Class Schedule - Spring 2009

Mathematics

Mathematics
Department Chair: Sheldon Katz
Department Office: 273 Altgeld Hall, 1409 West Green, Urbana
Phone: 333-3350
www.math.uiuc.edu

MATH 012  Algebra  credit: 3 hours.
Rapid review of basic techniques of factoring, rational expressions, equations and inequalities; functions and graphs; exponential and logarithm functions; systems of equations; matrices and determinants; polynomials; and the binomial theorem. Students who need both algebra and trigonometry should enroll in MATH 016. Credit is not given for both MATH 012 and MATH 016. Credit not applicable toward graduation in certain curricula. Prerequisite: 1.5 units of high school algebra; 1 unit of high school geometry.

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<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tr>
<td>37506</td>
<td>Discussion/Recitation</td>
<td>AD3</td>
<td>04:00 PM - 04:50 PM</td>
<td>W</td>
<td>347 - Altgeld Hall</td>
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<tr>
<td>39373</td>
<td>Lecture</td>
<td>AL1</td>
<td>11:00 AM - 11:50 AM</td>
<td>MWF</td>
<td>245 - Altgeld Hall</td>
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<tr>
<td>39581</td>
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<td>X1</td>
<td>12:30 PM - 01:50 PM</td>
<td>MTWR</td>
<td>445 - Altgeld Hall</td>
<td>Wahl, K</td>
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Restricted to students in the transition/bridge program.

MATH 103  Theory of Arithmetic  credit: 4 hours.
Analyses of the mathematical issues and methodology underlying elementary mathematics in grades K-5. Topics include sets, arithmetic algorithms, elementary number theory, rational and irrational numbers, measurement, and probability. There is an emphasis on problem solving. Priority registration will be given to students enrolled in teacher education programs leading to certification in elementary or childhood education. Prerequisite: MATH 012 or equivalent.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning I

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<th>CRN</th>
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<th>Time</th>
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<th>Location</th>
<th>Instructor</th>
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<td>37821</td>
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<td>AB1</td>
<td>11:00 AM - 12:40 PM</td>
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Quant Reasoning I course.

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Quant Reasoning I course.

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<td>37823</td>
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<td>14 - Illini Hall</td>
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Quant Reasoning I course.
MATH 115  **Preparation for Calculus**  credit: 3 hours.
Reviews trigonometric, rational, exponential, and logarithmic functions; provides a full treatment of limits, definition of derivative, and an introduction to finding area under a curve. Intended for students who need preparation for MATH 220, either because they lack the content background or because they are not prepared for the rigor of a university calculus course. Credit is not given for both MATH 115 and either MATH 014 or MATH 016. Students may not receive credit for MATH 115 if MATH 115 is taken after receiving credit for MATH 220 or MATH 221. Prerequisite: MATH 012 and an adequate ALEKS score.

This course satisfies the General Education Criteria for a: Quantitative Reasoning I

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Quant Reasoning I course.
Restricted to students in the transition/bridge program.

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Quant Reasoning I course.

MATH 117  **Elementary Mathematics**  credit: 4 hours.
Analyzes the mathematical issues and methodology underlying elementary mathematics in grades 6-8. Topics include the Real number system and field axioms, sequences and series, functions and math modeling with technology, Euclidean and non-Euclidean geometry, probability and statistics. Priority registration will be given to students enrolled in teacher education programs leading to certification in elementary education. Prerequisite: MATH 012 or equivalent.

This course satisfies the General Education Criteria for a: Quantitative Reasoning I

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<tr>
<th>CRN</th>
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Quant Reasoning I course.

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Quant Reasoning I course.
MATH 119  **Ideas in Geometry**  credit: 3 hours.
General education course in mathematics, for students who do not have mathematics as a central part of their studies. The goal is to convey the spirit of mathematical thinking through topics chosen mainly from plane geometry. Prerequisite: Two units of high school algebra; one unit of high school geometry; or equivalent.
This course satisfies the General Education Criteria for a:
Quantitative Reasoning I

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<td>141 - Altgeld Hall</td>
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MATH 124  **Finite Mathematics**  credit: 3 hours.
Introduction to finite mathematics for students in the social sciences; introduces the student to the basic ideas of logic, set theory, probability, vectors and matrices, and Markov chains. Problems are selected from social sciences and business. Prerequisite: MATH 012 or an adequate ALEKS score.
This course satisfies the General Education Criteria for a:
Quantitative Reasoning I

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Quant Reasoning I course.

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Quant Reasoning I course.

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<td>09:00 AM - 10:20 AM</td>
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<td>343 - Altgeld Hall</td>
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Quant Reasoning I course.
This section has a blended format in which half of the content is delivered in lecture and half is delivered on-line.
MATH 125  **Elementary Linear Algebra**  credit: 3 hours.
Basic concepts and techniques of linear algebra; includes systems of linear equations, matrices, determinants, vectors in n-space, and eigenvectors, together with selected applications, such as Markov processes, linear programming, economic models, least squares, and population growth. Credit is not given for both MATH 125 and any of MATH 225, MATH 410, or MATH 415. Prerequisite: MATH 012 or an adequate ALEKS score.

