New York City College of Technology, CUNY

CURRICULUM MODIFICATION PROPOSAL FORM

This form is used for all curriculum modification proposals. See the Proposal Classification Chart for information about what types of modifications are major or minor. Completed proposals should be emailed to the Curriculum Committee chair.

Title of Proposal	Minor in Computer Science
Date	May 5, 2022
Major or Minor	Minor
Proposer's Name	Henry Africk
Department	Mathematics
Date of Departmental Meeting in which proposal was approved	May 5, 2022
Department Chair Name	Jonathan Natov
Department Chair Signature and Date	
Academic Dean Name	Justin Vazquez-Poritz
Academic Dean Signature and Date	
Brief Description of Proposal (Describe the modifications contained within this proposal in a succinct summary. More detailed content will be provided in the proposal body.	Creation of a Minor in Computer Science using existing courses. This program will allow students throughout the college to add the designation "Minor in Computer Science" to their transcript.
Brief Rationale for Proposal (Provide a concise summary of why this proposed change is important to the department. More detailed content will be provided in the proposal body).	The mathematics department currently offers an associate in science degree in computer science. Many of the students in this program would like to continue studying computer science at a bachelor's degree level. Fortunately, the mathematics and other departments already offer a variety of advance courses related to computer science. The required sequence of courses in the proposed minor will provide an adequate preparation for computer science courses at the advanced undergraduate or graduate level. It is designed to provide a fundamental understanding of the key concepts of the theory of computing and will offer students options for careers where knowledge of computers is required. CUNY colleges which already offer a minor in computer science include Baruch College, Brooklyn College, City College, College of Staten Island, Hunter College, Lehman College, and Queens College.
Proposal History (Please provide history of this proposal: is this a resubmission? An updated version? This may most easily be expressed as a list).	v1.1 (2021-12-21) - Initial submission. V1.2 (2022-4-22) – Revised submission. V1.3 (2022-5-22) – Revised submission. V1.4 (2023-2-12) – Revised submission. V1.5 (2023-3-01) – Revised submission.

Please include all appropriate documentation as indicated in the Curriculum Modification Checklist.

For each new course, please also complete the New Course Proposal and submit in this document.

Please submit this document as a single .doc or .rtf format. If some documents are unable to be converted to .doc, then please provide all documents archived into a single .zip file.

ALL PROPOSAL CHECK LIST

Completed CURRICULUM MODIFICATION FORM including:	
• Brief description of proposal	X
• Rationale for proposal	X
• Date of department meeting approving the modification	X
• Chair's Signature	X
• Dean's Signature	X
Evidence of consultation with affected departments List of the programs that use this course as required or elective, and courses that use this as a prerequisite.	x
Documentation of Advisory Commission views (if applicable).	
Completed Chancellor's Report Form.	x

EXISTING PROGRAM MODIFICATION PROPOSALS

Documentation indicating core curriculum requirements have been met for new programs/options or program changes.	
Detailed rationale for each modification (this includes minor modifications)	

Rationale for Proposal for a Minor in Computer Science

The mathematics department currently offers an associate in science degree in computer science. Many of the students in this program would like to continue studying computer science at a bachelor's degree level. Fortunately, the mathematics and other department already offer a variety of advance courses related to computer science. The required sequence of courses provides an adequate preparation for computer science courses at the advanced undergraduate or graduate level. It is designed to provide a fundamental understanding of the key concepts of the theory of computing and will offer students options for careers where knowledge of computers is required. CUNY colleges which already offer a minor in computer science include Baruch College, Brooklyn College, City College, College of Staten Island, Hunter College, Lehman College, and Queens College.

Detailed Description of the Proposed Minor

Computer science is an exciting and rapidly changing discipline which emphasizes the theoretical foundation that supports current computer technology and guides future developments. The goal of the minor in computer science is to provide students enrolled in majors with a substantial computer component with the intellectual capabilities and computational skills that will give them a notable edge in their path to a successful career. This minor will enhance the value of their bachelor's degree and better prepare them for opportunities in business, government, education and the computer industry. The minor in computer science consists of three required courses and two elective courses: MAT 1630 Introduction to Computational Science (3 credits) or CST 1201 Programming Fundamentals (3 credits),

MAT 2440 Discrete Structures and Algorithms I (3 credits), MAT 2540 Discrete Structures and Algorithms II (3 credits), and two additional upper-level courses, depending on the student's needs or interests (6-8 credits). The prerequisites for these courses include some or all of CST 1101 Problem Solving with Computer programming, MAT 1375 Precalculus, MAT 1475 Calculus I and MAT 1575 Calculus II. Thus, the minor is 15-17 credits. Students must achieve a grade of 2.0 or higher in all courses that contribute towards the minor in order to be granted a Minor designation on their transcripts.

