MATHEMATICS, B.S. (BEHREND)

Begin Campus: Any Penn State Campus

End Campus: Erie

Program Description

This major builds a foundation in mathematics with emphasis on the applications of mathematics and to the development of problem-solving skills. The major has four options that share a common core of mathematics courses for the first two years. The options are Applied Mathematics, Business, Computer Science, and Pure Mathematics. They allow students to concentrate on developing mathematical skills suitable either for entry level positions in areas including applied mathematics, actuarial sciences, statistics and computer programming, or for graduate studies in mathematics and related fields. Students, with the assistance of a faculty adviser, should select an option in their sophomore year. In addition, students are strongly encouraged to participate in faculty supervised research.

What is Mathematics?

The study of mathematics emphasizes careful problem analysis, precision of thought and expression, and the development of mathematical skills needed for work in many other areas. Theoretical mathematicians increase basic knowledge in "pure" fields like abstract algebra, analysis, or topology. Applied mathematicians use tools growing out of calculus, analysis, computing, statistics, and operations research to solve problems in science, industry, government, and other areas.

You Might Like This Program If...

- You enjoy solving challenging problems.
- You like to know why and how things work.
- You are interested in multiple academic disciplines.
- You are looking for a foundational major that supports diverse career paths in the sciences, engineering, research, education, and computer science.
- You find irrational numbers to be very rational, and calculate pi for fun.

Entrance to Major

In order to be eligible for entrance to the Mathematics major, a student must have:

1. attained at least a 2.00 cumulative grade point average; and
2. completed MATH 140 and MATH 141 and earned a grade of C or better in each of these courses.

Degree Requirements

For the Bachelor of Science degree in Mathematics, a minimum of 120 credits is required:

Requirement	Credits
General Education	45
Electives	7-8
Requirements for the Major	85-92

18-24 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 9 credits of GN courses; 6 credits of GQ courses; 0-6 credits of GS courses; 3 credits of GWS courses.

Per Senate Policy 83.80.5, the college dean or campus chancellor and program faculty may require up to 24 credits of coursework in the major to be taken at the location or in the college or program where the degree is earned.

Requirements for the Major

A student enrolled in this major must earn at least a grade of C in each 300- and 400-level course in the major.

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (https://senate.psu.edu/students/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/).

Common Requirements for the Major (All Options)

Code	Title	Credits
Prescribed Courses		
ENGL 202C	Effective Writing: Technical Writing	3
Prescribed Courses: Require a grade of C or better		
CMPSC 121	Introduction to Programming Techniques	3
CMPSC 122	Intermediate Programming	3
MATH 140	Calculus With Analytic Geometry I	4
MATH 141	Calculus with Analytic Geometry II	4
MATH 220	Matrices	2
MATH 230	Calculus and Vector Analysis	4
MATH 251	Ordinary and Partial Differential Equations	4
MATH 311W	Concepts of Discrete Mathematics	4
MATH 312	Concepts of Real Analysis	3
STAT 301		3
STAT 401	Experimental Methods	3
Additional Courses		
Select 1 credit of GN designated course and 8 additional credits in one of the following sequences:		9
BIOL 110 & BIOL 220W	Biology: Basic Concepts and Biodiversity and Biology: Populations and Communities	
CHEM 110 & CHEM 111 & CHEM 112 & CHEM 113	Chemical Principles I and Experimental Chemistry I and Chemical Principles II and Experimental Chemistry II	
PHYS 211 & PHYS 212	General Physics: Mechanics and General Physics: Electricity and Magnetism	
PHYS 250 & PHYS 251	Introductory Physics I and Introductory Physics II	
Requirements for the Option		
Requirements for the Option: Require a grade of C or better		
Select an option		36-43

Requirements for the Option

Applied Mathematics Option (36 credits)

Code	Title	Credits
Additional Courses		
Additional Courses: Require a grade of C or better		

