Mathematics and Statistics- Bachelor of Science

For information, contact the Department of Mathematics, 123 Bachelor Hall, 513-529-5818, or the Department of Statistics, 311 Upham Hall, 513-529-7828.

The Bachelor of Science in Mathematics and Statistics includes the related hours requirement as well as the foreign language requirement from the College of Arts and Science (CAS) Requirements. All MTH and STA courses applied to the program and all courses in the 15-hour section of the related hours must be taken for a letter grade, not credit/no-credit. In the MTH and STA courses, the GPA must be at least 2.00. Service courses do not figure into the GPA unless explicitly approved by the department.

Students pursuing the B.S. Mathematics & Statistics major and the B.S. in Mathematics must have at least 15 distinct hours not included in the Mathematics major.

Program Requirements

(9 prerequisite hours, 6-7 introductory hours, 31 major hours, 15 related hours; 52-62 total hours)

Each degree requires the following introductory courses:

Code	Title	Credit Hours
MTH 252	Calculus III [1]	4
MTH 222	Introduction to Linear Algebra [2]	2-3
Total Credit Hours		**6-7**

[1] The Honors version of this course will also apply. Prerequisites include Calculus I and Calculus II.

[2] The combination of MTH 222T and MTH331T may be taken in place of MTH 222 and MTH 331.

Select courses from the lists below to meet the following hours requirements:

- The selected courses must include at least 31 semester hours at the 300 level or above.
- The selected courses must include at least 22 semester hours at the 400 level.
- The selected courses must include at least 12 semester hours at the 400 level earned at Miami.

Code	Title	Credit Hours
All of the following mathematics courses are required.		
MTH 331	Proof: Introduction to Higher Mathematics	3
MTH 347	Differential Equations [1]	3
MTH 421	Introduction to Abstract Algebra	4
MTH 441	Real Analysis	3
Select at least one of the following mathematics courses.		3-4
MTH 432	Optimization	
MTH 433	Applied Linear Algebra	
MTH 435	Mathematical Modeling Seminar	
MTH 439	Combinatorics	
MTH 447	Topics in Mathematical Finance	
MTH 451	Introduction to Complex Variables	
MTH 453	Numerical Analysis	
MTH 455	Introduction to Partial Differential Equations	
MTH/MME 495	Introduction to Applied Nonlinear Dynamics	
All of the following statistics courses are required.		
STA 363	Introduction to Statistical Modeling	3
STA 401	Probability	3
STA 462	Inferential Statistics	3
or STA 466	Experimental Design Methods	
STA 463	Regression Analysis	4
Select enough additional hours from the following list, or from the lists above, to meet the hours requirements stated above. [2]		1-2
MTH 410	Topics In Geometry	
MTH 411	Foundations of Geometry	
MTH 420	Topics in Algebra	
MTH 425	Number Theory	
MTH 437	Game Theory and Related Topics	
MTH 438	Theory and Applications of Graphs	
MTH 440	Topics in Analysis	
MTH 482	Great Theorems of Mathematics	
MTH 483	Introduction to Mathematical Logic	
MTH 486	Introduction to Set Theory	
MTH 491	Introduction to Topology	
STA 402	Statistical Programming	
STA 427	Introduction to Bayesian Statistics	
STA 467	Statistical Learning	
STA 475	Data Analysis Practicum	
STA 483	Analysis of Forecasting Systems	
Total Credit Hours		**31**

[1] Students who have taken MTH 245 or MTH 246 as a requirement for another major may substitute it for MTH 347. (However, as it is a 200-level course, it will not count toward the required hours at the 300 level or above.)

[2] Up to two semester hours from MTH 430, MTH 477, or STA 477 may also be counted toward the hours requirements.

Related Hours

A program of related courses is intended to provide the student with opportunities to see and do mathematics or statistics in the context of other disciplines and, perhaps, enhance the student's employment prospects. The departmental requirement is for a program of at least 15 hours. Please note that all related area courses must be taken for a grade, not as credit/no credit. Each program includes two parts, as follows:

Part I: Computer Programming Requirement: Every major is required to demonstrate computer programming proficiency by passing one approved programming course. Approved courses include:

Code	Title	Credit Hours
CSE 153	Introduction to C/C++ Programming [1]	3
CSE 163	Introduction to Computer Concepts and Programming [1]	3
CSE 174	Fundamentals of Problem Solving and Programming [1]	3
STA 402	Statistical Programming [2]	3
MTH 408	Mathematical Problem Solving with Technology [3]	3
PHY 286	Introduction to Computational Physics [4]	3

1 Any CSE course with one of CSE 153, 163, 174 as a prerequisite can be used to satisfy the programming requirement.

2 STA 402 cannot be used to satisfy any other Mathematics or Mathematics and Statistics degree requirement if it is used toward the programming requirement.

