

OPTIONS in MATHEMATICS

Mathematics, B.A.

Mathematics, B.S.

Mathematical Economics

Mathematics and Physics

Five Year Programs:

B.A. & M.A.

B.S. & M.A.

M.A. Secondary Education Certificate Program

Minors in Mathematics

Mathematics

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Mathematics majors may select either the Bachelor of Arts (B.A.) program or the Bachelor of Science (B.S.) program.

The B.A. program is a traditional program in pure mathematics. It is intended for students who plan to go to graduate school or to teach mathematics at a college or high school level after graduation. While the B.A. program has relatively few required courses, the required courses are academically demanding. The lack of heavy requirements is intended to provide students with an opportunity to explore their interests in and out of mathematics.

The B.S. program, which has more required courses, has an applied flavor. It is intended for students who plan to seek employment in a mathematics-related field or join a graduate program in applied mathematics or a mathematics-related field upon graduation.

Either program can be combined with the department's M.A. program, leading to the M.A. degree after five years of study.

The department offers a joint program with the Department of Physics leading to the B.S. degree and a joint program with the Department of Economics leading to the B.A. degree. Students who plan careers as secondary school mathematics teachers may choose to take a five-year interdisciplinary program, offered jointly with the College of Education, that leads to a bachelor's degree in mathematics, teaching certification, and a Master's degree in Education.

Basic Courses: Three semesters of calculus: Math 1041/1941, Math 1042/1942, Math 2043; linear algebra: Math 2101; Math 3041, Math 3141, Math 3142, Math 4051 and Math 4096.

Mathematics, B.A. Requirements

In addition to the basic courses, one of the following courses in Computer and Information Sciences: CIS 1053, CIS 1057, CIS 1068 or CIS 2168; and Math 2196 or Math 3000+ (Math 2196 can only count if it is taken prior to Math 3098 and Math 3141), Math 3098, Math 3101, Math 4061 or Math 4063; and one additional mathematics elective course numbered 3000 or above.

Year 1, Fall Semester

Department	Course#	Course Name	Hours	RCI
Mathematics	1041	Calculus I	4	QB
		<i>or</i>		
Mathematics	1941	Honors Calculus I	4	QB
CIS	1053	Programming in Matlab	4	QB
		<i>or</i>		
CIS	1057	Computer Programming in C	4	QB
		<i>or</i>		
CIS	1068	Program Design & Abstraction	4	
		<i>or</i>		
CIS	2168	Data Structures	4	
Subtotal			8	

Year 1, Spring Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	1042	Calculus II	4	
		<i>or</i>		
Mathematics	1942	Honors Calculus II	4	
Subtotal			4	

Year 2, Fall Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	2043	Calculus III	4	
Mathematics	2101	Linear Algebra	3	
Subtotal			7	

Year 2, Spring Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	2196	Basic Concepts of Math	3	WI
		<i>or</i>		
Mathematics	Elective	Select one course 3000+	3-4	
Mathematics	3041	Differential Equations I	3	
Subtotal			6-7	

Year 3, Fall Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	3098	Modern Algebra	3	WI
Mathematics	3141	Advanced Calculus I	3	
Subtotal			6	

Year 3, Spring Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	3101	Topics in Modern Algebra	3	
Mathematics	3142	Advanced Calculus II	3	
Subtotal			6	

Year 4, Fall Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	4051	Introduction to Functions of a Complex Variable	3	
Mathematics	Elective	Select one course 3000+	3-4	
Subtotal			6-7	

Year 4, Spring Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	4061	Differential Geometry	3	
		<i>or</i>		

Mathematics	4063	Topology I	3	
Mathematics	4096	Senior Problem Solving Seminar	3	WI
Subtotal			6	

Credits in Coursework for B.A. in Mathematics	49-51
Core / Elective Credits	72-74
Total Credits for B.A. Degree	123

Mathematics, B.S. Requirements

In addition to the basic courses, Calculus-based Physics I, II; two of the following courses from Computer and Information Sciences: CIS 1053, CIS 1057, CIS 1068, CIS 2168; and Math 3031, Math 3043, Math 3098; and two science/mathematics electives taken from the following list: Actuarial Science 3501, Actuarial Science 3502; Chemistry 3301, Chemistry 3302; CIS 3211, CIS 3242; Economics 3503; Physics 2101, Physics 2701, Physics 3101, Physics 3301, Physics 3302, Physics 3701, Physics 4101; or any mathematics course numbered 3000 or above (Math 2196 can count as one of the electives, provided it is taken prior to Math 3098 and Math 3141); and one additional mathematics elective course numbered 4000 or above.