Select 6 credits from CMPSC 221 or higher, except CMPSC 360		6
Select five of the following:		15
MATH 310	Elementary Combinatorics	
MATH 412	Fourier Series and Partial Differential Equations	
MATH 449	Applied Ordinary Differential Equations	
MATH 455	Introduction to Numerical Analysis I	
MATH 456	Introduction to Numerical Analysis II	
MATH 482	Mathematical Methods of Operations Research	
STAT 414	Introduction to Probability Theory	
STAT 461	Analysis of Variance	
STAT 462	Applied Regression Analysis	
STAT 464	Applied Nonparametric Statistics	
STAT 466	Survey Sampling	
Select two of the following:		6
MATH 421	Complex Analysis	
MATH 426	Introduction to Modern Geometry	
MATH 427	Foundations of Geometry	
MATH 429	Introduction to Topology	
MATH 435	Basic Abstract Algebra	
MATH 436	Linear Algebra	
MATH 465	Number Theory	
Supporting Courses and Related Areas		
Supporting Courses and Related Areas: Require a grade of C or better		
Select 9 credits from a school-approved list		9

Business Option (43 credits)

A maximum of 30 credits through the School of Business may be used to fulfill General Education, Major Requirements and Option Requirements.

Code	Title	Credits
Prescribed Courses		
Prescribed Courses: Require a grade of C or better		
ACCTG 211	Financial and Managerial Accounting for Decision Making	4
ECON 102	Introductory Microeconomic Analysis and Policy	3
ECON 104	Introductory Macroeconomic Analysis and Policy	3
MIS 204	Introduction to Management Information Systems	3
Additional Courses		
Additional Courses: Require a grade of C or better		
Select 6 credits from CMPSC 221 or higher, except CMPSC 360, and MIS 336		6
Select two of the following:		6
ECON 481	Business Forecasting Techniques	
ECON 485	Econometric Techniques	
FIN 301	Corporation Finance	
FIN 405	Advanced Financial Management	
FIN 420	Investment and Portfolio Analysis	
FIN 427	Derivative Securities	
MGMT 301	Basic Management Concepts	
MGMT 331	Management and Organization	
MGMT 341	Human Resource Management	
MKTG 301	Principles of Marketing	
Select two of the following:		6
MATH 482	Mathematical Methods of Operations Research	
MIS 336	Database Management Systems	
MIS 430	Systems Analysis	
MIS 435	Systems Design and Implementation	
MIS 445	Business Intelligence	
STAT 414	Introduction to Probability Theory	
STAT 461	Analysis of Variance	
STAT 462	Applied Regression Analysis	
STAT 464	Applied Nonparametric Statistics	
STAT 466	Survey Sampling	
Select two of the following:		6
MATH 421	Complex Analysis	
MATH 426	Introduction to Modern Geometry	
MATH 427	Foundations of Geometry	
MATH 429	Introduction to Topology	
MATH 435	Basic Abstract Algebra	
MATH 436	Linear Algebra	
MATH 465	Number Theory	
Supporting Courses and Related Areas		
Supporting Courses and Related Areas: Require a grade of C or better		
Select 6 credits from a school-approved list		6

Computer Science Option (36 credits)

Code	Title	Credits
Prescribed Courses		
Prescribed Courses: Require a grade of C or better		
CMPSC 455	Introduction to Numerical Analysis I	3
CMPSC 465	Data Structures and Algorithms	3
Additional Courses		
Additional Courses: Require a grade of C or better		
CMPSC 221	Object Oriented Programming with Web-Based Applications	3
or SWENG 311	Object-Oriented Software Design and Construction	
CMPSC 312	Computer Organization and Architecture	3
or CMPEN 351	Microprocessors	
Select 12 credits from CMPSC courses at the 300- and 400-level		12
Supporting Courses and Related Areas		
Supporting Courses and Related Areas: Require a grade of C or better		
Select 12 credits from a school-approved list		12

Pure Mathematics Option (36 credits)

Code	Title	Credits
Additional Courses		
Additional Courses: Require a grade of C or better		
Select six of the following:		18
MATH 310	Elementary Combinatorics	
MATH 412	Fourier Series and Partial Differential Equations	
MATH 421	Complex Analysis	
MATH 426	Introduction to Modern Geometry	
MATH 427	Foundations of Geometry	
MATH 429	Introduction to Topology	
MATH 435	Basic Abstract Algebra	
MATH 436	Linear Algebra	
MATH 455	Introduction to Numerical Analysis I	
MATH 456	Introduction to Numerical Analysis II	