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<td>37562</td>
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<td>02:00 PM - 02:50 PM</td>
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<td>1320 - Digital Computer Laboratory</td>
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<td>37560</td>
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<td>X1</td>
<td>12:00 PM - 12:50 PM</td>
<td>MWF</td>
<td>112 - Chemistry Annex</td>
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MATH 161  **Statistics**  credit: 3 hours.
Same as STAT 100. See STAT 100.
This course satisfies the General Education Criteria for a: Quantitative Reasoning I

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<td>114 - Transportation Building</td>
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Quant Reasoning I course.

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Quant Reasoning I course.

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Quant Reasoning I course.

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<td>150 - Animal Sciences Laboratory</td>
<td>Martinsek, A Patterson, J</td>
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</table>

Quant Reasoning I course.
MATH 181  **A Mathematical World**  credit: 3 hours.

Introduction to selected areas of mathematical sciences through application to modeling and solution of problems involving networks, circuits, trees, linear programming, random samples, regression, probability, inference, voting systems, game theory, symmetry and tilings, geometric growth, comparison of algorithms, codes and data management. Prerequisite: Three years of high school mathematics, including two years of algebra and one year of geometry.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning I

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<th>CRN</th>
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<th>Time</th>
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<td>10:00 AM - 10:50 AM</td>
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<td>443 - Altgeld Hall</td>
<td>Kelsey, G</td>
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<tr>
<td>46843</td>
<td>Lecture-Discussion</td>
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<td>11:00 AM - 11:50 AM</td>
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<td>E2</td>
<td>01:00 PM - 02:50 PM</td>
<td>MWF</td>
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<td>F1</td>
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<td>Wahl, K</td>
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Quant Reasoning I course.

A Mathematical World, 3 hours.

Quant Reasoning I course.

Meet 16-Mar-09 - 06-May-09.
MATH 199  **Undergraduate Open Seminar**  credit: 1 TO 5 hours.
Approved for both letter and S/U grading. May be repeated.

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<tr>
<td>10551</td>
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Instructor Approval Required

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<th>Location</th>
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<td>46559</td>
<td>Lecture-Discussion</td>
<td>CHP</td>
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<td>MWF</td>
<td>243 - Altgeld Hall</td>
<td>Ahlgren, S</td>
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Credit Hours: 3 hours
Camp Honors/Chanc Schol course.
Special Topic: Numbers. For Chancellor's Scholars only; other may only enroll with the consent of the instructor and the Campus Honors Program.

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<th>Location</th>
<th>Instructor</th>
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<tr>
<td>49060</td>
<td>Lecture-Discussion</td>
<td>FTM</td>
<td>03:00 PM - 03:50 PM</td>
<td>W</td>
<td>201 - 505 E Green</td>
<td>Sebestik, J</td>
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Credit Hours: 1 hours
Restricted to students with Freshman or Sophomore class standing.

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<td>48356</td>
<td>Discussion/Recitation</td>
<td>JMM</td>
<td>01:00 PM - 02:50 PM</td>
<td>M</td>
<td>159 - Altgeld Hall</td>
<td>McNeilly, J Peterson, V</td>
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Credit Hours: 1 hours
Departmental Approval Required
For Math 115 Merit Workshop students only. Departmental approval required. For further information see http://www.math.uiuc.edu/timetable/

MATH 210  **Theory of Interest**  credit: 3 hours.
Study of compound interest and annuities; applications to problems in finance. Prerequisite: MATH 231 or equivalent.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning II

<table>
<thead>
<tr>
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<td>02:00 PM - 02:50 PM</td>
<td>MWF</td>
<td>160 - English Building</td>
<td>Chen, S</td>
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Quant Reasoning II course.

MATH 213  **Basic Discrete Mathematics**  credit: 3 hours.
Beginning course on discrete mathematics, including sets and relations, functions, basic counting techniques, recurrence relations, graphs and trees, and matrix algebra; emphasis throughout is on algorithms and their efficacy. Credit is not given for both MATH 213 and CS 173. Prerequisite: MATH 220 or MATH 221, or equivalent.
This course satisfies the General Education Criteria for a:
Quantitative Reasoning II

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<td>09:00 AM - 09:50 AM</td>
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<td>140 - Henry Administration Bldg</td>
<td>Duursma, I</td>
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Quant Reasoning II course.
Restrict to freshmen and sophomores.

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<td>Duursma, I</td>
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Quant Reasoning II course.
Restrict to freshmen and sophomores.

MATH 220  **Calculus**  credit: 5 hours.
First course in calculus and analytic geometry; basic techniques of differentiation and integration with applications including curve sketching; antidifferentiation, the Riemann integral, fundamental theorem, exponential and trigonometric functions. Credit is not given for both MATH 220 and either MATH 221 or MATH 234. Prerequisite: MATH 016 or MATH 115; and an adequate ALEKS placement score.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning I

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<th>Location</th>
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<tbody>
<tr>
<td>37543</td>
<td>Laboratory</td>
<td>AB1</td>
<td>03:00 PM - 04:50 PM</td>
<td>T</td>
<td>159 - Altgeld Hall</td>
<td>Harper, M</td>
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Quant Reasoning I course.
Small group learning lab. Must also sign up for 37542.