Year 1, Fall Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	1041	Calculus I	4	QB
		<i>or</i>		
Mathematics	1941	Honors Calculus I	4	QB
CIS	1053	Programming in Matlab	4	QB
		<i>or</i>		
CIS	1057	Computer Programming in C	4	QB
		<i>or</i>		
CIS	1068	Program Design & Abstraction	4	
		<i>or</i>		
CIS	2168	Data Structures	4	
Physics	1061	Elementary Classical Physics I	4	SA
Subtotal			12	

Year 1, Spring Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	1042	Calculus II	4	
		<i>or</i>		
Mathematics	1942	Honors Calculus II	4	
CIS	1053	Programming in Matlab	4	QB
		<i>or</i>		
CIS	1057	Computer Programming in C	4	QB
		<i>or</i>		
CIS	1068	Program Design & Abstraction	4	
		<i>or</i>		
CIS	2168	Data Structures	4	
Physics	1062	Elementary Classical Physics II	4	SB
Subtotal			12	

Year 2, Fall Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	2043	Calculus III	4	
Mathematics	2101	Linear Algebra	3	
Mathematics	3031	Introduction to Probability Theory	3	
Subtotal			10	

Year 2, Spring Semester

Department	Course #	Course Name	Hours	RCI
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Mathematics	3041	Differential Equations I	3	
Mathematics	2196*	Basic Concepts of Math	3	WI
		<i>or</i>		
Mathematics	Elective	Select one course 3000+	3-4	
		<i>or</i>		
Actuarial Science	3501 or 3502	Actuarial Modeling I or II	3	
		<i>or</i>		
Chemistry	3301 or 3302	Physical Chemistry Lecture I or II	3	
		<i>or</i>		
CIS	3211	Automata, Computability, & Languages	3	
		<i>or</i>		
	3242	Discrete Structures		
		<i>or</i>		
Economics	3503	Introduction to Econometrics	3	
		<i>or</i>		
Physics	2101	Classical Mechanics	3	
	2701	Introduction to Modern Physics	4	
	3101	Analytical Mechanics	3	
	3301	Electricity and Magnetism	4	
	3302	Classical Electromagnetism	3	
	3701	Introduction to Quantum Mechanics	3	
	4101	Thermodynamics and Kinetic Theory	3	
Subtotal			6-7	

*Math 2196 must be taken before Math 3098 and Math 3141

Year 3, Fall Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	3043	Numerical Analysis I	3-4	
Mathematics	3098	Modern Algebra	3	WI
Mathematics	3141	Advanced Calculus I	3	
Subtotal			9-10	

Year 3, Spring Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	3142	Advanced Calculus II	3	
Mathematics	Elective	Select one course 3000+	3-4	
		<i>or</i>		
Actuarial Science	3501 or 3502	Actuarial Modeling I or II	3	
		<i>or</i>		
Chemistry	3301 or 3302	Physical Chemistry Lecture I or II	3	
		<i>or</i>		
CIS	3211	Automata, Computability, & Languages	3	
		<i>or</i>		
	3242	Discrete Structures		
		<i>or</i>		
Economics	3503	Introduction to Econometrics	3	
		<i>or</i>		
Physics	2101	Classical Mechanics	3	
	2701	Introduction to Modern Physics	4	
	3101	Analytical Mechanics	3	
	3301	Electricity and Magnetism	4	
	3302	Classical Electromagnetism	3	
	3701	Introduction to Quantum Mechanics	3	
	4101	Thermodynamics and Kinetic Theory	3	
Subtotal			6-7	

Year 4, Fall Semester

Mathematics	1041	Calculus I	4	QB
		<i>or</i>		
Mathematics	1941	Honors Calculus I	4	QB
Physics	1061	Elementary Classical Physics I	4	SA
		<i>or</i>		
Physics	2021	General Physics I	4	
Subtotal			8	

Year 1, Spring Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	1042	Calculus II	4	
		<i>or</i>		
Mathematics	1942	Honors Calculus II	4	
Physics	1062	Elementary Classical Physics II	4	SB
		<i>or</i>		
Physics	2022	General Physics II	4	
Subtotal			8	

Year 2, Fall Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	2043	Calculus III	4	
Mathematics	2196*	Basic Mathematical Concepts	3	WI
Mathematics	3041	Differential Equations I	4	
Physics	2501	Computing for Scientists	3	
Subtotal			14	

*Note: Math 2196 must be taken prior to Math 3098 or Math 3141.