MATH 465	Number Theory	
MATH 482	Mathematical Methods of Operations Research	
STAT 414	Introduction to Probability Theory	
STAT 461	Analysis of Variance	
STAT 462	Applied Regression Analysis	
STAT 464	Applied Nonparametric Statistics	
STAT 466	Survey Sampling	
Select three of the following:		9
MATH 403	Classical Analysis I	
MATH 421	Complex Analysis	
MATH 429	Introduction to Topology	
MATH 435	Basic Abstract Algebra	
Supporting Courses and Related Areas		
Supporting Courses and Related Areas: Require a grade of C or better		
Select 9 credits from a school-approved list		9

General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required and Inter-Domain courses do not meet this requirement.)

- **Quantification (GQ):** 6 credits
- **Writing and Speaking (GWS):** 9 credits

Breadth in the Knowledge Domains (Inter-Domain courses do not meet this requirement.)

- **Arts (GA):** 3 credits
- **Health and Wellness (GHW):** 3 credits
- **Humanities (GH):** 3 credits
- **Social and Behavioral Sciences (GS):** 3 credits
- **Natural Sciences (GN):** 3 credits

Integrative Studies

- **Inter-Domain Courses (Inter-Domain):** 6 credits

Exploration

- **GN,** may be completed with Inter-Domain courses: 3 credits
- **GA, GH, GN, GS, Inter-Domain courses.** This may include 3 credits of World Language course work beyond the 12th credit level or the requirements for the student's degree program, whichever is higher**:** 6 credits

University Degree Requirements

First Year Engagement

All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement

6 credits are required and may satisfy other requirements

- United States Cultures: 3 credits
- International Cultures: 3 credits

Writing Across the Curriculum

3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits

A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work

Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition

The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (https://senate.psu.edu/students/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/)). For more information, check the Suggested Academic Plan for your intended program.

Program Learning Objectives

- **Communication:** Students will demonstrate and apply communicating mathematics in written form.
- **Modeling:** Students will demonstrate the knowledge to describe physical situations mathematically.
- **Opportunity:** Students will demonstrate knowledge of internship opportunities and opportunities to participate in mathematical research directed by mathematics faculty. Furthermore, each student who participated in an internship or in undergraduate research will be able to describe in a paragraph what he or she learned through the experience.
- **Problem Solving:** Students will demonstrate the knowledge to apply logical skills in order to understand how to approach and solve mathematical problems.
- **Proofs:** Students will demonstrate and apply proof techniques.

Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (https://senate.psu.edu/students/policies-and-rules-for-undergraduate-students/32-00-advising-policy/)

Erie

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Suggested Academic Plan

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2025-26 academic year. To access previous years' suggested academic plans, please visit the archive (https://bulletins.psu.edu/undergraduate/archive/) to view the appropriate Undergraduate Bulletin edition.

Applied Mathematics Option: Mathematics, B.S. at Erie Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits	Spring	Credits
MATH 140*#†	4	MATH 141*#	4
ENGL 15 or 30H‡	3	MATH 220*	2
CMPSC 121*†	3	CMPSC 122*	3
General Education Course (GN Selection/Science Sequence Course)†	4	General Education Course (GN Selection/Science Sequence Course)†	4
PSU 7	1	General Education Course†	3
	15		**16**

Second Year

Fall	Credits	Spring	Credits
CAS 100‡	3	MATH 311W*	4
MATH 230*	4	MATH 251*	4
STAT 301*[2]	3	STAT 401*	3
General Education Course†	3	General Education Course	3
General Education Course (GHW)	1.5	General Education Course (GHW)	1.5
	14.5		**15.5**