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<tbody>
<tr>
<td>37522</td>
<td>Discussion/Recitation</td>
<td>AD1</td>
<td>01:00 PM - 01:50 PM</td>
<td>TR</td>
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Quant Reasoning I course.

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Quant Reasoning I course.

MATH 225  Introductory Matrix Theory  credit: 2 hours.

Systems of linear equations, matrices and inverses, determinants, and a glimpse at vector spaces, eigenvalues and eigenvectors. Credit is not given for both MATH 225 and any of MATH 125, MATH 410, or MATH 415. Prerequisite: MATH 220 or MATH 221; or equivalent.

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### MATH 231  Calculus II  

credit: 3 hours.

Second course in calculus and analytic geometry: techniques of integration, conic sections, polar coordinates, and infinite series. Credit is not given for both MATH 231 and MATH 230. Prerequisite: MATH 220 or MATH 221.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning I

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Quant Reasoning I course.
Departmental Approval Required
For Merit Workshop students only. Departmental approval required. For further information see http://www.math.uiuc.edu/timetable/.

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Quant Reasoning I course.
Departmental Approval Required
Not intended for Graduate - Urbana-Champaign.
Requires concurrent registration in Math 249 P1H. This is an Honors course.

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Quant Reasoning I course.

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For Students in University Residence Hall Living-Learning Communities.

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Quant Reasoning I course.

Departmental Approval Required
**MATH 234  Calculus for Business I**  credit: 4 hours.

Introduction to the concept of functions and the basic ideas of the calculus. Credit is not given for both MATH 234 and either MATH 220 or MATH 221. Prerequisite: MATH 012 and an adequate ALEKS score.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning I

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MATH 241  **Calculus III**  credit: 4 hours.

Third course in calculus and analytic geometry including vector analysis: Euclidean space, partial differentiation, multiple integrals, line integrals and surface integrals, the integral theorems of vector calculus. Credit is not given for both MATH 241 and any of MATH 244, MATH 292, or MATH 380. Prerequisite: MATH 231.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning II

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Quant Reasoning II course.

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Quant Reasoning II course.
For Students in University Residence Hall Living-Learning Communities.

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Quant Reasoning II course. Departmental Approval Required. Not intended for Graduate - Urbana-Champaign. This is an Honors course.

Quant Reasoning II course.

Quant Reasoning II course.
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Quant Reasoning II course.

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Quant Reasoning II course.

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Quant Reasoning II course.

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Quant Reasoning II course.

Departmental Approval Required
Not intended for Graduate - Urbana-Champaign.
This is an Honors course.

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Requires concurrent registration in Math 231 D1H.

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Requires concurrent registration in Math 231 E1H.

**MATH 249 Honors Supplement** credit: 1 hours.
Supplemental credit hour for honors courses with additional material or special projects. Prerequisite: Concurrent registration in a specially designated honors section and consent of department.

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**MATH 285 Intro Differential Equations** credit: 3 hours.
Techniques and applications of ordinary differential equations, including Fourier series and boundary value problems, and an introduction to partial differential equations. Intended for engineering majors and others who require a working knowledge of differential equations. Credit is not given for both MATH 285 and any of MATH 284, MATH 286, MATH 441. Prerequisite: MATH 241.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning II
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<th>Course Code</th>
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**MATH 286  Intro to Differential Eq Plus**  credit: 4 hours.

Techniques and applications of ordinary differential equations, including Fourier series and boundary value problems, linear systems of differential equations, and an introduction to partial differential equations. Covers all the MATH 285 plus linear systems. Intended for engineering majors and other who require a working knowledge of differential equations. Credit is not given for both MATH 286 and any of MATH 284, MATH 285, MATH 441. Prerequisite: MATH 241.
This course satisfies the General Education Criteria for a:
Quantitative Reasoning II

<table>
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Quant Reasoning II course.

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Quant Reasoning II course.

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Quant Reasoning II course.

MATH 290  **Symbolic Computation Lab**  credit: 1 hours.
Laboratory component to courses using a symbolic programming package. Prerequisite: Consent of department; concurrent registration in a designated section of a mathematics course with symbolic computation component. May be taken only once for credit.

<table>
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<tr>
<th>CRN</th>
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Students from Math 220 Mathematica sections may enroll in this section.

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Students from Math 231 Mathematica sections may enroll in this section.

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Students from Math 286 Mathematica sections may enroll in this section.

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Students from Math 241 Mathematica sections may enroll in this section.

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Students from Math 380 Mathematica sections may enroll in this section.

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Students from Math 285 Mathematica sections may enroll in this section.
Students from Math 225 Mathematica sections may enroll in this section.

Students from Math 415 Mathematica sections may enroll in this section.

Students from Math 461 Mathematica sections may enroll in this section.

Students from Math 415 Z83 & Z84 Mathematica sections may enroll in this section.

