

MATHEMATICS AND MATHEMATICS EDUCATION

University of Wisconsin-Stevens Point

Student Planning Guide

**University of Wisconsin-Stevens Point
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Effective: Fall 2009

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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 and one semester of Linear Algebra. They then complete their program choosing one of the following options:

The Mathematics Major

This option allows you to specialize, or to acquire a broad background, in mathematics by selecting from various areas of mathematics such as linear algebra, abstract algebra, analysis, applied mathematics, differential equations, geometry, history of mathematics, number theory, numerical analysis, and probability & statistics.

The Mathematics Major with Actuarial Emphasis

This option requires students to specialize in those mathematical areas with particular value to actuarial science. A strong concentration of mathematics courses, including linear algebra and probability & statistics, is necessary, along with other courses in applied mathematics and actuarial science. Successful completion of one of the SOA examinations is an additional requirement for this emphasis.

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 student teaching experience completes the requirements for this major.

Careers

A bachelor's degree in mathematics 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, strong preparation for entry into many professional programs can be completed. Because of the versatile nature of mathematics, graduates of UWSP with a mathematics major have enjoyed solid career prospects in varied industries including insurance, banking, financial services, government (federal and state), education, software publishing, consulting, e-commerce, health care, and even law.

Mathematics Major

Description

Consists of at least 40 credits:

1. Math 120, 121, 213, 222, 300. We strongly recommend that you complete 213 and 300 before you enroll in any courses numbered above 300.
2. Take 4 courses from the following groups, to provide greater depth in at least one area:
 - a. Algebra: Math 330, 331.
 - b. Analysis: Math 324, 327.
 - c. Probability and statistics: Math 356, 357.
3. Complete either 3a or 3b below (9 or 10 additional credits) :
 - a. Take three courses selected from Math 305, 310, 315, 320, 323, 324, 327, 330, 331, 335, 356, 357, 360, 367, 372, 468.
 - b. Take two courses selected from Math 305, 310, 315, 320, 323, 324, 327, 330, 331, 335, 356, 357, 360, 367, 372, 468, and 3 or 4 credits from Math 380, 390, 395, 499.

To have the Mathematics Major approved for graduation, you must have a minimum grade point average of 2.00 in the math courses you select to satisfy the requirements of the major. In addition, you must achieve a grade of C or better in at least 15 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 120 (B)	4	
2.	Math 121 (B)	4	
3.	Math 213 (B)	4	
4.	Math 222 (B)	4	
5.	Math 300 (B)	3	
6.	Four Courses from: Math _____	3	
	Math 324 (F), Math 327 (S) Math _____	3	
	Math 330 (F), Math 331 (S) Math _____	3	
	Math 356 (F), Math 357 (S) Math _____	3	
7.	Elective course: Math _____	3	
8.	Elective course: Math _____	3	
9.	Elective course: Math _____	3 or 4	

(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

Mathematics Major with Actuarial Emphasis

Description

Consists of 45 credits:

1. Mathematics 120, 121, 213, 222, 300, 330, 356, 357.
2. CIS 102(Spreadsheet or Database), 110.
3. At least 3 credits from Mathematics 323, 324, 327.
4. Complete 4a or 4b below (9 or 10 additional credits).
 - a. Take three courses selected from Math 310, 315, 320, 323, 324, 327, 360, 367, 397, 468.
 - b. Take two courses selected from Math 310, 315, 320, 323, 324, 327, 360, 367, 397, 468; and 3 or 4 credits from Math 380, 390, 395, 499.
5. Collateral requirements: Pass at least one of the actuarial exams.
6. Recommended collateral areas: business and economics, communication, finance, insurance, writing.