Third Year

Fall	Credits	Spring	Credits
MATH 312*	3	ENGL 202C‡	3
Additional Course Selection (Group A)*	3	Additional Course Selection (Group A)*	3
Additional Course Selection (Group C)*	3	Additional Course Selection (Group B)*	3
General Education Course†	3	Additional Course Selection (Group C)*	3
Program List Course*	3	General Education Course†	3
	15		**15**

Fourth Year

Fall	Credits	Spring	Credits
Additional Course Selection (Group A)*	3	Additional Course Selection (Group A)*	3
Additional Course Selection (Group B)*	3	Additional Course Selection (Group A)*	3
Elective Course	3	Program List Course*†	3
General Education Course†	3	Elective Course	3
Program List Course*	3	General Education Course†	3
	15		**15**

Total Credits 121

* Course requires a grade of C or better for the major
‡ Course requires a grade of C or better for General Education
# Course is an Entrance to Major requirement
† Course satisfies General Education and degree requirement

[1] Prerequisite: satisfactory performance on the MATH placement tests (ALEKS) - i.e. placement beyond the level of MATH 22; or CHEM 101 and MATH 22 or MATH 41
[2] See adviser for acceptable substitutions

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

Program Notes

1.) Students who have not met the admissions requirement of two units of a high school world language must complete a college level-one world language within their first 60 credits. In order to be eligible for entrance

to the mathematics major, a student must have attained at least a 2.00 cumulative GPA and completed MATH 140 and MATH 141 earning a grade of C or better in both courses.
2.) Students graduating from a major must achieve a minimum GPA of 2.00 and earn a grade of C or better in all 300- and 400-level courses within the "prescribed," "additional," and "supporting" courses as specified in Senate Policy 82-44. If a student received a grade below a C, s/he must repeat that course or a School approved alternative, and earn a grade of C or better.
3.) Students should inquire whether their Program List courses count toward a minor or a certificate.
4.) A student must earn at least a total of 120 credits for graduation.

Scheduling Patterns
Some course are offered only in the fall or in the spring semester, and some upper-level courses are offered in alternative year pattern. The scheduling pattern below is tentative and subject to change:
Every Fall - MATH 312, MATH 455
Every Spring - MATH 436, STAT 401
Fall (Even Years) - MATH 427, MATH 428, MATH 465, STAT 462
Spring (Odd Years) - MATH 421, MATH 449, STAT 461
Fall (Odd Years) - MATH 412, MATH 435, STAT 414
Spring (Even Years) - MATH 310, MATH 429, MATH 456, MATH 482, one of either STAT 464 or STAT 466
Spring (Occasional Offerings) - MATH 403, MATH 426 or MATH 475Y or MATH 497

Advising Notes

Science Sequence Course
Student must complete one of the following two semester science course sequences, which will also count toward their general education Science (GN) requirement:
- BIOL 110S and BIOL 220W
- CHEM 110, CHEM 111, CHEM 112, and CHEM 113
- PHYS 211 and PHYS 212
- PHYS 250 and PHYS 251

Additional Course Selections
Group A: MATH 310, MATH 412, MATH 449, MATH 455, MATH 456, MATH 482, STAT 414, STAT 461, STAT 464, STAT 462, STAT 466
Group B: MATH 421, MATH 426, MATH 427, MATH 429, MATH 435, MATH 436, MATH 465
Group C: CMPSC 221 or higher, with the exception of CMPSC 360

Program List Courses
- All 300- and 400-level courses in BIOL, CHEM, MATH, PHYS, and STAT. No more than three credits of any 495 can be used as supporting courses

- CMPSC 102, CMPSC 221, and all 300-and 400-level CMPSC courses, with the exception of CMPSC 360
- ACCTG 211
- All CMPEN Courses
- All EE Courses
- All EMCH Courses
- All 300- and 400-level courses in ECON
- All 300-and 400-level courses in FIN
- All 200- and above level courses in MIS
- All SCM courses, with the exception of SCM 200
- BA 241 and BA 242
- All ME Courses
- All MGMT courses
- All MRKTG courses
- All SWENG Courses

