

PROGRAM C SPECIALIZATION BIOMATHEMATICS B.A./B.S. 2023

Mathematics plays an essential role in studying biological systems and advancing medicine. Mathematical models of biological systems allow testing assumptions that may not be accessible experimentally and generate innovative predictions that can lead to future research. The Department of Mathematics at the University of Iowa has outstanding faculty with a strong teaching and research record in Mathematical Biology.

The program in Mathematical Biology will help students to think about biological systems mathematically. Students will obtain essential skills in mathematical analysis and simulation and mathematical modeling in biology and knowledge of specific biology areas. This program will qualify students to participate in undergraduate research and use quantitative techniques in biology, neuroscience, and other fields.

This BS program requires 6 (7 if Option #2 on p.1 below is used) core courses in Mathematics plus at least 5 electives for B.A. and at least 7 electives for B.S. in Mathematics, Biological Sciences, Computer Science, and/or Statistics. All Program C degree requirements on upper-level math courses, mathematics courses, math residency, and 3-4 s.h. electives apply (see pp.1-2).

Students who declared math major for the first time in Fall 2023 or later at the UI must use this template. Students who declared math major by Summer 2023 at the UI may choose to follow this template or the previous template.

General Requirements

1. Six core math courses (23 s.h. total for both B.A and B.S.)

- Calculus I and Calculus II, 8 s.h.
NOTE: Either sequence MATH:1550-1560 or MATH:1850-1860 is acceptable. The coverages of these two sequences are different so that students should not mix and match unless there is a strong need with good preparation. Advanced placement (AP), CLEP, and credits obtained through the Mathematics Incentive Program are acceptable for all or part of this calculus requirement.
- MATH:2700 Introduction to Linear Algebra, 4 s.h.
- MATH:2850 Calculus III, 4 s.h.
- MATH:3600 Introduction to Ordinary Differential Equations, 3 s.h.
- MATH:3770 Fundamental Properties of Spaces and Functions I, 4 s.h.

Higher-level math courses may be used to substitute for core math courses if approved by the Math Department Director of Undergraduate Study in advance.

2. Or, seven core math courses for engineering track (at least 23 s.h. total for both B.A and B.S.)

- MATH:1550 Engineering Math I Single Variable Calculus, 4 s.h.
- MATH:1560 Engineering Math II Multivariable Calculus, 4 s.h.
- MATH:2550 Engineering Math III Matrix Algebra, 2 s.h.

- MATH:2560 Engineering Math IV Differential Equations, 3 s.h.
- MATH:3550 Engineering Math V Vector Calculus, 3 s.h.
- MATH:3770 Fundamental Properties of Spaces and Functions I, 4 s.h.
- A MATH course of at least 3 s.h. with course number higher than 2000 but excluding 2550, 2560, 2700, 2850, 3550, 3600, 3700, 3750, 3770, 3800, 3995-3997, 4010, 4020, 4060, 4750.

Higher-level math courses may be used to substitute for core math courses if approved by the Math Department Director of Undergraduate Study in advance.

3. Mathematical modeling courses (3 s.h. for B.A. and 6 s.h. for B.S.)

- MATH:4060 Discrete Mathematical Models (for B.S. only)
- MATH:4750 Introduction to Mathematical Biology (for both B.A. and B.S.)

4. Data and computational courses (6 s.h. total for both B.A and B.S.)

- MATH:3800 Elementary Numerical Analysis.
- STAT:3120 Probability and Statistics

5. Elective biology courses (6 s.h. total for both B.A and B.S.)

- Two elective biology courses from the list in #10 below.
- At least one course of these 2 electives must be at the 3000 level or higher.

6. One more elective course (3 s.h. for B.S. only)

- A CS course of level 2000 or high (e.g. CS:2230),
- Another biology course of level 3000 or higher according to the list in #10 below, or
- Another MATH course of level 3000 or higher excluding 3550, 3600, 3700, 3750, 3770, 3800, 3995-3997, 4010, 4020, 4060, 4750. (e.g. MATH:4820, 4210, 5750, 5760)

7. Residency requirement of the Math Department (for both B.A. and B.S.)

- Every math major must earn at least 15 s.h. at the UI in courses offered by the Department of Mathematics or cross-listed with a MATH-prefixed course.

8. Plan of study

- Every Program C student must file a Plan of Study before the start of their senior year. With the help of their advisor, a student prepares a list of courses as their Plan of Study according to Requirements 1-7 above. With advisor's approval, this Plan of Study is then submitted to the Math Department Director of Undergraduate Study for approval. Approved Plan of Study will be uploaded and appear in MyUI.
- If a student needs to change courses, a new Plan of Study must be submitted.
- Please use this [Fillable PDF Form for Plan of Study for Program C](#).

9. Math Department and college's requirements

- Students earning a degree in mathematics must also satisfy the [Math Department's rules](#) and the [requirements of the College of Liberal Arts and Sciences](#).
- More information about CLAS regulations can be found in the University of Iowa General Catalog

10. Biology elective courses

- BIOL:2512 Fundamental Genetics
- You may choose only one of the following 2 courses:
 - BIOL:3172 Evolution
 - BIOL:3373 Human Population Genetics & Variation.
- BIOL:3233 Intro Developmental Biology
- BIOL:3314 Genomics

- BIOL:3343 Animal Physiology
- BIOL:3713 Molecular Genetics
- You may choose only one of the following 2 courses:
 - BIOL:2753 Intro to Neurobiology
 - PSY:2701 Introduction to Behavioral Neuroscience
- BIOL:3253 Neurobiology I
- BIOL:3254 Neurobiology II
- CHEM:2210 Organic Chemistry I
- BIOC:3120 Biochemistry and Molecular Biology I
- BIOC:3130 Biochemistry and Molecular Biology II
- BIOC:4241 Biophysical Chemistry I
- BIOC:4242 Biophysical Chemistry II
- You may choose only one of the following 4 courses:
 - BIOL:4213 Bioinformatics
 - BIOL:4386 Introduction to Scientific Computing
 - BIOC:3310 Practical Data Science and Bioinformatics
 - BIOC/BME:4310 Computational Biochemistry
- BIOL:2673 Ecology
- BME:2500 Biomaterials & Biomechanics.