

MATHEMATICS AND MATHEMATICS EDUCATION

University of Wisconsin-Stevens Point

Student Planning Guide

Revised October 2020

**University of Wisconsin-Stevens Point
Department of Mathematical Sciences
Stevens Point, WI 54481**

(715) 346-2120 fax (715) 346-4260

Web Page: <http://www.uwsp.edu/mathsci>

Table of Contents

General Information	3
---------------------------	---

Mathematics Majors

Mathematics Major	4
Considering Graduate School	6
Mathematics Major with Actuarial Emphasis	8
Actuarial Emphasis Information	10
Mathematics Minor	11
Applied Mathematics Minor	11

Secondary Mathematics Teachers

Information about being admitted to the Professional Education Program ..	12
Mathematics Major	
Secondary Teacher Certification (grades 9-12)	13
Mathematics Minor	
Secondary Teacher Certification (grades 9-12)	15

Elementary School Teachers

Mathematics Minor	
for Elementary Education Majors	16
Courses in Mathematics and Mathematics Education	17
Courses in Mathematics – Catalog Descriptions	18
Courses in Mathematics Education – Catalog Descriptions	20

General Information

Of all human endeavors, few offer such a diverse character as mathematics. Galileo called mathematics the language which was used to write the universe. It is through mathematics that the physical sciences view and explain the laws of nature. Mathematics is used to solve problems in medicine, economics, management, geography, chemistry, engineering, physics and computer science. On the other hand, mathematics can also be viewed as an artistic expression of intellect. Mathematics is limited only by one's imagination, logic and creativity. Mathematics has something for everyone!

THE PROGRAM

All students majoring in mathematics at UW-Stevens Point begin by taking three semesters of Calculus, one semester of Linear Algebra, and an Introduction to Proof course. They then complete their Bachelor of Science degree choosing one of the following options:

The Mathematics Major

This option allows you the flexibility either to specialize (in applied mathematics for example) or to acquire a broad background in mathematics by selecting from various areas of mathematics such as linear algebra, abstract algebra, analysis, applied mathematics, history of mathematics, number theory, topology, and probability & statistics.

The Mathematics Major with Actuarial Emphasis

This option requires students to specialize in mathematical areas which have particular value to actuarial science. This program features a strong concentration of mathematics courses, including linear algebra and probability & statistics, along with other courses in applied mathematics, business, and economics, and preparation courses for Society of Actuaries (SOA) examinations.

The Mathematics Major for Teaching Certification

This option is structured to ensure that you will satisfy the licensing requirements for secondary teacher certification by completing dedicated geometry and statistics courses containing integrated educational methods. Additional mathematics courses from the areas of analysis, abstract algebra, and discrete mathematics provide a comprehensive content preparation. Additional educational training in mathematics teaching technology, mathematics educational methods, and the history of mathematics ensure your subject competency. A secondary/middle school student teaching experience completes the requirements for this major.

Careers

A Bachelor of Science degree in the mathematical sciences can prepare students for jobs in statistics, logistics, actuarial science, mathematical modeling, and education. By combining the mathematics major with an appropriate collateral minor or double major, you can prepare for entry into many professional programs. Because of the versatile nature of mathematics, graduates of UWSP with a mathematics major have enjoyed career prospects in varied industries including insurance, banking, financial services, government (federal and state), education, software publishing, consulting, e-commerce, health care, and law.

Mathematics Major (Bachelor of Science) Effective: Fall 2019

Description Consists of at least 46 credits:

1. Collateral Natural Science Requirements (required but not part of the 46 credits mentioned above):
 - a. Take at least 10 credits of Natural Science Courses from the General Education Program list, including 5 credits from PHYS 240 or PHYS 203
 - b. Or, complete a major or minor in Biology, Biochemistry, Chemistry, Chemical Engineering, Paper Science, or Physics
2. Mathematics Foundation Courses (22 credits): Math 225, 226, 227, 230, 300. We recommend that you complete 230 and 300 before you enroll in any courses numbered above 300. Note: Math 300 includes written communication in the major objectives.
3. Depth (6 credits): Complete one of the following:
 - a. Algebra: Two courses from Math 330, 331, 332
 - b. Analysis: Two courses from Math 323, 324, 327
 - c. Operations Research: Math 310 and 315
 - d. Probability and statistics: Math 356 and 357
4. Core (an additional 6 credits): Take two courses from Math 323, 324, 327, 330, 331, or 332
5. Breadth Electives (at least 9 additional credits):
 - a. (6 credits) Take two courses from Math 305, 310, 315, 320, 323, 324, 327, 330, 331, 332, 335, 356, 357, 367, 372.
 - b. (3 or 4 credits): Take one additional course from 5a or 3-4 credits from 390, 395 or 499
6. Capstone Experience (3 credits): Take either Math 380 or 381 or a capstone experience approved by the chair. Note: Math 380 and 381 include oral communication in the major objectives.

To have the Mathematics Major approved for graduation, you must have a minimum grade point average of 2.00 in the courses you select to satisfy the requirements of the major. In addition, you must achieve a grade of C or better in at least 18 credits in required courses numbered 300 or above. These standards apply regardless of a declaration of academic bankruptcy. The department chair may allow exceptions on a conditional basis.

COURSE	CREDITS	COMPLETED
1. Math 225 (B), Math 226 (B), Math 227 (B)	5+5+4	
2. Math 230, Math 300	4+4	
3. Natural Science: _____, _____, _____	12 or more	
4. Depth (complete one of the following options) a. 2 from Math 330, 331, 332: _____ & _____ b. 2 from Math 323, 324, 327: _____ & _____ c. Math 310 (F) and 315 d. Math 356 (F) and 357 (S)	6	
5. Core: Math _____ & _____	6	
6. Breadth Electives (from 5a and 5b above) Math _____	9 or 10	
7. Capstone: Math 380 or 381 (S)	3	

(B) – indicates a course typically offered both Spring and Fall

(F) – indicates a course typically offered every Fall, (S) – indicates a course typically offered every Spring



This graduation plan illustrates the type of curriculum a new student would take to complete a degree in four years. It is not meant to serve as an official document. Students should contact their academic adviser to develop a personalized plan of study. Refer to the University Catalog for a complete list of requirements: <https://catalog.uwsp.edu/>.