Business Option: Mathematics, B.S. at Erie Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits	Spring	Credits
MATH 140*#†	4	MATH 141*#	4
ENGL 15‡	3	MATH 220*	2
CMPSC 121*†	3	CMPSC 122*	3
PSU 7	1	ECON 102†	3
General Education Course (GN Selection/Science Sequence Course)†	4	General Education Course (GN Selection/Science Sequence Course)†	4
	15		**16**

Second Year

Fall	Credits	Spring	Credits
CAS 100‡	3	MATH 311W*	4
MATH 230*	4	MATH 251*	4
STAT 301*[2]	3	STAT 401*	3
ECON 104†	3	MIS 204*	3
General Education Course (GHW)	1.5	General Education Course (GHW)	3
	14.5		**17**

Third Year

Fall	Credits	Spring	Credits
MATH 312*	3	ENGL 202C‡†	3
ACCTG 211*	4	Additional Course Selection (Group A)*	3
Additional Course Selection (Group A)*	3	Additional Course Selection (Group D)*	3
General Education Course†	3	Additional Course Selection (Group B)*	3
General Education Course	3	General Education Course	3
	16		**15**

Fourth Year

Fall	Credits	Spring	Credits
Additional Course Selection (Group B)*	3	Additional Course Selection (Group C)*	3
Additional Course Selection (Group C)*	3	Program List Course*	3
Additional Course Selection (Group D)*	3	General Education Course	3
Program List Course*	3	Elective Course	3
General Education Course	3	Elective Course	3
	15		**15**

Total Credits 123.5

* Course requires a grade of C or better for the major
‡ Course requires a grade of C or better for General Education
# Course is an Entrance to Major requirement
† Course satisfies General Education and degree requirement

[1] Prerequisite: satisfactory performance on the MATH placement tests (ALEKS) - i.e. placement beyond the level of MATH 22; or CHEM 101 and MATH 22 or MATH 41
[2] See adviser for acceptable substitutions

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

Program Notes

1.) Students who have not met the admissions requirement of two units of a high school world language must complete a college level-one world language within their first 60 credits. In order to be eligible for entrance to the mathematics major, a student must have attained at least a 2.00 cumulative GPA and completed MATH 140 and MATH 141 earning a grade of C or better in both courses.
2.) Students graduating from a major must achieve a minimum GPA of 2.00 and earn a grade of C or better in all 300- and 400-level courses within the "prescribed," "additional," and "supporting" courses as specified in Senate Policy 82-44. If a student received a grade below a C, s/he must repeat that course or a School approved alternative, and earn a grade of C or better.
3.) Students should inquire whether their Program List courses count toward a minor or a certificate.
4.) A student must earn at least a total of 120 credits for graduation.

Scheduling Patterns

Some course are offered only in the fall or in the spring semester, and some upper-level courses are offered in alternative year pattern. The scheduling pattern below is tentative and subject to change:
Every Fall - MATH 312, MATH 455
Every Spring - MATH 436, STAT 401
Fall (Even Years) - MATH 427, MATH 428, MATH 465, STAT 462
Spring (Odd Years) - MATH 421, MATH 449, STAT 461
Fall (Odd Years) - MATH 412, MATH 435, STAT 414
Spring (Even Years) - MATH 310, MATH 429, MATH 456, MATH 482, one of either STAT 464 or STAT 466
Spring (Occasional Offerings) - MATH 403, MATH 426 or MATH 475Y or MATH 497

Advising Notes

Science Sequence Course

Student must complete one of the following two semester science course sequences, which will also count toward their general education Science (GN) requirement:
- BIOL 110S and BIOL 220W
- CHEM 110, CHEM 111, CHEM 112, and CHEM 113
- PHYS 211 and PHYS 212

- PHYS 250 and PHYS 251

Additional Course Selections
Group A: ECON 481, ECON 485, FIN 301, FIN 405, FIN 420, FIN 427, MGMT 301, MGMT 331, MGMT 341, MKTG 301
Group B: MATH 482, MIS 336, MIS 430, MIS 435, MIS 445, STAT 414, STAT 461, STAT 462, STAT 464, STAT 466
Group C: MATH 421, MATH 426, MATH 427, MATH 429, MATH 435, MATH 436, MATH 465
Group D: MIS 336, CMPSC 221 or higher, with the exception of CMPSC 360

No course may be used to fulfill the requirement in two different groups. For example, a student may not use MIS 336 to satisfy both the Group B and Group D requirements.