Year 2, Spring Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	3031	Introduction to Probability Theory	3	
Physics	2101	Classical Mechanics	3	
Physics	2701	Introduction to Modern Physics	4	
Mathematics	4041	Partial Differential Equations	3	
		<i>or</i>		
Physics	2502	Mathematical Physics	4	
Subtotal			13-14	

Year 3, Fall Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	2101	Linear Algebra	3	
Mathematics	3098	Modern Algebra	3	WI
Mathematics	3141	Advanced Calculus I	3	
Physics	3101	Analytical Mechanics	3	
Physics	3301	Electricity and Magnetism	4	
Subtotal			16	

Year 3, Spring Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	3142	Advanced Calculus II	3	
Physics	3302	Classical Electromagnetism	3	
Physics	3701	Introduction to Quantum Mechanics	3	
Subtotal			9	

Year 4, Fall Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	3043	Numerical Analysis I	3-4	
Physics	4101	Thermodynamics & Kinetic Theory	3	

Physics	4302	Optics	3	
Subtotal			9-10	

Year 4, Spring Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	4051	Intro. to Functions of a Complex Variable	3	
Physics	4796	Experimental Physics	3	WI
Subtotal			6	

Credits in Coursework for B.S. in Math/Physics	83-85
Core / Elective Credits	38-40
Total Credits for B.S. Degree	123

The interdisciplinary program is jointly administered by the departments of Mathematics and Physics. For further discussion of the Interdisciplinary major, see www.temple.edu/physics/undergradprog.html under "dual major in physics and mathematics."

Five-year Master's Program:

The Combined B.A. or B.S./M.A. Program

To participate in this five-year program, a mathematics major should be enrolled in either the B.A. or the B.S. program. Application to continue in the M.A. program must be made to the Graduate Chair of the department no later than the first semester of the senior year. To be accepted by the M.A. program, a student must have a GPA of at least 3.25 in Mathematics courses when the application is made. In addition to completing the B.A. or B.S. requirements, the student must complete four additional graduate-level mathematics courses numbered 5000 and above by the end of her/his senior year. If the Core and College requirements have also been met, the student will be awarded the B.A. or B.S. degree at the conclusion of this portion of the program. All courses must be passed with a grade of C- or better, and no more than two graduate courses can carry a grade less than B- for the student to continue with the M.A. portion of the program.

Fifth-Year Course Requirements

The student will take a total of six graduate-level courses, selected to conform to the M.A. requirements. At the end of the fifth year, the student must either write a master's thesis or pass one of the following examinations:

- Master's Comprehensive Examination in Pure Mathematics
- Master's Comprehensive Examination in Applied Mathematics
- Ph.D. Combined Comprehensive Examination (M.A. level pass)

For further details on the M.A. degree requirement see the [Graduate Bulletin](#).

Five-Year Master's/Secondary Education Certification Program

This is a combined program between the College of Science and Technology and the College of Education. For more information, see the following website:

www.temple.edu/bulletin/Academic_programs/schools_colleges/ed/intro/generalinfo/ed_generalinfo.shtm#teacher

Minor Requirements

- Three semesters of calculus (Math 1041, Math 1042, and Math 2043).
- One semester of computer programming (Computer and Information Sciences: CIS 1053, CIS 1057, CIS 1068, CIS 2168 or Physics 2501).
- Linear algebra (Math 2101)
- Five additional mathematics courses numbered 3000 or above; or Math 2196 and four mathematics courses numbered 3000 or above. (Math 2196 must be taken prior to Math 3098 or Math 3141.)

Distinction in Mathematics

To graduate with Distinction in Mathematics a student should meet the following requirements:

Physics	4302	Optics	3
Subtotal			9-10

Year 4, Spring Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	4051	Intro. to Functions of a Complex Variable	3	
Physics	4796	Experimental Physics	3	WI
Subtotal			6	

Credits in Coursework for B.S. in Math/Physics	83-85
Core / Elective Credits	38-40
Total Credits for B.S. Degree	123

The interdisciplinary program is jointly administered by the departments of Mathematics and Physics. For further discussion of the Interdisciplinary major, see www.temple.edu/physics/undergradprog.html under "dual major in physics and mathematics."

