Applied Mathematics - Bachelor of Science

This program provides an education in the contemporary use of mathematical and related computational methods for analyzing practical problems arising in engineering, economics, the sciences, and industry.

The students will develop a foundation in applied mathematics and computation that will allow them to build mathematical models and analyze data in real-world settings. Students choose electives in the sciences, technology, engineering or other areas of interest to complement and provide context for their mathematical training.

Program Requirements

Note: Students pursuing the Applied Mathematics major and the B.S. in Mathematics must have at least 15 distinct hours not included in the Mathematics major.

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

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

- The selected courses must include at least 27 semester hours at the 300 level or above.
- The selected courses must include at least 18 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
Core Courses		
MTH 222	Introduction to Linear Algebra [1]	3
MTH 252	Calculus III	4
MTH 253	Introduction to Technical Computing	1
MTH 331	Proof: Introduction to Higher Mathematics [1]	3
MTH 347	Differential Equations [2]	3
MTH 441	Real Analysis	3
Elective Courses		
Select six of the following:		18
MTH 340	Internship [3]	
or MTH 377	Independent Studies	
MTH 400	Topics in Advanced Mathematics [4]	
MTH 432	Optimization	
MTH 433	Applied Linear Algebra	
MTH 435	Mathematical Modeling Seminar	
MTH 438	Theory and Applications of Graphs	
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	
STA 401	Probability	
Total Credit Hours		**35**

1. MTH 222 and MTH 331 can be substituted with the Honors versions of these courses, MTH 222T and MTH 331T, which must be taken concurrently.
2. Students who have taken MTH 245 or MTH 246 as a requirement for another major may substitute it for MTH 347 if MTH 455 or MTH 495 is taken as an elective course.
3. If an internship (MTH 340), Undergraduate Summer Scholar Program (MTH 340U), Dean's Scholar Program, or Research Experience for Undergraduates (REU) was done for fewer than 3 credit hours, then to count it as one of the six elective courses, a student must do a post-activity independent study (MTH 377E or R) to bring the total up to 3 credit hours.
4. When this topics course is focused on applied mathematics.

Related Hours

This requirement is intended to promote scientific breadth and encourage application of mathematics to other fields. All related hours courses must be taken for a grade, not as credit/no credit.

Code	Title	Credit Hours
Computer Programming		
Select one of the following:		3
CSE 153	Introduction to C/C++ Programming	
CSE 163	Introduction to Computer Concepts and Programming	
CSE 174	Fundamentals of Problem Solving and Programming	
Related Courses		
Select at least 9 credit hours from the courses listed below. Or complete a major, co-major, or minor outside of the Department of Mathematics. [1]		9
Computer Science		
CSE 274	Data Abstraction and Data Structures	
CSE 276	Mathematics and Computer Science	
CSE 374	Algorithms I	
CSE 432	Machine Learning	
CSE 464	Algorithms	
CSE 473	Automata, Formal Languages, and Computability	
Electrical Engineering		
ECE 205	Electric Circuit Analysis I	
or any ECE course numbered 301 or above		
Economics		
ECO 201	Principles of Microeconomics	
ECO 202	Principles of Macroeconomics	
ECO 315	Intermediate Microeconomic Theory	
ECO 317	Intermediate Macroeconomic Theory	
ECO 414	Mathematical Economics	

ECO 465	Game Theory with Economic Applications	
Finance		
FIN 301	Introduction to Business Finance	
FIN 401	Principles of Investments and Security Markets	
FIN 402	Fixed-Income Portfolio Management	
FIN 403	Portfolio Management	
FIN 404	Forward, Futures and Derivatives	
Geography		
GEO 441	Geographic Information Systems	
GEO 442	Advanced Geographic Information Systems	
GEO 443	Python Programming for Geospatial Applications	
GEO 448	Techniques and Applications of Remote Sensing	
Linguistics		
LIN 210	Special Topics in Language Awareness [2]	
LIN 460	Capstone in Linguistics	
Physics		
PHY 181 & PHY 183	General Physics I and General Physics Laboratory I	
PHY 182 & PHY 184	General Physics II and General Physics Laboratory II	
PHY 281	Contemporary Physics I: Foundations	
PHY 282	Contemporary Physics II: Frontiers	
PHY 286	Introduction to Computational Physics	
or any PHY course numbered 421 or above		
Statistics		
STA 301	Applied Statistics	
STA 308	Introduction to Programming and Scripting for Data Analytics	
STA 363	Introduction to Statistical Modeling	
or any STA course numbered 401 or above [3]		
Total Credit Hours		**12**

[1] Related courses may be reduced by up to 3 credit hours with the approval of the department if professional or research experience is gained, for example, through an internship (MTH 340), Undergraduate Summer Scholar Program (MTH 340U), Dean's Scholar Program, or Research Experience for Undergraduates (REU). The same pre-approved activity can't be double-counted in electives and obtain a related courses reduction.
If students' interests are not accommodated by the pre-approved courses listed here, they may petition the Department of Mathematics to apply another course or courses toward the related hours requirement.

[2] Only LIN 210F, *Computational Linguistics*, applies.

[3] STA 401 can't be double-counted in electives and related courses.