This plan assumes placement into English 101/202 and Math 225.

Semester 1	Credits	Semester 2	Credits
English 101 - Freshman English (Foundation-WC)	3	Communication 101 (Foundation-OC)	3
GENED Investigation (ART/HP/HU/SS)	3	GENED Investigation (ART/HP/HU/SS)	3
Math 225 - Calculus I	4	Math 226 - Calculus II	4
Natural Science for the Major*	4-5	Physics 240*	5
<i>Total credits</i>	14-15	<i>Total credits</i>	15
Semester 3	Credits	Semester 4	Credits
English 202 - Sophomore English (Foundation-WC)	3	GENED Investigation (ART/HP/HU/SS)	6
Wellness (Foundation-WLN)	2	Minor/2nd major course	3
GENED Investigation (ART/HP/HU/SS)	3	Math 300 - Intro to Proof with Real Analysis (COM)	4
Math 230 - Introduction to Linear Algebra	4	Natural Science for the Major*	3-4
Math 227 - Calculus III	4		
<i>Total credits</i>	16	<i>Total credits</i>	16-17
Semester 5	Credits	Semester 6	Credits
GENED Cultural/Env Awareness (ER/GA/USD or IS)	3	GENED Investigation (ART/HP/HU/SS)	3
Minor/2nd major/Elective courses	6	GENED Cultural/Env Awareness (ER/GA/USD or IS)	3
Math Elective (300-level; Core)	3	Minor/2nd major/Elective course	3
Math Elective (300-level; Depth)	3	Math Elective (300-level; Breadth^{1 or 2})	3
		Math Elective (300-level; Depth)	3
<i>Total credits</i>	15	<i>Total credits</i>	15
Semester 7	Credits	Semester 8	Credits
GENED Cultural/Env Awareness (ER/GA/USD or IS)	3	GENED Cultural/Env Awareness (ER/GA/USD or IS)	3
Minor/2nd major/Elective courses	6	Minor/2nd major/Elective courses	6
Math Elective (300-level; Core)	3	Math Elective (300-level; Breadth^{1 or 2})	3
Math Elective (300-level; Breadth^{1 or 2})	3	Math 380 - History of Mathematics or	3
		Math 381 - Math Research Methods (Sp; CAP)	
<i>Total credits</i>	15	<i>Total credits</i>	15

Academic Standards and Policies for this Major:

Students must maintain a minimum GPA of 2.00 in the courses selected to satisfy the requirements of the major. In addition, students must achieve a grade of C or better in at least 18 credits in required courses numbered 300 and above.

*Need at least 10 credits in Natural Science including Physics 240 - University Physics **OR** Physics 203 - College Physics I **OR** a major or minor in Biology, Biochemistry, Chemistry, Paper Science, or Physics.

Depth Math Electives: Complete one of the following: **Algebra** [Two courses from 330, 331, 332]; **Analysis** [Two courses from 323, 324, 327]; **Operations Research** [310 and 315]; or **Probability and Statistics** [356 and 357]

Core Math Electives: Choose two courses from: Math 323, 324, 327, 330, 331, or 332

Breadth Math Electives: ¹Choose two courses from Math 305, 310, 315, 320, 323, 324, 327, 330, 331, 332, 335, 356, 357, 367, 372. ²Can choose one additional course from the first list or 3-4 credits from the following: Math 390, 395, 499

(Fa) = offered fall semesters (Sp) = offered spring semesters

For Students Considering Graduate School

Why attend graduate school?

Because graduate school provides an excellent opportunity to learn and do research in any number of exciting areas of mathematics! Also, an advanced degree in mathematics can potentially open up career paths both in industry and academia (i.e. research careers and university careers with teaching and research) that might not otherwise be available to you.

Cost

For many students, if not most, graduate school in mathematics will cost nothing – it will not add to student loan debt. The reason for this is that universities provide many admitted students with either an assistantship or a fellowship that, along with a tuition waiver, includes a stipend to cover living expenses. Assistantships often require that a student teach, grade, tutor, etc... whereas fellowships are more like scholarships. That said, not all students are offered such a package, so make sure that you fully understand whatever support package you are being offered. Feel free to talk over your options with UWSP faculty.

How to choose a graduate school

While there is no “right” way to do this, it is a good idea to familiarize yourself with webpages of graduate programs you might be interested in. Try to be sure that some of the areas of research represented at the university sound interesting to you (you don’t need to know *exactly* what you want to study yet, just a very rough idea will suffice for most places). You also need to consider how important factors such as reputation and location are to you. Regardless, it is a good idea to apply to a variety of schools to give yourself options (upon acceptance, many schools will make you an offer AND pay for you to come visit during the spring of your senior year).

How to apply

While not all graduate schools have the same admission requirements, most require:

- 1) A personal statement/statement of purpose
- 2) Three letters of reference
- 3) Official Academic Transcripts
- 4) General GRE scores (this exam may be taken year round).

Also, a great many schools require the GRE subject examination in mathematics which must usually be taken by **October** of your senior year – this is due to the fact graduate school applications can be due as early **December** (but typically January) of your senior year. The moral is, be working on this all during the summer and fall of your senior year, if not sooner!

Suggested Courses

For students pursuing a graduate degree in mathematics it is recommended that you take as many as possible (and hopefully all) of Math 305 (discrete mathematics), Math 323 (real analysis), Math 331 and 332 (abstract algebra), and Math 372 (topology).

For students with more of an interest in applied mathematics, you should take Math 320 (differential equations) and Math 323 (real analysis), and depending on your interests, strongly consider Math 310 and Math 315 (operations research), and Math 356 and Math 357 (probability and statistics).

In addition to these core courses, regardless of your focus on pure or applied mathematics, it would be *very* helpful to take as many as possible of Math 324 (complex analysis), Math 327 (advanced calculus), and Math 330 (intermediate linear algebra). If you have time to take an independent study in an area that you enjoy, that is always a great idea too!

What is graduate school like?

The classification of a student as they enter graduate school varies from university to university. In some instances, it is assumed you are a Ph.D. student from the outset and, in others, you may be considered a Master's student initially. It is worth noting that even if you are admitted to a Ph.D. program, it is often possible to earn a Master's degree after roughly two years (this is especially useful if you decide to leave the a Ph.D. program prior to completion).