To have a major in mathematics approved for graduation, you must have a minimum grade point average of 2.00 (2.75 to student teach) in the math courses you select to satisfy the requirements of the major. In addition, you must achieve a grade of C or better in at least 15 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 120 (B)	4	
2. Math 121 (B)	4	
3. Math 213 (B)	4	
4. Math 222 (B)	4	
5. Math 300 (B)	3	
6. Math 330 (F)	3	
7. Math 356 (F)	3	
8. Math 357 (S)	3	
9. CIS 102 (B)	1	
10. CIS 110 (B)	4	
11. Elective course: Math _____	3	
12. Elective course: Math _____	3	
13. Elective course: Math _____	3 or 4	
14. One from Math 323, 324, 327 Math _____	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

Mathematics Minor

Description

Consists of 25 credits:

1. Mathematics 120, 121, 213, 222, 300.
2. At least 6 credits from Math 305, 310, 315, 320, 323, 324, 327, 330, 331, 335, 356, 357, 360, 367, 372, 468.

COURSE	CREDITS	COMPLETED
1. Math 120 (B)	4	
2. Math 121 (B)	4	
3. Math 213 (B)	4	
4. Math 222 (B)	4	
5. Math 300 (B)	3	
6. Elective course: Math _____	3	
7. Elective course: Math _____	3	

Applied Mathematics Minor

Description

Consists of 24 credits:

1. Mathematics 120, 121, 213, 356, 357.
2. At least two additional courses selected from Math 222, 305, 310, 315, 320, 360, 367, 468.

COURSE	CREDITS	COMPLETED
8. Math 120 (B)	4	
9. Math 121 (B)	4	
10. Math 213 (B)	4	
11. Math 356 (F)	3	
12. Math 357 (S)	3	
13. Elective course: Math _____	3	
14. Elective course: Math _____	3	

School of Education

Mathematics Major for Teacher Certification (Secondary / Middle)

Acceptance Information

See <http://www.uwsp.edu/mathed/program/soe.htm> for the most current acceptance information.

Selection Criteria

The combined limit of mathematics students allowed entry into the Professional Education Program is 15 majors per year (minors are not included in this count).

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 complete the following courses in the major: either Math 213 or Math 222.
3. Applicants must score "satisfactory" on the essay component described below.
4. Applicants must have a major GPA ≥ 2.75 .
5. Applicants will be ranked according to their GPA sum: the sum of the overall GPA (including transfer credits) and the major GPA (including transfer credits) divided by two.
 - a. Fall applications: Up to 10 applicants will be selected according to their GPA sum. During the fall application, only those applicants with a GPA sum ≥ 3.00 will be considered.
 - b. Spring applications: Applicants will be selected according to their GPA sum.
6. In the event that step 5b does not fill all 15 positions available for the year, applicants with a major GPA < 2.75 may be considered.
7. Applicants denied admission may appeal through the School of Education.
8. Applicants 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 Mathematics and Computing Department (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 paper must be typed (word-processed preferred), double spaced, standard margins, standard type size, and NO MORE than two pages long. Do not do any research or reading for this essay. Express your ideas in complete sentences with appropriate transitional phrases and punctuation. In this technological world, the use of an electronic spell checker is prudent. Be sure to proof what you write and, as with any writing, it is a good practice to let someone else critique your work before you turn it in.

Approved by the CUTEM committee, Mathematics and CIS Department
Approved by the Teacher Education Committee (April 20, 1999)
University of Wisconsin-Stevens Point
This Page of this Document Revised on June 11, 2007

Mathematics Major for Teacher Certification (Secondary / Middle)

Effective: Fall 2009

Description

Consists of at least 47 credits:

1. Required (34 cr): Math 120, 121, 213, 222, 300, 331, 340, and Math Ed 334, 335, 340.
2. Complete 2a OR 2b below (at least 4 cr):
 - a. Math 350, Math Ed 350.
 - b. Math 356, 357
3. Complete 3a **OR** 3b below (9 or 10 additional credits).
 - a. Take three courses selected from Math 305, 310, 315, 320, 323, 324, 327, 330, 335, 360, 372.
 - b. Take two courses from Math 305, 310, 315, 320, 323, 324, 327, 330, 335, 360, 367, 372; and 3 or 4 credits from Math 380, 390, 395, 499.