Five-year Master's Program:

The Combined B.A. or B.S./M.A. Program

To participate in this five-year program, a mathematics major should be enrolled in either the B.A. or the B.S. program. Application to continue in the M.A. program must be made to the Graduate Chair of the department no later than the first semester of the senior year. To be accepted by the M.A. program, a student must have a GPA of at least 3.25 in Mathematics courses when the application is made. In addition to completing the B.A. or B.S. requirements, the student must complete four additional graduate-level mathematics courses numbered 5000 and above by the end of her/his senior year. If the Core and College requirements have also been met, the student will be awarded the B.A. or B.S. degree at the conclusion of this portion of the program. All courses must be passed with a grade of C- or better, and no more than two graduate courses can carry a grade less than B- for the student to continue with the M.A. portion of the program.

Fifth-Year Course Requirements

The student will take a total of six graduate-level courses, selected to conform to the M.A. requirements. At the end of the fifth year, the student must either write a master's thesis or pass one of the following examinations:

- Master's Comprehensive Examination in Pure Mathematics
- Master's Comprehensive Examination in Applied Mathematics
- Ph.D. Combined Comprehensive Examination (M.A. level pass)

For further details on the M.A. degree requirement see the [Graduate Bulletin](#).

Five-Year Master's/Secondary Education Certification Program

This is a combined program between the College of Science and Technology and the College of Education. For more information, see the following website:

www.temple.edu/bulletin/Academic_programs/schools_colleges/ed/intro/generalinfo/ed_generalinfo.htm#teacher

Minor Requirements

- Three semesters of calculus (Math 1041, Math 1042, and Math 2043).
- One semester of computer programming (Computer and Information Sciences: CIS 1053, CIS 1057, CIS 1066, CIS 2168 or Physics 2501).
- Linear algebra (Math 2101)
- Five additional mathematics courses numbered 3000 or above; or Math 2196 and four mathematics courses numbered 3000 or above. (Math 2196 must be taken prior to Math 3098 or Math 3141.)

Distinction in Mathematics

To graduate with Distinction in Mathematics a student should meet the following requirements:

1. All requirements for the B.A. or B.S. degree in Mathematics must be met with a GPA of at least 3.50 in the Mathematics courses.
2. At the time of graduation, the student's overall GPA, including all college-level courses, must be at least 3.25.
3. A student must either have a GPA of 3.50 or higher in the following courses: Math 3141, Math 3142, Math 3098, Math 3101, Math 4051 and any other 4000-level course other than individual study, or a student must complete a graduate math course 5000 level or higher with a grade of B or better.

Department	Course #	Course Name	Hours	RCI
Mathematics	4051	Introduction to Functions of a Complex Variable	3	
Mathematics	Elective	Select one course 4000 or above	3-4	
Subtotal			6-7	

Year 4, Spring Semester

Department	Course #	Course Name	Hours	RCI
Mathematics	4096	Senior Problem Solving Seminar	3	WI
Subtotal			3	

Credits in Coursework for B.S. in Mathematics	64-68
Core / Elective Credits	55-59
Total Credits for B.S. Degree	123

Intercollegial B.A. Degree in Mathematical Economics

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or

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The Departments of Economics and Mathematics offer the Mathematical Economics program as a platform for systematic concentration in the mathematical approach to economics. Economics has progressed in the last several decades by making extensive use of mathematical techniques. As a result, students who wish to pursue graduate study in economics, finance, accounting and other disciplines that make an extensive use of economics need a thorough grounding in both economics and mathematics. The Mathematical Economics curriculum provides this grounding with a broad selection of courses that cover all important areas of economics and the mathematical tools required for a critical, deep mastery of these areas. This program is especially recommended for those students who intend to pursue graduate studies in Economics. The program and its requirements are described in full in the "[Intercollegial Programs](#)" section of this *Bulletin*.

Interdisciplinary B.S. Degree in Mathematics and Physics

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Mathematics and Physics, B.S. Degree.

Calculus I, II, III; Calculus-based Physics I, II; Math 2101, Math 2196, Math 3031, Math 3098, Math 3041, Math 3043, Math 3141, Math 3142, Math 4051; Physics 2101, Physics 2501, Physics 2701, Physics 3101, Physics 3301, Physics 3302, Physics 3701, Physics 4101, Physics 4302, Physics 4796; Math 4041 or Physics 2502.

Year 1, Fall Semester

Department	Course #	Course Name	Hours	RCI
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