For the first year or two of a Ph.D. program, students typically take about three courses per semester and perform their duties as a teaching assistant or research assistant. Three classes may not sound like much, but it will be enough to keep you busy! At some point during this period, students are usually required to pass some form of qualifying examinations in various areas of mathematics (after the completion of these exams, some schools will award a Master's degree). After these examinations, a student will begin research with an advisor from the University faculty. The culmination of this work is a Ph.D. thesis which usually must consist of original, publishable work. From start to finish, it may take a student anywhere from four to seven years to complete a Ph.D. program.

Master's programs can vary a bit, but are often very similar to the initial years of a Ph.D. program and often culminate with some sort of examination (universities may or may not require a Master's thesis). Master's programs typically take two years from start to finish.

If your goal is to eventually become a professor, you will need to earn a Ph.D. whereas for other occupations, a Master's might well suffice. As always, consult your advisor or other members of the UWSP community if you have any questions about which is the right degree for you.

Mathematics Major with Actuarial Emphasis

(Bachelor of Science) Effective: Fall 2019

Description Consists of at least 52 credits:

1. Collateral Business and Computer Science Requirements (required but not part of the 50 credits mentioned above):
 - a. CIS 102 (Spreadsheet or Database), CNMT 110, Acct210
 - b. One of Acct 211, CIS 210, Engl 351
2. Mathematics Foundation Courses (22 credits): Math 225, 226, 227, 230, 300. Note: Math 300 includes written communication in the major objectives.
3. Core (21 credits): Complete all of the following.
 - a. Probability and Statistics: Math 356 and 357
 - b. Theory of Interest: Math 362
 - c. Economics: Econ 110 and Econ 111
 - d. Finance: Bus 350 and Bus 353
4. Breadth Electives and Oral Comm. in the Major: (9 to 10 additional credits)
 - a. (3 credits) Take one additional course from Math 305, 310, 315, 320, 323, 324, 327, 330, 331, 332, 360, 367
 - b. (3 or 4 credits) Take one additional course from 4a or 3-4 credits from Math 390, 395, 499, Bus 343, 352, 356, Econ 310, 360
- c. (3 credits) Oral Communication in the Major: Take either Math 380 or 381 or another course approved by the chair
5. Capstone Experience (0 to 2 credits): Take an actuarial exam; also take Math 358 (course requirement is waived if an actuarial exam is passed).

To have a major in mathematics approved for graduation, you must have a minimum grade point average of 2.00 in the courses you select to satisfy the requirements of the major. In addition, you must achieve a grade of C or better in at least 18 credits in required courses numbered 300 or above. These standards apply regardless of a declaration of academic bankruptcy. The department chair may allow exceptions on a conditional basis.

COURSE	CREDITS	COMPLETED
1. Math 225 (B), Math 226 (B), Math 227 (B)	5+5+4	
2. Math 230, Math 300	4+4	
3. CIS 102, CNMT 110, and Acct 210	1+4+3	
4. Acct 211 or CIS 210 or Engl 351 _____	3 or 4	
5. Math 356 (F), 357 (S), and 362	3+3+3	
6. Econ 110 and 111	3+3	
7. Bus 350 and 353	3+3	
8. Breadth Electives (4a and 4b): Math _____ & _____	3 + 3or4	
9. Math 380 or 381 (S)	3	
10. Capstone Experience (Actuarial Exam + Math 358)	0 to 2	

(B) – indicates a course typically offered both Spring and Fall

(F) – indicates a course typically offered every Fall, (S) – indicates a course typically offered every Spring



This graduation plan illustrates the type of curriculum a new student would take to complete a degree in four years. It is not meant to serve as an official document. Students should contact their academic adviser to develop a personalized plan of study. Refer to the University Catalog for a complete list of requirements: <https://catalog.uwsp.edu/>.

This plan assumes placement into English 101/202 and Math 225.

Semester 1	Credits	Semester 2	Credits
English 101 - Freshman English (Foundation-WC)	3	Communication 101 (Foundation-OC)	3
GENED Investigation (ART/HP/HU/SS/NS)	6-8	GENED Investigation (ART/HP/HU/SS/NS)	3-5
Math 225 - Calculus I	5	Math 226 - Calculus II	5
CIS 102 - Practicum in Computing (Spreadsheet or Database)	1	CNMT 110 - Object-Oriented Programming	4
<i>Total credits</i>	14-16	<i>Total credits</i>	14-16
Semester 3	Credits	Semester 4	Credits
English 202 - Sophomore English (Foundation-WC)	3	GENED Investigation (ART/HP/HU/SS/NS)	3
Wellness (Foundation-WLN)	2	Minor/2nd major/Elective course	3
Math 230 - Intro to Linear Algebra or Math 356 (Fa)	3-4	Math 362 - Theory of Interest or Math 357 (Sp)	3
Math 227 - Calculus III	4	Econ 111 - Principles of Microeconomics	3
Econ 110 - Principles of Macroeconomics	3	Accounting 210 - Introductory Financial Accounting	3
<i>Total credits</i>	15-16	<i>Total credits</i>	15
Semester 5	Credits	Semester 6	Credits
GENED Cultural/Env Awareness (ER/GA/USD or IS)	3	GENED Investigation (ART/HP/HU/SS/NS)	3
Minor/2nd major/Elective course	3	Minor/2nd major/Elective course	3
Math 300 - Intro to Proof with Real Analysis (COM)	3	Minor/2nd major/Elective course	3
Math 230 or Math 356 - Probability & Statistics I (Fa)	3-4	Math 362 or Math 357 - Probability & Statistics II (Sp)	3
Accounting 211 or CIS 210 or English 351	3	Business 350 - Principles of Finance	3
<i>Total credits</i>	15-16	<i>Total credits</i>	15
Winterim	Credits	<i>Take an Actuarial Exam</i>	
Math 358 - Seminar to Prep for Actuarial Exam (Wi)	2		
<i>Total credits</i>	2		
Semester 7	Credits	Semester 8	Credits
GENED Investigation (ART/HP/HU/SS/NS)	3	GENED Cultural/Env Awareness (ER/GA/USD or IS)	3
GENED Cultural/Env Awareness (ER/GA/USD or IS)	3	Minor/2nd major/Elective courses	6
Minor/2nd major/Elective course	3	Math Elective (300-level; Breadth²)	3-4
Business 353 - Investments	3	Math 380 - History of Mathematics or	3
Math Elective (300-level; Breadth¹)	3	Math 381 - Math Research Methods (Sp; COM)	
<i>Total credits</i>	15	<i>Total credits</i>	15-16

Academic Standards and Policies for this Major:

Students must maintain a minimum GPA of 2.00 in the courses selected to satisfy the requirements of the major. In addition, students must achieve a grade of C or better in at least 18 credits in required courses numbered 300 and above.