MATH 347  **Fundamental Mathematics**  credit: 3 hours.
Fundamental ideas used in many areas of mathematics. Topics will include: techniques of proof, mathematical induction, binomial coefficients, rational and irrational numbers, the least upper bound axiom for real numbers, and a rigorous treatment of convergence of sequences and series. This will be supplemented by the instructor from topics available in the various texts. Students will regularly write proofs emphasizing precise reasoning and clear exposition. Credit is not given for both MATH 347 and MATH 348. Prerequisite: MATH 231.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning II

<table>
<thead>
<tr>
<th>CRN</th>
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</table>
Mathematics, Spring 2009

MATH 348  **Fundamental Mathematics-ACP**  credit: 4 hours.
Course is identical to MATH 347 except for the additional writing component. Credit is not given for both MATH 348 and MATH 347. Prerequisite: MATH 231 and completion of the campus Composition I general education requirement.
This course satisfies the General Education Criteria for a:
Quantitative Reasoning II
Advanced Composition

<table>
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Advanced Composition, and Quant Reasoning II course.

MATH 357  **Numerical Methods I**  credit: 3 hours.
Same as CS 357. See CS 357.

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Credit Hours: 3 hours

MATH 362  **Probability with Engrg Applic**  credit: 3 hours.
Same as ECE 313. See ECE 313.

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Credit Hours: 3 hours

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Credit Hours: 3 hours

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</table>

Credit Hours: 3 hours

MATH 370  **Actuarial Problem Solving**  credit: 1 hours.
Methods and techniques of solving problems in actuarial mathematics for advanced students intending to enter the actuarial profession. Approved for S/U grading only. May be repeated in the same or subsequent semesters to a maximum of 4 hours. Prerequisite: Consent of instructor.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
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<td>M</td>
<td>245 - Altgeld Hall</td>
<td>Yang, S</td>
</tr>
</tbody>
</table>

For students who will take Course 1 of the National Actuarial Exam. 1 hour credit only.

<table>
<thead>
<tr>
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Instructor Approval Required
Instructor approval required.

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</table>

For students who will take Course 2 of the National Actuarial Exam. 1 hour credit only.

MATH 380  **Advanced Calculus**  credit: 3 hours.

Introductory study of vector calculus and functions of several variables; topics include directional derivatives; Jacobians; change of variables in multiple integrals; maxima and minima; line and surface integrals; theorems of Gauss, Green, and Stokes; infinite series; and uniform convergence. Credit is not given for both MATH 380 and MATH 241. Prerequisite: MATH 242.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning II

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
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Quant Reasoning II course.
Section Z8 will be taught asynchronously using Mathematica courseware. See http://www.math.uiuc.edu/timetable/ for further details.

MATH 390  **Individual Study**  credit: 0 TO 3 hours.

Guided individual study of advanced topics not covered in other courses. May be repeated to a maximum of 8 hours. Approved for both letter and S/U grading. Prerequisite: Consent of instructor.

<table>
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Instructor approval required.

MATH 402  **Non Euclidean Geometry**  credit: 3 OR 4 hours.

Historical development of geometry; includes tacit assumptions made by Euclid; the discovery of non-Euclidean geometries; geometry as a mathematical structure; and an axiomatic development of plane geometry. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Prerequisite: MATH 241; MATH 347 or MATH 348, or equivalent; or consent of instructor.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning II

<table>
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Credit Hours: 3 hours  
Quant Reasoning II course.  
Open to both undergraduate and graduate students.

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Credit Hours: 4 hours  
Quant Reasoning II course.  
Instructor Approval Required  
Not intended for Undergrad - Urbana-Champaign.  
Instructor approval forms available in 313 Altgeld Hall.

<table>
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Credit Hours: 3 hours  
Quant Reasoning II course.  
Open to both undergraduate and graduate students.

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Credit Hours: 4 hours  
Quant Reasoning II course.  
Instructor Approval Required  
Not intended for Undergrad - Urbana-Champaign.  
Instructor approval forms available in 313 Altgeld Hall.

**MATH 403  Euclidean Geometry  credit: 3 OR 4 hours.**

Selected topics from geometry, including the nine-point circle, theorems of Cera and Menelaus, regular figures, isometries in the plane, ordered and affine geometries, and the inversive plane. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Prerequisite: MATH 241; MATH 347 or 348, or equivalent; or consent of instructor.

This course satisfies the General Education Criteria for a:  
Quantitative Reasoning II

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Credit Hours: 3 hours  
Quant Reasoning II course.  
Open to both undergraduate and graduate students.

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<th>CRN</th>
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</table>

Credit Hours: 4 hours  
Quant Reasoning II course.  
Instructor Approval Required  
Not intended for Undergrad - Urbana-Champaign.
MATH 405  Teacher's Course  credit: 3 OR 4 hours.
In-depth, advanced perspective look at selected topics covered in the secondary curriculum. Connects mathematics learned at
the university level to content introduced at the secondary level. Intended for students who plan to seek a secondary certificate in
mathematics teaching. 4 hours of credit requires approval of the instructor and department with completion of additional work of
substance. Prerequisite: MATH 241; MATH 347 or MATH 348, or equivalent; or consent of instructor.
This course satisfies the General Education Criteria for a:
Quantitative Reasoning II

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Credit Hours: 3 hours
Quant Reasoning II course.
Open to both undergraduate and graduate students.