Program List Courses
- All 300- and 400-level courses in BIOL, CHEM, MATH, PHYS, and STAT. No more than three credits of any 495 can be used as supporting courses

- CMPSC 102, CMPSC 221, and all 300-and 400-level CMPSC courses, with the exception of CMPSC 360
- All 300- and 400-level courses in ECON
- All 300-and 400-level courses in FIN
- All 200- and above level courses in MIS
- All SCM courses, with the exception of SCM 200
- BA 241 and BA 242
- All MGMT courses
- All MRKTG courses

Computer Science Option: Mathematics, B.S. at Erie Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits	Spring	Credits
MATH 140*#†	4	MATH 141*#	4
ENGL 15 or 30H‡	3	MATH 220*	2
CMPSC 121*†	3	CMPSC 122*	3
General Education Course (GN Selection/Science Sequence Course)†	4	General Education Course (GN Selection/Science Sequence Course)†	4
PSU 7	1	General Education Course†	3
	15		**16**

Second Year

Fall	Credits	Spring	Credits
CAS 100‡	3	MATH 311W*	4
MATH 230*	4	MATH 251*	4
STAT 301*[2]	3	STAT 401*	3
General Education Course†	3	Additional Course Selection (Group A)*	3
General Education Course (GHW)	1.5	General Education Course (GHW)	1.5
	14.5		**15.5**

Third Year

Fall	Credits	Spring	Credits
MATH 312*	3	ENGL 202C‡	3
Additional Course Selection (Group A)*	3	Additional Course Selection (Group A)*	3
Additional Course Selection (Group A)*	3	Additional Course Selection (Group B)*	3
General Education Course†	3	Program List Course*	3
Program List Course*	3	General Education Course†	3
	15		**15**

Fourth Year

Fall	Credits	Spring	Credits
Additional Course Selection (Group B)*	3	Additional Course Selection (Group B)*	3
Additional Course Selection (Group B)*	3	Program List Course*†	3
Elective Course	3	Elective Course	3
General Education Course†	3	General Education Course†	3
Program List Course*	3	General Education Course†	3
	15		**15**

Total Credits 121

* Course requires a grade of C or better for the major
‡ Course requires a grade of C or better for General Education
# Course is an Entrance to Major requirement
† Course satisfies General Education and degree requirement

[1] Prerequisite: satisfactory performance on the MATH placement tests (ALEKS) - i.e. placement beyond the level of MATH 22; or CHEM 101 and MATH 22 or MATH 41
[2] See adviser for acceptable substitutions

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

Program Notes

1.) Students who have not met the admissions requirement of two units of a high school world language must complete a college level-one world language within their first 60 credits. In order to be eligible for entrance to the mathematics major, a student must have attained at least a 2.00 cumulative GPA and completed MATH 140 and MATH 141 earning a grade of C or better in both courses.
2.) Students graduating from a major must achieve a minimum GPA of 2.00 and earn a grade of C or better in all 300- and 400-level courses within the "prescribed," "additional," and "supporting" courses as specified in Senate Policy 82-44. If a student received a grade below a C, s/he must repeat that course or a School approved alternative, and earn a grade of C or better.
3.) Students should inquire whether their Program List courses count toward a minor or a certificate.
4.) A student must earn at least a total of 120 credits for graduation.