Breadth Math Electives: ¹Choose one course from Math 305, 310, 315, 320, 323, 324, 327, 330, 331, 332, 367. ²Can choose one additional course from the first list or 3-4 credits from the following: Math 390, 395, 499; Business 343, 352, 356; Economics 310, 360.

(Fa) = offered fall semesters (Sp) = offered spring semesters (Wi) = offered winter term only

For Students with an Actuarial Emphasis

The Mathematics major with Actuarial Emphasis is a Mathematics major, but with a more focused list of course requirements and fewer electives. The purpose of the major is to satisfy the first academic requirements for application to one of the professional actuarial societies, the Society of Actuaries (SOA), or the Casualty Actuarial Society (CAS) and to present material that is covered on the first two Actuarial exams. These are Probability (MATH 356 and 357), and Financial Modeling (MATH 362). MATH 358 also covers material on the Actuarial exams. In addition, the non-Math courses (Business and Economics) required for the major will fulfill some of the Validation of Educational Experience (VEE) requirements for entry into the societies. The early examinations and VEE requirements are the same for both the SOA and CAS.

Students who wish to enter the actuarial profession will need to commit to a very substantial, independent effort to prepare for and pass the actuarial examinations, which are administered by the actuarial societies. Most of these examinations will be taken after graduating from UWSP. Actuarial society guidelines recommend 150 – 400 hours of study for each test.

The actuarial job market is very competitive. Employers generally want to see two passed exams for full-time hires, and at least one passed exam for summer internships. For this reason, students are encouraged to take MATH 356, 357, 358 and MATH 362 as early as is practical, and to budget sufficient time for exam preparation. Completing an internship is also extremely helpful for being hired as an actuary after graduation. Some internship applications are due in September for the following summer, so investigate your internship options early.

While the Mathematics major with Actuarial Emphasis is specifically designed to fulfill actuarial society requirements, the content courses also provide preparation for careers in Business and Finance with a stronger quantitative background than a Business major. A double major with Data Analytics provides an excellent background in Quantitative Business Analysis, for example. Other options that students may consider are a Mathematics major with a Business or Economics minor; a Business or Economics major with a Mathematics minor, or a Mathematics/Economics double major. With proper course selection, any of these combinations may also cover the same material.

Students with potential interest in an actuarial career are encouraged to look at the following sites for specific information about the profession and job prospects:

www.beanactuary.org

www.soa.org

www.casact.org

Mathematics Minor

Description Consists of 28 credits:

1. Mathematics 225, 226, 227, 230, 300.
2. At least 6 credits from Math 305, 310, 315, 320, 323, 324, 327, 330, 331, 332, 335, 356, 357, 367, 372.

COURSE	CREDITS	COMPLETED
1. Math 225 (B)	5	
2. Math 226 (B)	5	
3. Math 227 (B)	4	
4. Math 230	4	
5. Math 300	4	
6. Elective course: Math _____	3	
7. Elective course: Math _____	3	

Applied Mathematics Minor

Description Consists of at least 26 credits:

1. Mathematics 225, 226, 230.
2. Complete two from the following: Mathematics 310(F), 315, 356(F), 357(S)
3. Complete two additional courses from Mathematics 227, 305, 310, 315, 320, 356, 357, 362, 367.

COURSE	CREDITS	COMPLETED
1. Math 225 (B)	5	
2. Math 226 (B)	5	
3. Math 230	4	
4. Applied courses: Math _____ & _____	3+3	
5. Elective courses: Math _____ & _____	3(or 4)+3	

(B) – indicates a course typically offered both Spring and Fall

(F) – indicates a course typically offered every Fall, (S) – indicates a course typically offered every Spring

Professional Education Program Application

Mathematics Major for Teacher Certification (Secondary / Middle)

Acceptance Information

See <http://www.uwsp.edu/education/Pages/CurrentUndergrad/UndergraduateAdvise/appRequire.aspx> and <http://www.uwsp.edu/education/Pages/CurrentUndergrad/EnrollmentCap/math.aspx> for the most current acceptance information.

Selection Criteria

The Mathematics Education faculty will consider the final selection based upon the following criteria:

1. Applicants must meet the minimum requirements for admission to the Professional Education Program as set by the School of Education.
2. Applicants must have completed Math 226.
3. Applicants must have a grade of B or better in at least one of Math 225, 226, or 230.
4. Applicants must score "satisfactory" on the essay component described below.
5. Applicants must have a major GPA of 2.75 or greater.
6. Applicants who have been denied admission may appeal through the School of Education.
7. Applicants who have been denied admission to the Professional Education Program will be allowed to make one more application (a total of two applications).

Deadline

School of Education deadline: September 22 and February 22 of each year.

Essay Component

Bring your essay directly to the Department of Mathematical Sciences (Science Building, B246). The essay is due on or before the deadline for applying for admission to the Professional Education Program.

Respond to the following question: Why do you want to be a mathematics teacher?

The essay must be typed, double spaced, with standard margins and standard type size. It must be NO MORE than two pages long. No new research or reading is expected for this essay. Express your ideas in complete sentences with appropriate transitional phrases and punctuation. Spell checking is prudent. Be sure to proof what you write. As with any writing, it is a good practice to have someone else critique your work before you turn it in.