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Credit Hours: 4 hours
Quant Reasoning II course.
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Instructor approval forms available in 313 Altgeld Hall.

MATH 408  Actuarial Statistics I  credit: 4 hours.
Same as STAT 408. See STAT 408.

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<tr>
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MATH 410  Lin Algebra & Financial Apps  credit: 3 OR 4 hours.
Emphasizes techniques of linear algebra and introductory and advanced applications to actuarial science, finance and economics.
Topics include linear equations, matrix theory, vector spaces, linear transformations, eigenvalues and eigenvectors and inner product
spaces. In addition, current research topics such as modeling, data mining, and generalized linear models are explored. 4 hours of
Credit requires approval of the instructor and department with completion of additional work of substance. Credit is not given for both MATH 410 and MATH 125, MATH 225, or MATH 415. Prerequisite: MATH 241; MATH 210 or FIN 221; or consent of instructor.

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<th>Instructor</th>
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<td>N13</td>
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<td>Nevins, T</td>
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Credit Hours: 3 hours
Restricted to Actuarial Science majors.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>50885</td>
<td>Lecture-Discussion</td>
<td>N14</td>
<td>10:30 AM - 11:50 AM</td>
<td>TR</td>
<td>150 - Animal Sciences Laboratory</td>
<td>Nevins, T</td>
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</table>

Credit Hours: 4 hours
Departmental Approval Required
Restricted to Actuarial Science majors.

**MATH 412  Graph Theory**  credit: 3 OR 4 hours.

Examines basic concepts and applications of graph theory, where graph refers to a set of vertices and edges that join some pairs of vertices; topics include subgraphs, connectivity, trees, cycles, vertex and edge coloring, planar graphs and their colorings. Draws applications from computer science, operations research, chemistry, the social sciences, and other branches of mathematics, but emphasis is placed on theoretical aspects of graphs. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Prerequisite: MATH 347 or MATH 348 or equivalent experience or CS 373.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning II

<table>
<thead>
<tr>
<th>CRN</th>
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<td>MWF</td>
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Credit Hours: 3 hours
Quant Reasoning II course.
Open to both undergraduate and graduate students.

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<th>CRN</th>
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Credit Hours: 4 hours
Quant Reasoning II course.
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Instructor approval forms available in 313 Altgeld Hall.

**MATH 413  Intro to Combinatorics**  credit: 3 OR 4 hours.

Permutations and combinations, generating functions, recurrence relations, inclusion and exclusion, Polya's theory of counting, and block designs. Same as CS 413. 3 undergraduate hours. 3 or 4 graduate hours. 4 hours of credit requires approval of the instructor and completion of additional work of substance. Prerequisite: MATH 347 or MATH 348 or equivalent experience.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning II
MATH 415  **Applied Linear Algebra**  credit: 3 OR 4 hours.

Introductory course emphasizing techniques of linear algebra with applications to engineering; topics include matrix operations, determinants, linear equations, vector spaces, linear transformations, eigenvalues, and eigenvectors, inner products and norms, orthogonality, equilibrium, and linear dynamical systems. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Credit is not given for both MATH 415 and any of MATH 125, MATH 225, or MATH 410. Prerequisite: MATH 241 or consent of instructor.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning II

<table>
<thead>
<tr>
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<th>Time</th>
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<td>MWF</td>
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Quant Reasoning II course.
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Instructor approval forms available in 313 Altgeld Hall.

<table>
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<td>Uses Mathematica courseware. See <a href="http://www.math.uiuc.edu/timetable/">http://www.math.uiuc.edu/timetable/</a> for details. Open to both undergraduate and graduate students.</td>
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Quant Reasoning II course.
Open to both undergraduate and graduate students.

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Credit Hours: 4 hours
Quant Reasoning II course.
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Instructor approval forms available in 313 Altgeld Hall.

<table>
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Credit Hours: 3 hours
Quant Reasoning II course.
Open to both undergraduate and graduate students.

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Credit Hours: 4 hours
Quant Reasoning II course.
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Instructor approval forms available in 221 Altgeld Hall beginning January 13, 2005.

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Credit Hours: 3 hours
Quant Reasoning II course.
Section Z8 will be taught asynchronously using Mathematica courseware. See http://www.math.uiuc.edu/timetable/ for further details.
Open to both undergraduate and graduate students.

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Credit Hours: 4 hours
Quant Reasoning II course.
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Section Z8 will be taught asynchronously using Mathematica courseware. See http://www.math.uiuc.edu/timetable/ for further details.

**MATH 416  ** **Abstract Linear Algebra**  credit: 3 OR 4 hours.
Rigorous proof-oriented course in linear algebra. Topics include determinants, vector spaces over fields, linear transformations, inner product spaces, eigenvectors and eigenvalues, Hermitian matrices, Jordan Normal Form. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Prerequisite: MATH 241 or consent of instructor; MATH 347 is recommended.