3 MTH 408 can only be used toward the programming requirement by students who have been admitted to an AYA teacher licensure cohort.

4 PHY 286 can only be used toward the programming requirement by students who are also majoring in Physics.

Part II: Related Area Requirement: Every major must include in their program a cluster of courses in one area of study which mathematics or statistics is used. Minimally (but see **Related Area Reduction** below), the area is to consist of at least 12 credit hours, with at least 6 advanced hours. Advanced hours include all courses numbered 200 level or above in CHM, CSE, PHY, and all courses numbered 300 level or above in ACC, ECO, ECE, ISA, STA. Pre-approved related areas are listed below. If your interests are not accommodated by the pre-approved areas listed below, you may elect to design your own program of related courses. Such programs must be approved by the Chief Departmental Adviser **in advance of applying for graduation**. Pre-approved related areas include:

- Actuarial Science: ECO 201, ECO 202, ACC 221, ACC 222, FIN 301 (Students interested in an actuarial career are urged to complete the Minor in Actuarial Science, which will also satisfy this Related Area Requirement.)
- Teacher Education: The secondary licensure program in The College of Education, Health, and Society (This option is available only for Integrated Mathematics Education Majors).
- Accounting (ACC)
- Chemistry (CHM)
- Computer Science and Software Engineering (CSE)
- Economics (ECO)
- Electrical and Computer Engineering (ECE)
- Information Systems & Analytics (ISA)
- Physics (PHY)
- Statistics (STA); Note: students majoring in Mathematics and Statistics (Bachelor of Science) cannot use statistics as their related area

Unless using the Actuarial Science or Teacher Education option, all related area hours must come from the same department. Students majoring in Mathematics (Bachelor of Arts or Bachelor of Science) may use statistics as their related area. There is no restriction on the statistics courses that can count (service courses are OK), but courses applied to the related area cannot also be counted towards the requirements of the major. On the other hand, students majoring in Mathematics and Statistics (Bachelor of Science) cannot use statistics as their related area. Students may simultaneously use any related area courses towards the university Thematic Sequence requirement, or toward a minor or second major. But, related area courses cannot be used towards the requirements of a Mathematics or Mathematics and Statistics major.

Related Area Reduction: Some students may want to have the flexibility to include in their program an additional course in mathematics or statistics. To that end, the cluster of related courses required can be reduced by up to 3 hours (of the 6 advanced hours) by taking the same number of hours in a MTH or STA course, numbered 400 or higher and listed among the possible courses to fulfill requirements of your chosen degree. This decision must be made in consultation with your adviser or one of the CDAs.

Teacher Licensure

Students who wish to combine teacher licensure with a major in the Department of Mathematics should apply for admission to a licensure cohort as outlined in the College of Education, Health and Society chapter. For information, contact the Office of Student Services in the College of Education, Health and Society.

To earn an A.B. degree in addition to teacher licensure, you must complete the requirements for the Bachelor of Arts degree, while also satisfying your professional education course requirements. As a consequence, the following courses (not all of which apply toward the A.B.) are automatically required to be in your academic program:

These courses must include:

Code	Title	Credit Hours
MTH 331	Proof: Introduction to Higher Mathematics	3
MTH 408/ MTH 508	Mathematical Problem Solving with Technology	3
MTH 409/ MTH 509	Secondary Mathematics from an Advanced Perspective	3
MTH 411/ MTH 511	Foundations of Geometry	3
MTH 421/ MTH 521	Introduction to Abstract Algebra	4
MTH 482	Great Theorems of Mathematics	3
STA 301	Applied Statistics	3
STA 401/STA 501	Probability	3

One additional course is required for completion of the A.B. degree. See the A.B. requirements for details about the selection of this course.

To earn a B.S. degree in addition to teacher licensure, you must complete the requirements for the B.S. in Mathematics or the B.S. in Mathematics and Statistics. Each of these programs requires four or five additional courses. See the B.S. requirements for details about the selection of these courses.