Approved by the CUTEM committee, Department of Mathematical Sciences
Approved by the Teacher Education Committee (November 24, 2015)
University of Wisconsin-Stevens Point
This Page of this Document Revised June, 2017

Mathematics Major for Teacher Certification:

Secondary/Middle (Bachelor of Science) Effective: Fall 2019

Description Consists of at least 49 credits:

1. Collateral Natural Science Requirements (required but not part of the 49 credits mentioned above):
Note: Consult with the School of Education regarding natural science requirements for Teacher Certification.
 - a. Take at least 10 credits of Natural Science Courses from the General Education Program list, including 5 credits from PHYS 240 or PHYS 203
 - b. Or, complete a major or minor in Biology, Biochemistry, Chemistry, Chemical Engineering, Paper Science, or Physics
2. Mathematics Foundation Courses (20 credits): Math 225, 226, 230, 300. We recommend that you complete 230 and 300 before you enroll in any courses numbered above 300. Note: Math 300 includes written communication in the major objectives.
3. Abstract Algebra (3 credits): Take either Math 331 or 332
4. Statistics (4 or 6 credits): Complete one of the following:
 - a. Math 350 and M Ed 350 or b. Math 356 and 357
5. Math Education (12 credits): Take Math 340, M Ed 334, M Ed 335, M Ed 340 Note: Math Ed 335 includes oral communication in the major objectives.
6. Breadth Electives (at least 6 additional credits):
 - a. (3 or 4 credits) Take one course from Math 227, 305, 310, 315, 320, 323, 324, 327, 330, 331, 332, 335, 356, 357, 367, 372.
 - b. (3 or 4 credits): Take 1 additional course from 6a or 3-4 credits from Math 380, 381, 390, 395 or 499, or Math Ed 390 or 399.
7. Student Teaching (6 – 12 credits): Take M Ed 398 (if you have more than one major, 6 credits in each, otherwise 12 credits in M Ed 398).

To have the Mathematics Major approved for graduation, you must have a minimum grade point average of 2.00 (2.75 to student teach) in the courses you select to satisfy the requirements of the major. In addition, you must achieve a grade of C or better in at least 18 credits in required courses numbered 300 or above. These standards apply regardless of a declaration of academic bankruptcy. The department chair may allow exceptions on a conditional basis.

COURSE	CREDITS	COMPLETED
1. Math 225 (B), Math 226 (B),	5+5	
2. Math 230, Math 300	4+4	
3. Natural Science: _____, _____, _____	10 or more	
4. Abstract Algebra: Math 331 or 332	3	
5. Statistics: Math 350 & M Ed 350, or Math 356(F) & 357(S)	4 or 6	
6. Math 340 and Math Ed 340	3+1	
7. Math Ed 334 (S) and 335 Math _____	4+4	
8. Breadth Electives (from 6a and 6b above this chart): _____, _____	6 to 8	
9. Student Teaching	6 to 12	

(B) – indicates a course typically offered both Spring and Fall, (F) – Fall courses, (S) – Spring courses



Sample Graduation Plan Mathematics (BS) for Teacher Certification

This graduation plan illustrates the type of curriculum a new student would take to complete a degree in four years. It is not meant to serve as an official document. Students should contact their academic adviser to develop a personalized plan of study. Refer to the University Catalog for a complete list of requirements: <https://catalog.uwsp.edu/>.

Semester 1	Credits	Semester 2 (Take Praxis Core, if needed)	Credits
English 101 or 150: Freshman English (WC) ¹	3	Communication 101: Fund. of Oral Communication (OC)	3
Psychology 110: Intro to Psychology (SS)	3	Natural Science GEP (NS) ³	5
Natural Science GEP (NS) ³	5	Arts GEP course (ART)	3
Math 225: Calculus I (QL) ²	5	Math 226: Calculus II	5
Total credits	16	Total credits	16
Semester 3 (Apply to the Professional Education Program)	Credits	Semester 4	Credits
English 202: Sophomore English (WC) ¹	3	Education 200: Professional Portfolio Development I	1
Math 230: Introduction to Linear Algebra	4	Education 381: Educational Psychology (SS)	2
Wellness GEP (WLN)	1	Education 382: Managing Learning Environments (SS)	1
History GEP course (HP)	3	Math 300: Introduction to Proof w/ Real Analysis (COM)	4
Education 205: Pluralism for Educators (XL)	2	Math Ed 334: Technology Tools for Math Teachers (Sp)	4
Total credits	13	Biology 100: Bio. Principles & the Human Envir. (NS)	3
		Total credits	15
Semester 5	Credits	Semester 6 (Take Praxis Subject Assessment)	Credits
Math major elective	3	Education 386: Literacy in the Secondary Schools	3
Math 340: College Geometry with Teaching Methods	3	Education 351: Educating Students with Special Needs	3
Math Ed 340: Teaching Geometry	1	Math 350: Probability & Statistics w/ Teaching Methods	3
Take one: Math 331 or 332	3	Math Ed 350: Teaching Probability & Statistics	1
Take approved literature course (HU)	3	Math major elective	3
Global Awareness GEP course (GA)	3	Environmental Responsibility GEP course (ER)	3
Total credits	16	Total credits	16
Semester 7 (Apply to Student Teach)	Credits	Semester 8 (Student Teaching & edTPA completion)	Credits
Education 300: Professional Portfolio Development II	1	Math Ed 398: Student Teaching in Mathematics (CAP)	12
Education 390: Reading & Writing for Content Underst.	3	Education 400: Seminar on Teaching	1
Math major elective	3		
Math Ed 335: Techniques in Secondary Education (COM)	4		
US Diversity GEP course (USD)	3		
Interdisciplinary Course (IS)	3		
Total credits	17	Total credits	13
		Summer or Winter courses	Credits
		Education 385: Teaching the Early Adolescent (Su or Wi)	3
		Total credits	3

Academic Standards and Policies for this Major: Some education, health education and physical education courses require admission to the Professional Education Program. Additionally, students in the Professional Education Program must pass state-mandated assessments in order to student teach and earn licensure. A complete list of academic policies, including admission and completion requirements, can be found online at https://catalog.uwsp.edu/preview_entity.php?catoid=6&ent_oid=356.

(Fa) = offered fall semesters (Sp) = offered spring semesters (Su) = offered only in summer (Wi) = offered only in Winterim

¹ Based on English Placement | ² Based on Math Placement | ³ The Math major requires at least 12 credits of natural science. See an adviser for specific science options for the mathematics major for teacher certification. | ⁴ Math/M.Ed 340, Math/M.Ed. 350 and Math Ed. 335 are each offered once every three semesters. The sequence in which math education students complete these courses is dependent on when each course is offered.