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Credit Hours: 3 hours
MATH 417  **Intro to Abstract Algebra**  credit: 3 OR 4 hours.
Fundamental theorem of arithmetic, congruences. Permutations. Groups and subgroups, homomorphisms. Group actions with applications. Polynomials. Rings, subrings, and ideals. Integral domains and fields. Roots of polynomials. Maximal ideals, construction of fields. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Prerequisite: Either MATH 416 or one of MATH 410, MATH 415 together with one of MATH 347, MATH 348, CS 373; or consent of instructor.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning II

<table>
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Credit Hours: 3 hours
Quant Reasoning II course.
Open to both undergraduate and graduate students.

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Credit Hours: 4 hours
Quant Reasoning II course.
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Instructor approval forms available in 313 Altgeld Hall.

MATH 418  **Intro to Abstract Algebra II**  credit: 3 OR 4 hours.
Rings of quotients of an integral domain. Euclidean domains, principal ideal domains. Unique factorization in polynomial rings. Fields extensions, ruler and compass constructions. Finite fields with applications. Modules. Structure theorem for finitely generated modules over principal ideal domains. Application to finitely generated abelian groups and canonical forms of matrices. Introduction to error-correcting codes. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Prerequisite: MATH 417 or consent of instructor.

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Credit Hours: 3 hours
Open to both undergraduate and graduate students.

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Credit Hours: 4 hours
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
MATH 425  **Honors Advanced Analysis**  credit: 3 hours.
A theoretical treatment of differential and integral calculus in higher dimensions. Topics include inverse and implicit function theorems, submanifolds, the theorems of Green, Gauss and Stokes, differential forms, and applications. As part of the honors sequence, this course will be rigorous and abstract. Approved for honors grading. 3 undergraduate hours. Prerequisite: MATH 424 and either MATH 415 or MATH 416, and consent of the department.

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MATH 428  **Honors Topics in Mathematics**  credit: 3 hours.
A capstone course in the Mathematics Honors Sequences. Topics will vary. As part of the honors sequence, this course will be rigorous and abstract. Approved for honors grading. 3 undergraduate hours. May be repeated in the same or separate terms to a maximum of 12 hours. Prerequisite: Consent of the department.

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MATH 432  **Set Theory and Topology**  credit: 3 OR 4 hours.
Informal set theory, cardinal and ordinal numbers, and the axiom of choice; topology of metric spaces and introduction to general topological spaces. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Prerequisite: MATH 347 or MATH 348 or consent of instructor.

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Credit Hours: 3 hours

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</table>

Credit Hours: 4 hours
Departmental Approval Required

MATH 441  **Differential Equations**  credit: 3 OR 4 hours.
Basic course in ordinary differential equations; topics include existence and uniqueness of solutions and the general theory of linear differential equations; treatment is more rigorous than that given in MATH 285. 4 hours of credit requires approval of the instructor and completion of additional work of substance. Credit is not given for both MATH 441 and any of MATH 284, MATH 285, MATH 286. Prerequisite: MATH 241. Recommended: MATH 347 or MATH 348.

This course satisfies the General Education Criteria for a: Quantitative Reasoning II
### MATH 442  **Intro Partial Diff Equations**  credit: 3 OR 4 hours.

Introduces partial differential equations, emphasizing the wave, diffusion and potential (Laplace) equations. Focuses on understanding the physical meaning and mathematical properties of solutions of partial differential equations. Includes fundamental solutions and transform methods for problems on the line, as well as separation of variables using orthogonal series for problems in regions with boundary. Covers convergence of Fourier series in detail. 4 hours of credit requires approval of the instructor and completion of additional work of substance. Prerequisite: One of MATH 284, MATH 285, MATH 286, MATH 441.
MATH 444  **Elementary Real Analysis**  credit: 3 OR 4 hours.
Careful treatment of the theoretical aspects of the calculus of functions of a real variable; topics include the real number system, limits, continuity, derivatives, and the Riemann integral. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Credit is not given for both MATH 444 and MATH 447. Prerequisite: MATH 241; MATH 347 or MATH 348, or equivalent.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning II

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Credit Hours: 3 hours
Quant Reasoning II course.
Open to both undergraduate and graduate students.

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Credit Hours: 4 hours
Quant Reasoning II course.
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Instructor approval forms available in 313 Altgeld Hall.

<table>
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Credit Hours: 3 hours
Quant Reasoning II course.
Open to both undergraduate and graduate students.

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Credit Hours: 4 hours
Quant Reasoning II course.
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Instructor approval forms available in 313 Altgeld Hall.

MATH 446  **Applied Complex Variables**  credit: 3 OR 4 hours.
For students who desire a working knowledge of complex variables; covers the standard topics and gives an introduction to integration by residues, the argument principle, conformal maps, and potential fields. Students desiring a systematic development of the foundations of the subject should take MATH 448. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Credit is not given for both MATH 446 and MATH 448. Prerequisite: MATH 241 or MATH 380; or consent of instructor.

<table>
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Credit Hours: 3 hours
Open to both undergraduate and graduate students.

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Credit Hours: 4 hours
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Instructor approval forms available in 313 Altgeld Hall.