To have a major in mathematics approved for graduation, you must have a minimum grade point average of 2.00 (2.75 to student teach) in the math courses you select to satisfy the requirements of the major. In addition, you must achieve a grade of C or better in at least 15 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 120 (B)	4	
2. Math 121 (B)	4	
3. Math 213 (B)	4	
4. Math 222 (B)	4	
5. Math 300 (B)	3	
6. Math 331 (S)	3	
7. Math/MathEd 340 (F)	4	
8. MathEd 334 (S)	4	
9. MathEd 335 (F)	4	
10. Math/MathEd 350 (S) or Math 356/357 (F/S)	4 or 6	
11. Elective course: Math _____	3	
12. Elective course: Math _____	3	
13. Elective course: Math _____	3 or 4	

(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

Mathematics Minor for Teacher Certification (Secondary / Middle)

Effective: Fall 2009

Description

Consists of at least 31 credits:

1. Required (27 cr): Math 120, 121, 213, 300, 340 and Math Ed 334, 335, 340.
2. Complete 2a OR 2b below (at least 4 cr):
 - a. Math 350, Math Ed 350.
 - b. Math 356, 357.

COURSE	CREDITS	COMPLETED
1. Math 120 (B)	4	
2. Math 121 (B)	4	
3. Math 213 (B)	4	
4. Math 300 (B)	3	
5. Math/MathEd 340 (F)	4	
6. MathEd 334 (S)	4	
7. MathEd 335 (F)	4	
8. Math/MathEd 350 (S) 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

Possible Four-Year Course Schedule

Catalog Years: 2009-2011

Possible Four-year Course Schedule Mathematics Major for Teacher Certification (Secondary / Middle) Bachelor of Science				
	YEAR 1	YEAR 2	YEAR 3	YEAR 4
FALL	<ul style="list-style-type: none"> Math 120 – 4 cr English 101 (GDR) – 3 cr Natural Science GDR [E: physical science requirement, suggest physics course with lab] – 5 cr Humanities area 1 GDR [E: fine arts requirement] – 3 cr Wellness GDR – 1 cr <p>(16 credits)</p>	<ul style="list-style-type: none"> Math 213 – 4 cr Math 222 – 4 cr History 177 [E: History GDR] – 3 cr Political Science 101 [E: Social Science category 1] – 3 cr Communication 101 [GDR] – 2 cr <p>(16 credits)</p>	<ul style="list-style-type: none"> Math/MathEd 340 – 4 cr Math Elective – 3 cr Ed 351 [E; P] – 3 cr Environmental Literacy GDR – 3 cr Humanity or social science GDR – 3 cr <p>(16 credits)</p>	<ul style="list-style-type: none"> MathEd 335 [P] – 4 cr Math Elective – 3 cr Ed 300 – 1 cr Ed 386 [E; P] – 3 cr Ed 390 [WE, E; P] – 3 cr Humanity or social science GDR – 3 cr <p>(17 credits)</p>
SPRING	<ul style="list-style-type: none"> Math 121 – 4 cr English 102 [GDR] – 3 cr Natural Science GDR [E: biological science requirement, suggest Biology 100] – 3 cr Psychology 110 [E: Social Science category 1 GDR] – 3 cr Ed 205 [E] – 2 cr <p>(15 credits)</p>	<ul style="list-style-type: none"> Math 300 – 3 cr MathEd 334 – 4 cr Math 380 (WE) – 3 cr Natural Science GDR with lab – 4 cr Humanities Area 2 GDR [E: literature requirement] – 3 cr Apply for admission to the SoE <p>(17 credits)</p>	<ul style="list-style-type: none"> Math/MathEd 350 – 4 cr Math 331 – 3 cr Ed 200 – 1 cr Ed 381 [E; P] – 3 cr Wellness GDR – 2 cr History 176 [E: History GDR] – 3 cr <p>(16 credits)</p>	<ul style="list-style-type: none"> MathEd 398 [P] – 15 cr Ed 400 [P] – 1 cr <p>(16 credits)</p>
Winterim or Summer				

Codes:

P = must be admitted to the School of Education (SoE) professional education program.

E = required by the *Secondary Education Curriculum for Teacher Certification*.