Mathematics Minor for Teacher Certification: Secondary / Middle

Effective: Fall 2019

Description

Consists of at least 30 credits:

1. Required (26 cr): Math 225, 226, 230, 340 and M Ed 334, 335, 340.
2. Complete 2a OR 2b below (at least 4 cr):
 - a. Math 350, M Ed 350.
 - b. Math 356, 357.

COURSE	CREDITS	COMPLETED
1. Math 225 (B)	5	
2. Math 226 (B)	5	
3. Math 230	4	
4. Math/MathEd 340	4	
5. MathEd 334 (S)	4	
6. MathEd 335	4	
7. Math/MathEd 350 or Math 356/357 (F/S)	4 or 6	

(B) – indicates a course typically offered both Spring and Fall

(F) – indicates a course typically offered every Fall

(S) – indicates a course typically offered every Spring

This minor is for students with a secondary teaching major in another discipline.

Mathematics Minor

For Elementary Education

Effective: Fall 2019

Description

Consists of at least 24 credits plus student teaching:

1. Required: Math 345, 359, 369; M Ed 334, 345, 359, 369.
2. Complete either Math 255 or Math/MathEd 350.
3. Complete one of the following: Math 109, 111, or 225

Required in the Elementary Education major, but not part of the minor: Math 228, 338.

COURSE	CREDITS	COMPLETED
1. Math/MathEd 345 (B)	4	
2. Math/MathEd 359	4	
3. Math/MathEd 369 (S)	4	
4. MathEd 334 (S)	4	
5. Math 255 (B) <u>or</u> Math/MathEd 350	4	
6. Math 109 <u>or</u> Math 111 <u>or</u> Math 225 (B)	4 or 5	
7. MathEd 398 – Student Teaching (Recommended, but not required)		

(B) – indicates a course typically offered both Spring and Fall

(F) – indicates a course typically offered every Fall

(S) – indicates a course typically offered every Spring

Courses for Mathematics Major/Minor

This page was revised in October of 2020. These are typical offerings, not guaranteed.

COURSE	CREDITS	OFFERED
Math 225	4	Fall/Spring
Math 226	4	Fall/Spring
Math 227	4	Fall/Spring
Math 230	4	Spring (and Fall ¹)
Math 300	4	Spring (and Fall ¹)
Math 305	3	Irregular
Math 310	3	Fall
Math 315	3	Spring ¹
Math 320	3	Fall
Math 323	3	Every 3 rd semester
Math 324	3	Every 3 rd semester
Math 327	3	Every 3 rd semester
Math 330	3	Every 3 rd semester
Math 331	3	Every 3 rd semester
Math 332	3	Every 3 rd semester
MathEd 334	4	Spring
Math 335	3	Irregular
MathEd 335	4	Every 3 rd semester
Math/MathEd 340	4	Every 3 rd semester
Math/MathEd 350	4	Every 3 rd semester
Math 356	3	Fall
Math 357	3	Spring
Math 362	3	Spring ¹
Math 367	3	Irregular
Math 372	3	Irregular
Math 380	3	Spring ¹
Math 381	3	Spring ¹

¹ Not offered every year.

Courses in Mathematics

MATH 90. Beginning Algebra. 3 cr. Real numbers, solving linear equations, exponents, polynomials, rational expressions. Algebra for those with low placement test scores who need practice in fundamental math skills. Does not count toward a degree.

MATH 95. Intermediate Algebra. 3 cr. Linear equations including graphing, exponents, radicals, function notation, and quadratic equations. Does not count toward a degree. Prereq: Math 090 or suitable placement test score

MATH 105. Mathematics Applications, Appreciation, and Skills. 3 cr. Topics include probability, statistics, geometry, logic, history and appreciation of mathematics, mathematics of finance, and others. Not a substitute for MATH 095 OR MATH 107 as a prereq for any other math course. Prereq: MATH 090 or suitable placement test score. GEP: QL

MATH 107. Algebra for Pre-Calculus. 2 cr. Factoring and simplifying rational expressions, interval notation, solving absolute value equations, linear inequalities, rules of exponents and logs, solving exponential equations, functional notation, evaluation of functions and graphs. Prereq: MATH 095 or suitable placement test score.

MATH 109. Mathematics for the Social and Management Sciences. 4 cr. Systems of linear equations, matrices, linear programming, exponential growth and decay, mathematics of finance, differential calculus with emphasis on applications. Prereq: MATH 100 or 107 or suitable placement test score. GEP: QL

MATH 111. Applied Calculus. 4 cr. Calculus applied to business, economics, biology, natural resources, and social science. May not take MATH 111 for credit after successful completion of MATH 225. Prereq: MATH 100 or 107 a suitable placement test score. GEP: QL

MATH 112. Basic Trigonometry and Applications. 2 cr. Introduction to trigonometry and applications to surveying, navigation, and indirect measurement. Not open to those who have taken MATH 119. MATH 112 will not substitute for MATH 119 and is not preparation for MATH 225. May not earn credit in both MATH 112 and MATH 119. Prereq: MATH 100 or 107 or placement into MATH 112.

MATH 118. Precalculus Algebra. 4 cr. Topics include concepts, graphs, and properties of functions, inverse and algebraic functions, techniques of graphing, conic sections, linear and nonlinear systems, arithmetic and geometric series, mathematical induction and the binomial theorem. Preparation for MATH 225 if you did not place into MATH 225. Prereq: MATH 100 or 107 or suitable placement test score. GEP: QL

MATH 119. Precalculus Trigonometry. 2 cr. Trigonometric functions, their basic properties and graphs; inverse trigonometric functions; identities; applications. Preparation for MATH 225 if you did not place into MATH 225. May not earn credit in both MATH 112 and MATH 119. Prereq: 100 or 107 or suitable placement test score.

MATH 209. Mathematics for Information Sciences. 4 cr. Boolean algebra, relational database theory, algorithms, combinatorics, discrete probability, recursion, graph theory, network flows and applications for information sciences. Prereq: MATH 095 or 100 or suitable placement test score.