Scheduling Patterns

Some course are offered only in the fall or in the spring semester, and some upper-level courses are offered in alternative year pattern. The scheduling pattern below is tentative and subject to change:
Every Fall - MATH 312, MATH 455
Every Spring - MATH 436, STAT 401
Fall (Even Years) - MATH 427, MATH 428, MATH 465, STAT 462
Spring (Odd Years) - MATH 421, MATH 449, STAT 461
Fall (Odd Years) - MATH 412, MATH 435, STAT 414
Spring (Even Years) - MATH 310, MATH 429, MATH 456, MATH 482, one of either STAT 464 or STAT 466
Spring (Occasional Offerings) - MATH 403, or MATH 426 or MATH 475Y or MATH 497

Advising Notes

Science Sequence Course

Student must complete one of the following two semester science course sequences, which will also count toward their general education Science (GN) requirement:
- BIOL 110S and BIOL 220W
- CHEM 110, CHEM 111, CHEM 112, and CHEM 113
- PHYS 211 and PHYS 212

- PHYS 250 and PHYS 251

Additional Course Selections
Group A: CMPSC 311 or SWENG 311, CMPSC 312 or CMPEN 351, CMPSC 455, CMPSC 465
Group B: CMPSC courses at the 300- and 400-level, with the exception of CMPSC 360

Program List Courses
- All 300-and 400-level courses in MATH and STAT. No more than three credits of any 495 can be used as supporting courses
- CMPSC 102, CMPSC 221, and all 300-and 400-level CMPSC courses, with the exception of CMPSC 360
- CMPEN 441
- All 200- and above level courses in MIS
- All SCM courses, with the exception of SCM 200

Pure Mathematics Option: Mathematics, B.S. at Erie Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits	Spring	Credits
MATH 140*#†	4	MATH 141*#	4
ENGL 15 or 30H‡	3	MATH 220*	2
CMPSC 121*†	3	CMPSC 122*	3
General Education Course (GN Selection/Science Sequence Course)†	4	General Education Course (GN Selection/Science Sequence Course)†	4
PSU 7	1	General Education Course†	3
	15		**16**

Second Year

Fall	Credits	Spring	Credits
CAS 100‡	3	MATH 311W*	4
MATH 230*	4	MATH 251*	4
STAT 301*[2]	3	STAT 401*	3
General Education Course†	3	General Education Course	3
General Education Course (GHW)	1.5	General Education Course (GHW)	1.5
	14.5		**15.5**

Third Year

Fall	Credits	Spring	Credits
MATH 312*	3	ENGL 202C‡	3
Additional Course Selection (Group A)*	3	Additional Course Selection (Group A)*	3
Additional Course Selection (Group B)*	3	Additional Course Selection (Group B)*	3
General Education Course†	3	Additional Course Selection (Group A)*	3
Program List Course*	3	General Education Course†	3
	15		**15**

Fourth Year

Fall	Credits	Spring	Credits
Additional Course Selection (Group A)*	3	Additional Course Selection (Group A)*	3
Additional Course Selection (Group B)*	3	Additional Course Selection (Group A)*	3
Elective Course	3	Program List Course*†	3
General Education Course†	3	Elective Course	3
Program List Course*	3	General Education Course†	3
	15		**15**

Total Credits 121

* Course requires a grade of C or better for the major
‡ Course requires a grade of C or better for General Education
# Course is an Entrance to Major requirement
† Course satisfies General Education and degree requirement

[1] Prerequisite: satisfactory performance on the MATH placement tests (ALEKS) - i.e. placement beyond the level of MATH 22; or CHEM 101 and MATH 22 or MATH 41
[2] See adviser for acceptable substitutions

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

Program Notes

1.) Students who have not met the admissions requirement of two units of a high school world language must complete a college level-one world language within their first 60 credits. In order to be eligible for entrance to the mathematics major, a student must have attained at least a 2.00 cumulative GPA and completed MATH 140 and MATH 141earning a grade of C or better in both courses.
2.) Students graduating from a major must achieve a minimum GPA of 2.00 and earn a grade of C or better in all 300- and 400-level courses within the "prescribed," "additional," and "supporting" courses as specified in Senate Policy 82-44. If a student received a grade below a C, s/he must repeat that course or a School approved alternative, and earn a grade of C or better.
3.) Students should inquire whether their Program List courses count toward a minor or a certificate.
4.) A student must earn at least a total of 120 credits for graduation.