While the minor is intended mainly for students in the Applied Mathematics bachelor's degree program, it is available to students from other programs which provide the required mathematics and computer background. This includes Biomedical Informatics, Applied Computational Physics, Computer Systems Technology, Data Analytics in Economics, and Data Science. In all of these majors the necessary prerequisites are already included in the program.

Required and Elective Courses for the Minor

REQUIRED COURSES

- MAT 1630 Introduction to Computational Science (3 credits) or
  CST 1201 Programming Fundamentals (3 credits)
- MAT 2440 Discrete Structures and Algorithms I (3 credits)
- MAT 2540 Discrete Structures and Algorithms II (3 credits)

ELECTIVE COURSES (Choose two)

- BIO 2110 Programming for Biologists (4 credits)
- CST 1204 Database Systems Fundamentals (3 credits)
- CST 2402 Introduction to Data Science (3 credits)
- EMT 1111 Logic and Problem-Solving (3 credits, pending approval of change from 1 to 3 credits)
- MAT 2071 Introduction to Proofs and Logic (4 credits)
- MAT 2571 Introduction to Proofs (4 credits)
- MAT 2572 Probability and Mathematical Statistics I (4 credits)
- MAT 2580 Introduction to Linear Algebra (3 credits)
- MAT 2630 Numerical Methods (3 credits)
- MAT 2675 Calculus III (4 credits)
- MAT 2680 Differential Equations (3 credits)
- MAT 3672 Probability and Mathematical Statistics II (4 credits)
- MAT 3772 Stochastic Models I (3 credits)
- MAT 4672 Computational Statistics with Applications (3 credits)
- PHYS 3600 Machine Learning for Physics and Astronomy (4 credits)

Programmatic Learning Outcomes

Students will be able to:

- understand and apply the fundamental concepts and methods of computer science, logic, and mathematics.
- think algorithmically and solve STEM problems using computational tools.
- generate algorithms and effectively communicate their purpose.
- use appropriate language to communicate mathematical and technical ideas.
- understand the limitations and implications of an algorithm.

Sample Curriculum Map for Students in Applied Math BS

Required Minor Courses	Applied Math BS Degree
MAT 1630	Required course in major
MAT 2440	Required course in major
MAT 2540	Elective course in major
Elective Minor Courses	
MAT 2572	Required course in major
MAT 2630	Required course in major

Sample Curriculum Map for Students in Biomedical Informatics BS

Required Minor Courses	Biomedical Informatics BS Degree
CST 1201	Required course in major
MAT 2440	Liberal Arts elective
MAT 2540	Liberal Arts elective
Elective Minor Courses	
MAT 2572	Required course in major
CST 1204	Required course in major

Sample Curriculum Map for Students in Applied Computational Physics BS

Required Minor Courses	Applied Computational Physics BS Degree
CST 1201	Required course in major
MAT 2440	Liberal Arts elective

MAT 2540	Liberal Arts elective

Elective Minor Courses

MAT 2572	Required course in major
MAT 2580	Required course in major

Sample Curriculum Map for Students in Computer Systems BTECH

Required Minor Courses	Computer Systems BTECH Degree
CST 1201	Required course in major
MAT 2440	Required course in major
MAT 2540	Required course in major

Elective Minor Courses

CST 1204	Required course in major
CST 2402	Elective course in major

Sample Curriculum Map for Students in Data Analytics in Economics BS

Required Minor Courses	Data Analytics in Economics BS Degree
CST 1201	Required course in major
MAT 2440	Liberal Arts elective
MAT 2540	Liberal Arts elective

Elective Minor Courses

CST 1204	Required course in major
MAT 2580	Required course in major

Sample Curriculum Map for Students in Data Science BS

Required Minor Courses	Data Science BS Degree
CST 1201	Required course in major
MAT 2440	Required course in major

MAT 2540	Liberal Arts elective

Elective Minor Courses

CST 1204	Required course in major
CST 2402	Required course in major

Administration and Advisement

An Academic Minor Coordinator will be appointed by the mathematics department Chair once the program is approved. The coordinator will be responsible for contacting and advising students who are interested in the proposed minor. This would include currently enrolled students in the computer science associate degree and applied math bachelor's programs.