MATH 447  **Real Variables**  credit: 3 OR 4 hours.
Careful development of elementary real analysis including such topics as completeness property of the real number system; basic topological properties of n-dimensional space; convergence of numerical sequences and series of functions; properties of continuous functions; and basic theorems concerning differentiation and Riemann integration. 3 undergraduate hours. 3 or 4 graduate hours. 4 hours of credit requires approval of the instructor and completion of additional work of substance. Credit is not given for both MATH 447 and MATH 444. Prerequisite: MATH 241 or equivalent; junior standing; MATH 347 or MATH 348, or equivalent experience; or consent of instructor.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning II

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Credit Hours: 3 hours
Quant Reasoning II course.
Open to both undergraduate and graduate students.

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Credit Hours: 4 hours
Quant Reasoning II course.
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Instructor approval forms available in 313 Altgeld Hall.

MATH 448  **Complex Variables**  credit: 3 OR 4 hours.
For students who desire a rigorous introduction to the theory of functions of a complex variable; topics include Cauchy’s theorem, the residue theorem, the maximum modulus theorem, Laurent series, the fundamental theorem of algebra, and the argument principle. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Credit is not given for both MATH 448 and MATH 446. Prerequisite: MATH 241 or MATH 380; MATH 447.

<table>
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Credit Hours: 3 hours
Open to both undergraduate and graduate students.
MATH 450  **Numerical Analysis**  credit: 3 OR 4 hours.
Same as CS 450, CSE 401 and ECE 491. See CS 450.

<table>
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Credit Hours: 3 hours

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<td>Hirani, A</td>
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Credit Hours: 4 hours
Restricted to Graduate - Urbana-Champaign.

MATH 453  **Elementary Theory of Numbers**  credit: 3 OR 4 hours.
Basic introduction to the theory of numbers. Core topics include divisibility, primes and factorization, congruences, arithmetic functions, quadratic residues and quadratic reciprocity, primitive roots and orders. Additional topics covered at the discretion of the instructor include sums of squares, Diophantine equations, continued fractions, Farey fractions, recurrences, and applications to primality testing and cryptography. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Prerequisite: MATH 241 or equivalent.

This course satisfies the General Education Criteria for a: Quantitative Reasoning II

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<tr>
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Credit Hours: 3 hours
Quant Reasoning II course.
Open to both undergraduate and graduate students.

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Credit Hours: 4 hours
Quant Reasoning II course.
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Instructor approval forms available in 313 Altgeld Hall.
### Probability Theory

**Course Description**

Introduction to mathematical probability; includes the calculus of probability, combinatorial analysis, random variables, expectation, distribution functions, moment-generating functions, and central limit theorem. Same as STAT 451. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Credit is not given for both MATH 461 and either MATH 408 or ECE 313. Prerequisite: MATH 241 or equivalent.

#### CRN Information

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Credit Hours: 4 hours
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Instructor approval forms available in 313 Altgeld Hall.

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Credit Hours: 3 hours
Uses Mathematica courseware. See http://www.math.uiuc.edu/timetable/ for details. Open to both undergraduate and graduate students.

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Credit Hours: 4 hours
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Uses Mathematica courseware. See http://www.math.uiuc.edu/timetable/ for details. Open to both undergraduate and graduate students.

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Credit Hours: 3 hours
Open to both undergraduate and graduate students.

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Credit Hours: 4 hours
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Instructor approval forms available in 313 Altgeld Hall.

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MATH 463  **Statistics and Probability I**  credit: 4 hours.
Same as STAT 400. See STAT 400.
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**MATH 464  Statistics and Probability II**  credit: 3 OR 4 hours.
Same as STAT 410. See STAT 410.

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Credit Hours: 4 hours
Restricted to Graduate - Urbana-Champaign.

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Credit Hours: 3 hours
Restricted to Undergrad - Urbana-Champaign.

**MATH 465  Analysis of Variance**  credit: 3 OR 4 hours.
Same as STAT 424. See STAT 424.
MATH 469  Methods of Applied Statistics  credit: 3 OR 4 hours.
Same as STAT 420. See STAT 420.

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MATH 472  Actuarial Theory II  credit: 3 OR 4 hours.
Continuation of MATH 471. Emphasis is on multiple-life functions. 3 undergraduate hours. 3 or 4 graduate hours. 4 hours of credit requires approval of the instructor and completion of additional work of substance. Prerequisite: MATH 471.

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Credit Hours: 3 hours
Instructor approval forms available in 313 Altgeld Hall.

51241  Lecture-Discussion  E13  01:00 PM - 01:50 PM  MWF  328 - Armory  Johnson, P

Credit Hours: 3 hours

MATH 473  **Algorithms**  credit: 0 TO 4 hours.
Same as CS 473 and CSE 414. See CS 473.

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Credit Hours: 3 hours
Restricted to Undergrad - Urbana-Champaign.
This section is for UNDERGRADUATE students.

MATH 475  **Formal Models of Computation**  credit: 3 OR 4 hours.
Same as CS 475. See CS 475.

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Credit Hours: 3 hours
Credit Hours: 4 hours
MATH 478  **Actuarial Modeling**  credit: 3 OR 4 hours.
Considers the specification and evaluation of various types of actuarial models. Examines severity, frequency, and compound distributions useful in modeling the insurance loss process. Credibility theory is also discussed. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: MATH 408, MATH 461 or MATH 463; credit or concurrent registration in MATH 409 or MATH 464.