WE = Writing emphasis

Notes:

1. Must have six credits of writing emphasis (WE). Education 390 is always WE.
2. Must have one non-Western Culture (NWC) course and one minority studies (MNS) course.
3. The total Natural Science GDR credits must be at least 12.
4. Wellness GDR: 1 cr must be AA, 1 cr must be HE, and third credit may be either.
5. Complete at least 40 upper division credits (300 level or above).

Mathematics Minor

For Elementary Education Majors

Effective: Fall 2009

Description

Consists of 24 credits plus student teaching:

1. Required: Math 345, 359, 369; MathEd 334, 345, 359, 369, 398.
2. Complete either Math 355 or Math/MathEd 350.
3. Complete one of the following: Math 109, 111, or 120

Required but not part of the minor: Math 228, 338 and MathEd 228, 338.

COURSE	CREDITS	COMPLETED
1. Math/MathEd 345 (fall/spring)	4	
2. Math/MathEd 359 (fall)	4	
3. Math/MathEd 369 (spring)	4	
4. MathEd 334 (spring)	4	
5. Math 355 (fall/spring) <u>or</u> Math/MathEd 350 (spring)	4	
6. Math 109 <u>or</u> Math 111 <u>or</u> Math 120 (fall/spring)	4	
7. MathEd 398 – Student Teaching		

Courses for Mathematics Major/Minor

Effective: Fall 2009

COURSE	CREDITS	OFFERED
Math 120	4	Fall/Spring
Math 121	4	Fall/Spring
Math 213	4	Fall/Spring
Math 222	4	Fall/Spring
Math 300	3	Fall/Spring
Math 305	3	Fall ¹
Math 310	3	Fall
Math 315	3	Spring ¹
Math 320	3	Fall
Math 324	3	Fall
Math 327	3	Spring
Math 330	3	Fall
Math 331	3	Spring
Math 335	3	Spring ¹
Math/MathEd 340	4	Fall
Math/MathEd 350	4	Spring
Math 356	3	Fall
Math 357	3	Spring
Math 367	3	Spring ¹
Math 372	3	Spring ¹
Math 380	3	Spring
MathEd 334	4	Spring
MathEd 335	4	Fall

¹ Not offered every year.

Courses in Mathematics

MATH 100. College Algebra. 3 cr. Graphing linear equations and inequalities, exponents, radicals, quadratic equations, systems of equations, study of functions including exponentials and logarithmic functions. Prereq: 90 or suitable placement test score. GDR: MATH

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. An alternative to Math 100 to meet GDR in the BA degree. Not a substitute for Math 100 in the BS degree. Prereq: Math 90 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: 100 or suitable placement score. GDR: MATH BS BM/BFA

MATH 111. Applied Calculus. 4 cr. Calculus applied to business, economics, biology, natural resources, and social science. Prereq: 100 or a suitable placement score. May not take 111 for credit after successful completion of 120. GDR: MATH BS/BFA

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 119. Math 112 will not substitute for 119 and is not preparation for 120. May not earn credit in both 112 and 119. Prereq: 100 or placement into 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 120 if you did not place into 120. Prereq: 100 or suitable placement test score. GDR: MATH BS BM/BFA

MATH 119. Precalculus Trigonometry. 2 cr. Trigonometric functions, their basic properties and graphs; inverse trigonometric functions; identities; applications. Preparation for 120 if you did not place into 120. May not earn credit in both 112 and 119. Prereq: 100 or suitable placement test score.

MATH 120. Analytic Geometry and Calculus I. 4 cr. Analytic geometry of the plane; differentiation and integration of algebraic functions with some applications. Prereq: 118 and 119 or suitable placement score.

MATH 121. Analytic Geometry and Calculus II. 4 cr. Analytic geometry of the plane continued; differentiation and integration of transcendental functions; integration techniques; differential equations; infinite series; additional applications. Prereq: 120.

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: 100 and con reg in CIS 120.

MATH 213. Introduction to Linear Algebra. 4 cr. Topics in linear algebra; matrix algebra, systems of linear equations, Gauss-Jordan elimination, determinants, vector spaces, linear independence and bases, linear transformations, eigenvalues and eigenvectors; selected applications. Prereq: 121.