Assessment Statement

To assess student learning outcomes, an exit survey will be administered for students completing the minor to provide the opportunity to share overall feedback and thoughts with the academic community about the minor and how they benefitted from it. Enrollment trends will also be tracked, as well as rates of completion and grade distributions. Graduation and retention rates, successful completion and time to graduation for students declaring the minor might also be compared with those of the overall student population. Additionally, grade distributions for the classes taken by students declaring the minor could be compared with those of the general population of students who take these classes.

Diversity and Inclusive Education Statement

This academic minor welcomes students from all backgrounds, experiences and perspectives. In accordance with the City Tech and CUNY missions, this academic minor intends to provide an atmosphere of inclusion, respect, and the mutual appreciation of differences so that together we can create an environment in which all students can flourish. It is the instructor's goal to provide materials and activities that are welcoming and accommodating of diversity in all of its forms, including race, gender identity and presentation, ethnicity, national origin, religion, cultural identity, socioeconomic background, sexuality and sexual orientation, ability, neurodivergence, age, and etc. Your instructor is committed to equity and actively seeks ways to challenge institutional racism, sexism, ableism and other forms of prejudice. Your input is encouraged and appreciated. If a dynamic that you observe or experience in the courses included in the academic minor concerns you, you may respectfully inform your instructor without fear of how your concerns will affect your grade. Let your instructor know how to improve the effectiveness of the courses for you personally, or for other students or student groups. We acknowledge that NYCCT is located on the traditional homelands of the Canarsie and Lenape peoples.

Chancellor's Report Form

New Minor in Computer Science

Offered by the Department of Mathematics

From:	**To**:
No such minor is currently offered.	**MINOR IN COMPUTER SCIENCE** Creation of a Minor in Computer Science using existing courses. This program will allow students throughout the college to add the designation "Minor in Computer Science" to their transcript.
Rationale:	
The mathematics department currently offers an associate in science degree in computer science. Many of the students in this program would like to continue studying computer science at a bachelor's degree level. Fortunately, the mathematics and other department already offer a variety of advanced courses related to computer science. The required sequence of courses provides an adequate preparation for computer science courses at the advanced undergraduate or graduate level. It is designed to provide a fundamental understanding of the key concepts of the theory of computing and will offer students options for careers where knowledge of computers is required.	
Effect Outside Department: It will provide students in programs which provide the required mathematics and computer background an opportunity to add an additional credential to their bachelor's degree.	
Date of Department Approval: 5-5-2022	
Date of College Council Approval:	

Re: Minor in Computer Science

German Kolmakov

Reply all

Thu 4/14, 9:33 PM

Henry Africk;
German Kolmakov;
Jonathan Natov

Inbox

You replied on 4/15/2022 8:14 AM.

Dear Henry,

Warmest congratulations with the great work.

I truly believe that your minor is beneficial for the whole student body and, specifically, for our Applied Computational Physics major.

I strongly support your proposal.

All best wishes,
German
Physics, chair

Re: Minor in Computer Science

Ashwin Satyanarayana

Reply all

Fri 4/15, 10:27 AM

Henry Africk;
Jonathan Natov

Inbox

You replied on 4/15/2022 11:38 AM.

Hello Henry and Jonathan,

I heard back from Candido and we are ok with this proposal. Thanks for checking with us.

Best,
Ashwin

Ashwin Satyanarayana, Ph.D.
Associate Professor / Department Chair
Department of Computer Systems Technology,
New York City College of Technology
300 Jay Street - Namm 913, Brooklyn, NY 11201
Ph: (718) 260-5161

Minor in Computer Science

Randall Hannum

Reply all|
Mon 5/2, 8:34 PM
Henry Africk;
Jonathan Natov
Prof. Africk,

Thank you for reaching out to me regarding this. I have not received any feedback from the folks involved in the Data Analytics program.

All the best,
Randy

_____
Randall Hannum
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