Scheduling Patterns

Some course are offered only in the fall or in the spring semester, and some upper-level courses are offered in alternative year pattern. The scheduling pattern below is tentative and subject to change:
Every Fall - MATH 312, MATH 455
Every Spring - MATH 436, STAT 401
Fall (Even Years) - MATH 427 ,MATH 428, MATH 465, STAT 462
Spring (Odd Years)- MATH 421, MATH 449, STAT 461
Fall (Odd Years) - MATH 412, MATH 435, STAT 414
Spring (Even Years) - MATH 310, MATH 429, MATH 456, MATH 482, one of either STAT 464 or STAT 466
Spring (Occasional Offerings) - MATH 403, or MATH 426 or MATH 475Y or MATH 497

Advising Notes

Science Sequence Course

Student must complete one of the following two semester science course sequences, which will also count toward their general education Science (GN) requirement:
-BIOL 110S and BIOL 220W
-CHEM 110, CHEM 111, CHEM 112, and CHEM 113
-PHYS 211 and PHYS 212

-PHYS 250 and PHYS 251

Additional Course Selections
Group A: MATH 310, MATH 412, MATH 449, MATH 455, MATH 456, MATH 482, STAT 414, STAT 461, STAT 464, STAT 462, STAT 466
Group B: MATH 421, MATH 426, MATH 427, MATH 429, MATH 435, MATH 436, MATH 465

No course may be used to fulfill the requirement in both Group A and Group B

Program List Courses
- All 300- and 400-level courses in BIOL, CHEM, MATH, PHYS, and STAT. No more than three credits of any 495 can be used as supporting courses

- All CMPEN Courses
- CMPSC 102, CMPSC 221, and all 300-and 400-level CMPSC courses, with the exception of CMPSC 360
- All 300- and 400-level courses in ECON
- All EE Courses
- All EMCH Courses
- All 300-and 400-level courses in FIN
- All 200- and above level courses in MIS
- All SCM courses, with the exception of SCM 200
- ACCTG 211
- BA 241 and BA 242
- All ME Courses
- All MGMT courses
- All MRKTG courses
- PHIL 10, PHIL 12
- All SWENG Courses

Career Paths

You can tailor your math degree to your career goals by pursuing one of four options. Applied Mathematics emphasizes numerical analysis, modeling, and problem solving. Pure Mathematics is excellent preparation for graduate school. The Business Option includes additional coursework in statistics, management information systems, economics, and finance. The Computer Science Option emphasizes programming, algorithms, and numerical methods. Penn State Behrend has a comprehensive support system to help you identify and achieve your goals for college and beyond. Meet with your academic adviser often and take advantage of the services offered by the Academic and Career Planning Center.

Careers

A degree in mathematics can lead to careers in fields as varied as actuarial planning, computer systems design, software engineering, information systems, mathematical biology, mathematics education, operations research, programming management, quality control analysis, system analysis, data analysis, financial analysis, national security and defense, and technical writing. The demand for mathematicians is projected to be strong because of a shortage of science teachers and a growing need for specialists in actuarial mathematics, computer network efficiency, and data analysis. For students interested in both mathematics and teaching, Penn State Behrend also offers a B.S. in Secondary Education in Mathematics.

MORE INFORMATION ABOUT POTENTIAL CAREER OPTIONS FOR GRADUATES OF THE MATHEMATICS PROGRAM (https://behrend.psu.edu/school-of-science/academic-programs/mathematics/)

Opportunities for Graduate Studies

Graduates may continue their studies to earn a master's or doctoral degree in pure math, applied math, or other technical fields. Mathematics is a common foundational major for graduate study in the natural sciences, engineering, business and economics, statistics or biostatistics, operations research, and national security analysis. Mathematics also is a useful undergraduate major for future architects, doctors, lawyers, and other professionals.

MORE INFORMATION ABOUT OPPORTUNITIES FOR GRADUATE STUDIES (https://behrend.psu.edu/school-of-science/academic-programs/mathematics/)

Professional Resources

- Mathematical Association of America (https://maa.org)
- American Mathematical Society (https://www.ams.org/home/page/)
- National Association of Mathematicians (https://www.nam-math.org/)
- Society for Industrial and Applied Mathematics (https://www.siam.org/)

Contact

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