MATH 222. Analytic Geometry and Calculus III. 4 cr. Introduction to solid analytic geometry; differentiation of functions of several variables; multiple integrals; parametric equations and vectors; applications. Prereq: 121.

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: 100 or placement above 100 and con reg in Math Ed 228; and elementary ed major with cons chair of Math/Computing. *If you do not meet the prerequisites, you will not be allowed to take the course.*

MATH 300. Introduction to Proof with Real Analysis. 3 cr. Transition to upper division mathematics. Topics include logic, proof techniques, set theory, relations and functions; elementary properties of integers, rational numbers, and real numbers; open sets, closed sets, cardinality, limits, and continuous functions; also reading and writing formal mathematical proofs. Prereq: 121.

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: 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: 213 or 220 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: 222 and 310.

MATH 320/520. 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: 222.

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: 222 and 300 or cons instr.

MATH 327. Advanced Calculus. 3 cr. Theory of differential and integral calculus: limits and convergence, continuity, derivatives, integrals; Inverse and Implicit Function Theorems; Taylor and Fourier series; transforms. Prereq: 213 or 220, and 222, 300.

MATH 330. Intermediate Linear Algebra. 3 cr. Abstract finite and infinite dimensional vector and inner product spaces; subspaces: spanning and linear independence, bases and dimension; linear transformations: eigenvalues and eigenvectors, diagonalization, isomorphism, canonical forms; selected applications. Prereq: 213 or 220, and 300.

MATH 331. Abstract Algebra. 3 cr. Groups, rings, fields, number systems, Euclidean domains, and polynomials. Prereq: 213 or 220, and 300.

MATH 335. Number Theory. 3 cr. Primes, composites, and divisibility; congruences and residue classes; number-theoretic functions; Diophantine equations. Prereq: 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: 228 and con reg in Math Ed 338. GDR: MATH BS BM/BFA

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: 300 and con reg in Math Ed 340/540.

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 Math Ed 345.

MATH 350/550. 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; 350 is not a prereq for 357. Does not count toward math major/minor. Prereq: 121.

MATH 355. 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: 100 or suitable placement test score. GDR: MATH BS BM/BFA

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: 121.

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

MATH 358. Seminar to Prepare for Actuarial Exam 110. 2 cr. Study and discuss concepts and problems from statistics found on recent actuarial examinations. Prereq: 357 or con reg in 357.

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: 338 and con reg in Math Ed 359.

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: 121 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: 338 and con reg in Math 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: 213 or 220, and 300.

MATH 380. History of Mathematics. 3 cr. A survey of the history of mathematics with emphasis on mathematical ideas, problems, and methods from early civilization to the present. Prereq: 213 or 222.

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.

Mathematics Latent Courses: Not offered recently. See full course description in indicated (xx-xx) catalog.

- 220 Introduction to Linear Algebra and Differential Equations, 4 cr (07-09)
- 321 Intermediate Differential Equations, 3 cr (07-09)
- 322 Vector Analysis, 3 cr (03-05)
- 323 Foundations of Analysis, 3 cr (07-09)
- 360 Numerical Analysis, 3 cr (03-05)

- 455/655 Advanced Statistical Methods, 4 cr (07-09)
- 468 Applied Statistics, 3 cr (07-09)
- 550 Probability and Statistics with Teaching Methods, 3 cr (07-09)

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 334/534. 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 120 or cons instr.

M ED 335. Techniques in Secondary Education. 4 cr. Aims, methods, materials, techniques, planning, organization, assessment, and field experience. Same as Educ 335. 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. GDR MATH BS BM/BFA

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. 340/540. Teaching Secondary Geometry. 1 cr. Techniques, research, curricular planning, and evaluation issues related to teaching geometry at secondary level. Prereq: 300, con reg in Math 340/540.

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 350/550. Teaching Probability and Statistics. 1 cr. Techniques, research, and evaluation issues related to teaching probability and statistics at the secondary level. Prereq: Math 121 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 390/590. 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.

Mathematics Education Latent Courses: Not offered recently. See full course description in indicated (xx-xx) catalog.

- 550 Teaching Probability and Statistics, 1 cr (07-09)