MATH 225. Calculus I. 5 cr. Introduction to limits; differentiation and integration of algebraic and transcendental functions; optimization and additional applications. Prereq: MATH 118 and 119 or suitable placement test score. GEP: QL

MATH 226. Calculus II. 5 cr. Integration of algebraic and transcendental functions continued; techniques and applications of integration; improper integrals; infinite sequences and series; introduction to differential equations with applications. Prereq: MATH 225.

MATH 227. Calculus III. 4cr. Introduction to solid analytic geometry; parametric and polar equations; vectors; differentiation of functions of several variables; multiple integrals using different coordinate systems; applications. Prereq: MATH 226.

MATH 228. Fundamental Mathematical Concepts for Elementary Teachers I. 3 cr. Basic concepts and properties of sets, number systems, and functions for elementary school math. Prereq: MATH 095, 100 or placement above MATH 095 or 100; and con reg in M Ed 228; and declared elem ed, early childhood ed, or special ed major. *If you do not meet the prerequisites, you will not be allowed to take the course.* GEP: QL

MATH 230. Introduction to Linear Algebra. 4 cr. Topics in linear algebra; systems of linear equations, Gauss-Jordan elimination, linear combinations and linear independence, linear transformations, vector spaces and subspaces, matrix algebra, determinants, bases of nullspaces and column spaces, eigenvalues and eigenvectors, inner products and orthogonal projections with selected applications. Prereq: MATH 226.

MATH 255. Elementary Statistical Methods. 4 cr. Fundamental concepts and techniques that underlie applications to various disciplines, including descriptive statistics; averages; dispersion; random sampling; binomial, normal, Student T, Chi-square, and F distributions; estimation and tests of hypothesis; linear regression and correlation; laboratory emphasis on sampling and applications. Does not count toward math major/minor, or major for teacher certification. Prereq: MATH 095 or 100 or suitable placement test score. GEP: QL

MATH 300. Introduction to Proof. 4 cr. Transition to upper division mathematics. Topics include logic, proof techniques, set theory, relations, functions, and cardinality; elementary properties of integers, rational numbers, and real numbers; open and closed subsets of the real numbers; also reading and writing formal mathematical proofs. Prereq: MATH 226.

MATH 305. Discrete Mathematics. 3 cr. Algorithm analysis: recursion, complexity; combinatorics: recurrence relations, dynamic systems, counting techniques; graph theory: Eulerian and Hamiltonian graphs, algorithms and heuristics, planar graphs, trees, applications. Prereq: MATH 300 or con reg.

MATH 310. Operations Research I. 3 cr. Formulation and computation of linear programming problems: simplex method, duality, sensitivity analysis, computer solutions; integer programming; network flows with applications. Prereq: MATH 230 or 209.

MATH 315. Operations Research II. 3 cr. Interior point methods for linear programming; nonlinear optimization; dynamic programming; introduction to stochastic models with use of related computer software. Prereq: MATH 227 AND 310.

MATH 320. Differential Equations. 3 cr. Introduction to ordinary differential equations of the first and second order; linear equations with constant coefficients; solution in series; numerical approximations; Laplace transforms; system of ordinary equations; selected applications. Prereq: MATH 227.

MATH 323. Mathematical Analysis, 3 cr. Provides theoretical foundation of calculus in one variable. Topics include topology and order properties of \mathbb{R} ; limits and continuity; real sequences and series; differentiability and integration; sequences of functions. Prereq: MATH 300.

MATH 324. Complex Variables. 3 cr. Complex numbers, functions of a complex variable; power series; elementary functions; conformal and bilinear transformation; integral theorems; Taylor/Laurent expansions; theory of residues; applications. Prereq: MATH 227 and 300 or cons instr.

MATH 327. Advanced Calculus. 3 cr. Theory of differential and integral calculus of several variables. Topics selected from: differentiability; tangent spaces; line, surface and space integrals; Inverse and Implicit function theorems; Taylor and Fourier series; transforms. Prereq: MATH 230, 227, AND 300.

MATH 330. Intermediate Linear Algebra. 3 cr. Abstract finite and infinite dimensional vector and inner product spaces; subspaces; spanning and linear independence, bases, dimension, coordinates, linear transformations: eigenvalues and eigenvectors, diagonalization, isomorphism, projections, spectral theorems, canonical forms; selected additional topics. Prereq: MATH 230 AND 300.

MATH 331. Abstract Algebra – Rings and Fields. 3 cr. Ring axioms, homomorphisms and isomorphisms, subrings and ideals, polynomials, integral and Euclidean domains, field axioms, extension fields, selected additional topics. Prereq: MATH 230 AND 300.

MATH 332. Abstract Algebra – Group Theory. 3 cr. Group axioms, homomorphisms and isomorphisms, normal subgroups and quotient groups, cyclic groups, permutations and symmetric groups, selected additional topics. Prereq: MATH 230 AND 300.

MATH 335. Number Theory. 3 cr. Primes, composites, and divisibility; congruences and residue classes; number-theoretic functions; Diophantine equations. Prereq: MATH 300 or cons instr.

MATH 338. Fundamental Mathematical Concepts for Elementary Teachers II. 3 cr. Topics from geometry, measurement, algebra, and logic with emphasis on problem solving. Prereq: M ED 228 and con reg in M ED 338.

MATH 340. College Geometry. 3 cr. Foundations of geometry; survey of Euclidean geometry from various developmental approaches; introduction to non-Euclidean geometries. Does not count toward math major or minor. Prereq: MATH 300 and con reg in M ED 340.

MATH 345. Fundamental Mathematical Concepts for Elementary Teachers III. 3 cr. Topics from probability, statistics, calculus, and rational and real numbers with an emphasis on problem solving. Prereq: MATH 338 and con reg in M ED 345.

MATH 350. Probability and Statistics with Teaching Methods. 3 cr. Discrete and continuous probability distributions; random variables; mathematical expectation; statistical estimation and inference; hypothesis testing; regression. Applications and teaching methods for probability and statistics in high school classroom. May not earn credit in both 356 and 350; Con reg in M ED 350; and either MATH 226 con reg in MATH 226. Does not count toward math major/minor. MATH 350 is not a prereq for MATH 357.

MATH 356/556. Probability and Statistics I. 3 cr. Probability from a set-theoretic viewpoint; random variables and mathematical expectation; discrete and continuous probability distributions; functions of random variables and moment-generating functions. Prereq: MATH 226.

