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## MATHEMATICS AND COMPUTER SCIENCE

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### FACULTY

**Chairperson:** Assistant Professor Richard Quindley

**Professors:** Hang-Ling Chang, Zon-I Chang,  
Paul Fairbanks, Walter Gleason,  
Roger Marshall, Thomas Moore,  
Glenn Pavlicek, Gail Price,  
Philip Scalisi, Uma Shama,  
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**Associate**

**Professors:** Frank Lambiase, Michael Makokian,  
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**Assistant**

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**Web site: [www.bridgew.edu/depts/mathcs/](http://www.bridgew.edu/depts/mathcs/)**

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### DEGREE PROGRAMS

- BA in Mathematics
- BS in Mathematics
- BA in Computer Science
- BS in Computer Science
- MS in Computer Science
- MAT - Mathematics

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### UNDERGRADUATE MINORS

- Computer Science
- Mathematics

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## UNDERGRADUATE PROGRAMS

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### BACHELOR OF ARTS/BACHELOR OF SCIENCE IN MATHEMATICS

Since mathematics is both a cultural and a technical field of study, the curriculum is planned with the following objective:

1. to introduce students to mathematics as an important area of human thought;
2. to prepare students for careers in industry;
3. to give preparation to students for graduate study in mathematics and related fields;
4. to prepare students planning to teach mathematics on the secondary level;

5. to serve the needs of students in fields which rely on mathematics, e.g., experimental sciences, social sciences, and elementary education.

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### DOUBLE MAJOR WITH ELEMENTARY EDUCATION OR EARLY CHILDHOOD EDUCATION

Students may choose a double major in mathematics and elementary education, early childhood education or special education for licensure purposes. Appropriate advising materials with suggested course sequences are available.

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### MINOR IN SECONDARY EDUCATION (HIGH SCHOOL, MIDDLE SCHOOL, OR PREK-12 SPECIALIST)

Students may minor in secondary education (High School, Middle School or PreK-12 Specialist). Successful completion of this minor will lead to Massachusetts Initial Teacher Licensure. Please refer to the *Department of Secondary Education and Professional Programs* for specific teacher licensure and program requirements.

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### BACHELOR OF ARTS/BACHELOR OF SCIENCE IN COMPUTER SCIENCE

This program provides a broad background in computer science and will serve as preparation for employment in computer applications or for graduate studies in the field.

The department participates in a number of multidisciplinary programs for students preparing for careers in medicine, dentistry or oceanography. Additional information on these programs may be found in the section *Interdisciplinary and Preprofessional Programs*.

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### MATHEMATICS MAJOR

All majors are required to take:

- MA 151-152 Calculus I-II
- MA 251-252 Calculus III-IV
- MA 202 Linear Algebra
- MA 301 Abstract Algebra I
- MA 401 Introduction to Analysis I
- CS 101 Computer Science I

or

- CS 200 FORTRAN
- PH 243-244 General Physics I-II
- Five electives from any 300 or 400 level courses except MA 318. PH 403 Mathematical Physics may be taken as one of these five electives. Majors preparing for secondary school teaching careers must take MA 403 Probability Theory, MA 408 History of Mathematics as two of the five electives.

- Not more than one grade in the D range (D+, D, D-) among the five courses MA 151, MA 152, MA 202, MA 251, and MA 252 shall be accepted in partial fulfillment of the requirements for the major in mathematics. A student receiving a second grade in the D range in one of the above courses must repeat the course with the higher number and receive a C- or better before being allowed to enroll in other mathematics courses.

**Note:**

Students who are contemplating majoring in mathematics or computer science should be aware of the sequential nature of the course offerings. In order for students to plan their programs so that degree requirements may be completed within a four-year period, students should consult with the chairperson of the department or their advisor as soon as possible.

**General Education Requirements (GER)**

A minimum of 120 earned hours is required for graduation. These earned hours include General Education Requirements as specified in the Undergraduate Academic Programs section of this catalog. For additional graduation requirements, see the Undergraduate Academic Policies section of this catalog.

