 347 R Programming for Statistics replaces MTH 442 Statistical Computing from the current tracks. Within the tracks, Statistical Computing is the first course where students encountered R, the most common programming language in statistical analysis. By replacing MTH 442 Statistical Computing (a 400 level course) with MTH 347 R Programming for Statistics (a 300 level course), students will learn R earlier and have more opportunities to deepen their R knowledge in MTH 441 Statistical Methods and other academic/work experiences. Three of the four exams administered by the SOA involve programming in R.
- c. (\*) Students pursuing actuarial educational credentials can choose to satisfy part of them while in school by completing ECN 201 Principle of Economics – Micro, ECN 202 Principles of Economics – Macro, ACC 281 Financial Accounting, BUS 325 Principles of Finance. Note that completing courses at the undergraduate level is no longer the only way to satisfy such requirements. They can now be met by taking very affordable options offered by the SOA itself. In addition, most employers offer time off and financial support so that employees can pursue the completion of requirements and exams- an option our alumni report to enjoy. Thus completing such requirements while in school is no longer the only beneficial choice for students.



How the program prepares students to pursue credentials in Actuarial Science:

ASA Pathway 2022

FOUNDATIONS	ACTUARIAL I	ACTUARIAL II	ADVANCED	PROFESSIONALISM
EXAM FINANCIAL MATHEMATICS	EXAM FUNDAMENTALS OF ACTUARIAL MATHEMATICS	EXAM ADVANCED LONG-TERM ACTUARIAL MATHEMATICS OR ADVANCED SHORT-TERM ACTUARIAL MATHEMATICS	EXAM FUNDAMENTALS OF ACTUARIAL PRACTICE	<b>SEMINAR</b> ASSOCIATESHIP PROFESSIONALISM COURSE
EXAM PROBABILITY	VEE MATHEMATICAL STATISTICS			
VEE ECONOMICS		EXAM PREDICTIVE ANALYTICS	EXAM ADVANCED TOPICS IN PREDICTIVE ANALYTICS	
VEE ACCOUNTING AND FINANCE	EXAM STATISTICS FOR RISK MODELING			
EXAM PRE-ACTUARIAL FOUNDATIONS	EXAM ACTUARIAL SCIENCE FOUNDATIONS			

Candidates typically work through the learning stage columns from left to right. Adjacent components, from column to column, indicate knowledge growth from introductory to advanced skills.

© Society of Actuaries

Above is a screen-clip from <https://pathways.SOA.org/designations/asa2022> summarizing the path to becoming an Associate of the Society of Actuaries. VEE stands for Validation by Educational Experience, and these requirements are met by courses approved by the Society of Actuaries. The required and recommended coursework in the Actuarial and Data Science major satisfy the three VEE requirements and prepare students for the first 4 exams.

SOA requirement	Satisfied by or preparation in
VEE Economics	ECN 201 Principles of Economics – Micro and ECN 202 Principles of Economics – Macro
VEE Accounting and Finance	ACC 281 Financial Accounting and BUS 325 Principles of Finance
VEE Mathematical Statistics	MTH 446 Probability and Statistics II and MTH 447 Time Series
EXAM Financial Mathematics	MTH 452 Financial Mathematics
EXAM Probability	MTH 346 Probability and Statistics I and/or MTH 453 Actuarial Mathematics
EXAM Advanced Long-term Actuarial Mathematics or EXAM Advanced Short-term Actuarial Mathematics	On-the-job experience
EXAM Fundamentals of Actuarial Mathematics	Ad-hoc preparation
EXAM Statistics for Risk Modeling	MTH 447 Time Series and MTH 441 Statistical Methods

EXAM Predictive Analytics (Analysis of a data set)	MTH 347 R Programming for Statistics and MTH 447 Time Series and MTH 441 Statistical Methods
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**How the program prepares students for careers in data science:**

The National Academies of Science, Engineering, and Medicine published a 2018 report entitled Data Science for Undergraduates: Opportunities and Options reporting the findings of the Committee on Envisioning the Data Science Discipline: An Undergraduate Perspective, a committee sponsored by the National Science Foundation.

Foundational concepts and skills identified in the NAS report (pp.23-25)	Courses in the proposed program that impart those skills
<b><i>Mathematical foundations</i></b>	
Set theory and basic logic	MTH 281 Discrete Mathematics
Multivariate thinking via functions and graphical displays	MTH 201 Calculus I, MTH 202 Calculus II, MTH 203 Calculus III, MTH 255 Differential Equations
Basic probability theory and randomness	MTH 346 Probability and Statistics I
Matrices and basic linear algebra	MTH 324 Linear Algebra
Networks and graph theory	MTH 481 Discrete Mathematics II
Optimization	MTH 201 Calculus I, MTH 203 Calculus III
<b><i>Computational foundations</i></b>	
Basic abstractions	CSC 203 Problem Solving with Objects, CYB 203 Programming in Python
Algorithmic thinking	CSC 203 Problem Solving with Objects, CYB 203 Programming in Python, MTH 423 Data Science
Programming concepts	CSC 203 Problem Solving with Objects, CYB 203 Programming in Python, MTH 347 R Programming for Statistics
Data structures	CSC 203 Problem Solving with Objects, CYB 203 Programming in Python, MTH 423 Data Science
Simulations	MTH 441 Statistical Methods
<b><i>Statistical foundations</i></b>	
Variability, uncertainty, sampling error, and inference	MTH 347 R Programming for Statistics
Multivariate thinking	MTH 447 Time Series
Nonsampling error, design, experiments, biases, confounding, and causal inference	MTH 441 Statistical Methods
Exploratory data analysis	MTH 447 Time Series
Statistical modeling and model assessment	MTH 447 Time Series and MTH 441 Statistical Methods
Simulations and experiments	MTH 441 Statistical Methods

**Admission requirements & exit requirements (If not applicable, please write NA):**

NA
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**Program requirements** (If not applicable, please write NA):

NA

**Impact on transfer students:**

Is the program part of a seamless transfer arrangement? (Please check):

Yes       No

For both seamless-transfer and non-seamless-transfer programs, please describe how the proposed changes might impact the recruitment and degree-completion of transfer students and steps to be taken to prevent negative outcomes.

Transfers from other community colleges who have taken freshmen and sophomore math classes will be well positioned to finish their degree in four semesters. The current tracks require 2.5 additional years to complete the major, whereas the proposed major positions students to complete the major with an additional 4 semesters (on par with the traditional math major).

**Course additions and/or revision(s):**

NA

**Resource implications and estimated costs** (such as personnel, supplies, labs, or technology):

NA

**Stakeholder consultation:**

Please list the departments, programs, or offices that are likely to be impacted by the proposed changes and any relevant review committees. Please note with whom you consulted in preparing the proposal, from whom letters of commentary were solicited, the outcomes of those consultations and letter-requests, and your responses to those findings:

Computing Sciences Department  
AFE Department (which has been contacted and should forward input by Feb 9)

**Other supporting information** (if applicable):

**Attachments:**

College Senate Course Description Form(s) (for any new or substantially revised courses)

Letters of Support from Chair(s) and Dean

Letters of Commentary from Departments, Programs, Offices, and Committees (as applicable)