MATH 357/557. Probability and Statistics II. 3 cr. Statistical inference: estimation and tests of hypotheses; linear regression and correlations; multiple linear regression. Prereq: MATH 356.

MATH 358. Seminar to Prepare for Actuarial Exam P/1. 2 cr. Study and discuss concepts and problems from probability, calculus, and insurance found on recent examinations, as preparation for taking Exam P/1. Prereq: MATH 356.

MATH 359. Mathematics for Middle School I. 2 cr. Extended topics from algebra, geometry, trigonometry, analytic geometry, measurement, probability, and statistics. Problem solving and computer applications. Prereq: MATH 338 and con reg in M ED 359.

MATH 362. Theory of Interest. 3 cr. Interest rate measurement, force of interest, valuation of annuities with constant or non-constant payments, amortization and loan payment schedules, bond valuation, methods of measuring rate of return, spot and forward rates of interest, cashflow duration and immunization. Prereq: MATH 226 or instructor consent.

MATH 367. Mathematics of Decision and Choice. 3 cr. Quantitative approaches to rational decision making: game theory, decision analysis with uncertainty and risk, management science; model formulations and solution using computer software. Prereq: MATH 226 or 109.

MATH 369. Mathematics for Middle School II. 2 cr. Topics from sets, logic, mathematical reasoning and proof, mathematical structures, discrete mathematics, topology, and history of mathematics. Prereq: MATH 338 and con reg in M ED 369.

MATH 372. Topology. 3 cr. Topics in metric and point-set topology: homeomorphisms and isometries, connectedness, compactness, and separation axioms; low-dimensional Euclidean topology: curves, surfaces, knots, manifolds. Prereq: MATH 230 AND 300.

MATH 380. History of Mathematics. 3 cr. Topics taken from the history of mathematics, with emphasis on mathematical ideas, problems, and methods from early civilization through the 20th century. Students will read and analyze mathematical works, and give expository presentations during class and in more general forums. Prereq: 14 or more credits in 300-level Math or M Ed courses which count towards a math major, excluding MATH 395, (6 credits may be concurrent), or instructor consent.

MATH 381. Mathematical Research Methods. 3 cr. Topics taken from modern mathematics. Students will read and analyze recent mathematical works, and give expository presentations during class and in more general forums. Prereq: 14 or more credits in 300-level Math or M Ed courses which count towards a math major, excluding MATH 395, (6 credits may be concurrent), or instructor consent.

MATH 390/590. Special Topics in Mathematics. 1-3 cr. Subtitle will designate topic and number of credits. Prereq: cons chair.

MATH 395. Seminar. 1 cr. Present and discuss selected readings in mathematical subjects. May repeat for 3 cr max with different subtitles. Prereq: cons instr

MATH 397. Internship in Mathematics. 2-6 cr. Participate in supervised training work program in cooperating agency or business arranged by faculty with cons chair. Credits set by advisor and chair following dept guidelines. May repeat for 6 cr max. Prereq: Jr st and cons instr.

MATH 499. Independent Study. Upperclass math majors may arrange for independent study with cons chair. Credit based on scope of project. May apply 3 cr to major.

Courses in Mathematics Education

M ED 228. Teaching Elementary School Mathematics I. 1 cr. Principles, goals, methods, study of curricular content and assessment techniques; includes field experience. Prereq: Con reg in MATH 228.

M ED 229. Teaching Elementary School Mathematics I. 1 cr. Principles, goals, methods, and techniques. Only for transfer students who did not take Math 228 at UWSP. Prereq: 3 cr of math for elementary teachers equivalent to MATH 228.

M ED 334. Technology Tools for Mathematics Teachers. 4 cr. Techniques, research, and curriculum planning related to current technology within secondary and middle school math. Prereq: MATH 109, 111, or 225 or cons instr.

M ED 335. Techniques in Secondary Education. 4 cr. Aims, methods, materials, techniques, planning, organization, assessment, and field experience. Prereq: Jr st, admis to Prof Ed Prog.

M ED 338. Teaching Elementary School Mathematics II. 1 cr. Principles, goals, methods, and study of curricular content and assessment techniques; includes field experience. Prereq: Math Ed 228 or 229; and con reg in MATH 338.

M ED 339. Teaching Elementary School Mathematics II. 1 cr. Principles, goals, methods, and techniques. Only for transfer students who did not take Math 338 at UWSP. Prereq: 3 cr of math for elementary teachers equiv to MATH 338.

M ED 340. Teaching Geometry. 1 cr. Techniques, research, curricular planning, and evaluation issues related to teaching geometry at the middle and secondary levels. Prereq: MATH 300, con reg in MATH 340.

M ED 345. Teaching Elementary School Mathematics III. 1 cr. Principles, goals, methods, study of curricular content and assessment techniques at approp levels; includes field experience. Prereq: Math Ed 338 or 339; and con reg in MATH 345.

M ED 350. Teaching Probability and Statistics. 1 cr. Techniques, research, curricular planning, and evaluation issues related to teaching probability and statistics at the middle/secondary levels. Prereq: MATH 226 and con reg in MATH 350.

M ED 359. Teaching Middle School Mathematics I. 2 cr. Techniques, research, curriculum planning, teaching of problem solving. Prereq: MATH 338 and con reg in MATH 359.

M ED 369. Teaching Middle School Mathematics II. 2 cr. Techniques, research, curriculum planning, and evaluation issues related to middle school math. Prereq: MATH 338 and con reg in MATH 369.

M ED 390. Special Topics. 1-3 cr. Subtitle will designate topic and number of credits. Prereq: Cons chair.

M ED 398. Student Teaching in Mathematics. 4-16 cr; pass/fail. Observation and teaching in the secondary school classroom under the guidance of cooperating teachers and university faculty. Prereq: Completion of math DPI certified major/minor and DPI educ requirements.

M ED 399. Special Work. 1-3 cr. Upperclass students may arrange for independent study with cons chair. Credit based on scope of project.

M ED 400. Seminar on Teaching for Secondary Student Teachers. 1 cr; pass/fail. Structural group discussions on aspects of teaching that emerge during student teaching experiences. Prereq: Con reg in Math Ed 398.

M ED 790. Special Topics. 1-4 cr. Subtitle will designate topic and number of credits. Prereq: Cons chair.