**MATHEMATICS MINOR**

A minimum of eighteen hours is required. Students must satisfy the following three requirements:

1. MA 151-152 Calculus I-II  
or  
MA 141-142 Elements of Calculus I-II
2. One course from among the following:  
MA 120 Introduction to Linear Algebra  
MA 202 Linear Algebra  
MA 214 Introduction to Modern Algebra
3. Three *additional* courses from among the following:  
MA 110 Elementary Statistics I  
MA 111 Elementary Statistics II  
MA 120 Introduction to Linear Algebra  
MA 130 Discrete Mathematics I  
MA 200 Probability and Statistics  
MA 202 Linear Algebra  
MA 214 Introduction to Modern Algebra  
MA 216 Analytic Geometry  
MA 251 Calculus III  
any 300 or 400 level MA courses (including MA 318)

Students who take one course from any of the following pairs of courses may not take the other course of that pair for credit towards the minor

- MA 110 and MA 200
- MA 120 and MA 202
- MA 214 and MA 301

Students may elect to take MA 220 Introduction to Calculus to satisfy #1. Students who do so must take four courses to satisfy #3 although they may use up to two courses from among MA 105 Selected Topics in Mathematics, MA 107 Principles of Mathematics I, and MA 108 Principles of Mathematics II to satisfy that requirement.

**COMPUTER SCIENCE MAJOR**

All majors are required to take the following courses:

- CS 101 Computer Science I
- CS 102 Computer Science II
- CS 201 Assembly Language Programming
- CS 206 Introduction to Computer Organization
- CS 330 Data Structures and Algorithms
- CS 340 Organization of Programming Languages
- CS 350 Operating Systems
- MA 120 Introduction to Linear Algebra
- MA 130 Discrete Mathematics I
- MA 151-152 Calculus I-II
- MA 330 Discrete Mathematics II

At least four electives (12 semester hours) must be selected from the following courses:

- CS 280 Fundamentals of Microprocessors and Micro-computers
- CS 345 Compiler Construction
- CS 395 Computer Science Seminar
- CS 399 Topics in Theoretical Computer Science
- CS 405 Introduction to Database Systems
- CS 430 Computer Networks
- CS 435 Analysis of Algorithms
- CS 436 Computer Graphics
- CS 445 Logic Programming
- CS 460 Introduction to Robotics
- CS 470 Introduction to Artificial Intelligence
- CS 498 Internship in Computer Science
- MA 382 Switching Theory
- or
- MA 415 Numerical Analysis
- PH 442 Digital Electronics I

Not more than one grade in the D range (D+, D, D-) among the five courses CS 101, CS 102, CS 201, CS 206

and CS 330 shall be accepted in partial fulfillment of the requirements for the major in computer science. A student receiving a second D in one of the above must repeat the course with the higher number and receive a C- or better before being allowed to enroll in other computer science courses.

Any computer science major who has successfully completed CS 102 will not be allowed to take CS 100 or CS 105 for academic credit.

### General Education Requirements (GER)

A minimum of 120 earned hours is required for graduation. These earned hours include General Education Requirements as specified in the Undergraduate Academic Programs section of this catalog. For additional graduation requirements, see the Undergraduate Academic Policies section of this catalog.

### COMPUTER SCIENCE MINOR

CS 101 Computer Science I  
 CS 102 Computer Science II  
 CS 201 Assembly Language Programming  
 and three additional courses to be selected from:  
 PH 442 Digital Electronics I  
 or any course counting toward the computer science major.

### HONORS PROGRAM

The Honors Program in Mathematics and Computer Science provides highly motivated mathematics and computer science majors with opportunities to enhance their academic program through intensive scholarly study and research designed to be of assistance in post-graduate employment or in the pursuit of an advanced degree in mathematics or computer science. Contact the Department of Mathematics and Computer Science for further information concerning eligibility and application.

## GRADUATE PROGRAMS

### MASTER OF SCIENCE IN COMPUTER SCIENCE

The Master of Science in Computer Science is intended to meet the growing need for high-level computer professionals by

- strengthening the preparation of individuals currently working in computer-related fields;

- training professionals in other areas who wish to apply computer science to their respective fields or who desire to retrain for entry in a computer science career; and
- providing the necessary general and theoretical background for those individuals who wish to continue graduate study in computer science beyond the master's degree.

The program consists of 30 credit hours and may be completed entirely on a part-time basis (courses are offered in the late afternoon or evening).

The Master of Science in Computer Science program seeks to attract individuals from various backgrounds who are highly motivated and prepared to meet the challenges of a rigorous advanced degree curriculum. In addition to a bachelor's degree, applicants should be familiar with the organization of computers and have competencies in

- a high-level programming language such as C, C++, or Java;
- discrete and continuous mathematics; and
- data structures and algorithms

Demonstrated competencies within these areas can be achieved through professional experience, undergraduate study, or transitional graduate coursework (CP 510, CP 520, CP 530). If you do not already have a computer science degree, graduate faculty are available to help you evaluate your preparedness.

1. Candidates must successfully complete each of the following courses:

CS 520 Operating Systems Principles  
 CS 540 Automata, Computability, and Formal Languages  
 CS 545 Analysis of Algorithms  
 CS 560 Artificial Intelligence  
 CS 590 Computer Architecture

2. Candidates must successfully complete five courses from among the following:

CS 510 Topics in Programming Languages  
 CS 525 Design and Construction of Compilers  
 CS 530 Software Engineering  
 CS 536 Graphics  
 CS 550 Topics in Discrete Mathematics  
 CS 562 Expert Systems

- CS 565 Logic Programming
- CS 570 Robotics
- CS 575 Natural Language Processing
- CS 580 Database Systems
- CS 582 Distributed Database Systems
- CS 594 Computer Networks
- CS 596 Topics in Computer Science
- CS 599 Computer Science Seminar

Topics in Computer Science (CS 596) has recently addressed issues such as human-computer interaction, biometrics, computer security, computer vision and computer learning systems.

3. At the conclusion of the program, candidates will have the option of sitting for a comprehensive written exam, which incorporates subject matter from the five required courses, or completing a capstone project that allows candidates to pursue an area of interest in depth.

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### MASTER OF ARTS IN TEACHING MATHEMATICS

The Master of Arts in Teaching degree was developed for high school and middle school subject area teachers who have an initial license and are seeking a professional license in the Commonwealth of Massachusetts. The M.A.T. program is designed to meet the “appropriate master’s degree” requirement, which is part of the criteria for professional stage licensure, as set forth in the most recent DOE licensure regulations. This degree program will also appeal to secondary school teachers who already hold a standard level or professional license and want to acquire additional knowledge and a master’s degree in the discipline.

Students should consult the Graduate and Continuing Education section of the catalog for information regarding graduate program procedures and admission standards.

All accepted students must enroll under the direction of their adviser in GP 501 Graduate Program Planning, which is described under “Graduate Advisors and Program Planning” in the Graduate and Continuing Education section of this catalog.

#### Program Requirements

Education Core Courses	15 credits
ED 530 The Teacher as Researcher	
ED 531 The Standards-Based Classroom: Curriculum	

- ED 532 The Teacher as Leader: From Issues to Advocacy
- ED 533 The Standards-Based Classroom: Instruction and Assessment
- ED 538 The Professional Teacher (final program course)

Information about ED 530–538 is provided in the Course Descriptions section of this catalog under the heading of “School of Education and Allied Studies (SEAS) Master’s Courses (ED)”.

#### **Concentration Electives**

M.A.T. students are expected to have, or acquire in addition to degree requirements, an appropriate background of college level courses, to be determined by the department.

A minimum of 18 approved graduate credits in the academic area of concentration, which meet the academic and professional objectives of the student, is required.

Successful completion of a comprehensive examination is also required.