<table>
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Credit Hours: 3 hours

MATH 481  **Vector and Tensor Analysis**  credit: 3 OR 4 hours.
Vector spaces, transformation properties, covariant and contravariant tensors, and differential geometry of surfaces; applications to relativity theory. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Prerequisite: MATH 241 or MATH 380, or equivalent; or consent of instructor.

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Credit Hours: 3 hours
Open to both undergraduate and graduate students.

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Credit Hours: 4 hours
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Instructor approval forms available in 313 Altgeld Hall.

MATH 482  **Linear Programming**  credit: 3 OR 4 hours.
Rigorous introduction to a wide range of topics in optimization, including a thorough treatment of basic ideas of linear programming, with additional topics drawn from numerical considerations, linear complementarity, integer programming and networks, polyhedral methods. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Prerequisite: MATH 410, MATH 415, or MATH 416.

<table>
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Credit Hours: 3 hours
Open to both undergraduate and graduate students.

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Credit Hours: 4 hours
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
MATH 484  **Nonlinear Programming**  credit: 3 OR 4 hours.
Iterative and analytical solutions of constrained and unconstrained problems of optimization; gradient and conjugate gradient solution methods; Newton's method, Lagrange multipliers, duality and the Kuhn-Tucker theorem; and quadratic, convex, and geometric programming. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Prerequisite: MATH 241; MATH 347 or MATH 348; or equivalent; MATH 415 or equivalent; or consent of instructor.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning II

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Credit Hours: 3 hours
Quant Reasoning II course.
Open to both undergraduate and graduate students.

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<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>38093</td>
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<td>D14</td>
<td>11:00 AM - 11:50 AM</td>
<td>MWF</td>
<td>149 - Henry Administration Bldg</td>
<td>Furedi, Z</td>
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</tbody>
</table>

Credit Hours: 4 hours
Quant Reasoning II course.
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Instructor approval forms available in 313 Altgeld Hall.

MATH 487  **Advanced Engineering Math**  credit: 3 OR 4 hours.
Complex linear algebra, inner product spaces, Fourier transforms and analysis of boundary value problems, Sturm-Liouville theory. Same as ECE 493. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: One of MATH 284, MATH 285, MATH 286, MATH 441.

<table>
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<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>47012</td>
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<td>Q13</td>
<td>12:00 PM - 01:20 PM</td>
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<td>441 - Altgeld Hall</td>
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Credit Hours: 3 hours

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<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>47013</td>
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<td>Q14</td>
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<td>TR</td>
<td>441 - Altgeld Hall</td>
<td>Allen, J</td>
</tr>
</tbody>
</table>

Credit Hours: 4 hours
Departmental Approval Required

MATH 489  **Differential Equations II**  credit: 3 OR 4 hours.
Treats systems of linear differential equations (including the necessary matrix theory), and then concentrates on nonlinear systems, studying their dynamics by means of phase plane analysis and other methods. Provides applications of nonlinear systems to physics and biology. 4 hours of credit requires approval of the instructor and completion of additional work of substance. Prerequisite: One of MATH 284, MATH 285, MATH 286, MATH 441.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
</table>

Instructor approval forms available in 313 Altgeld Hall.
MATH 490  **Advanced Topics in Mathematics**  credit: 1 TO 4 hours.
Deals with selected topics and applications of mathematics; see Class Schedule or department office for current topics. May be repeated with approval. Prerequisite: Consent of instructor.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
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<td>41817</td>
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<td>Woods, D</td>
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</table>

Credit Hours: 1 hours
Algebra through Modeling
Module 5 - Algebra through Modeling with the TI-83 Graphing Calculator Family. Academic Outreach restrictions and assessments apply, see http://www.outreach.uiuc.edu. This section is for CTER students.

<table>
<thead>
<tr>
<th>CRN</th>
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<th>Time</th>
<th>Days</th>
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<tr>
<td>49587</td>
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<td>Woods, D</td>
</tr>
</tbody>
</table>

Credit Hours: 1 hours
Discrete Dynamical Systems
Discrete Dynamical Systems for Mathematics Teachers-MODULE 11. Academic Outreach restrictions and assessments apply, see http://www.outreach.uiuc.edu. This section is for CTER students.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
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<tr>
<td>49576</td>
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<td>Woods, D</td>
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</table>

Credit Hours: 1 hours
Dynamic Geometry w/SketchPad
Dynamic Geometry with Geometer's SketchPad-Module 10. Academic Outreach restrictions and assessments apply, see http://www.outreach.uiuc.edu; this section is for students in a CTER Cohort.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
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<th>Time</th>
<th>Days</th>
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<tr>
<td>49528</td>
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<td></td>
<td>Woods, D</td>
</tr>
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</table>

Credit Hours: 1 hours
Using the Geometers SketchPad
Module 4 - Using the Geometer's Sketch Pad. Academic Outreach restrictions and assessments apply, see http://www.outreach.uiuc.edu. This section is for CTER students.

MATH 491  **Logic Design**  credit: 3 hours.
Same as CS 462 and ECE 462. See ECE 462.
MATH 493  **Statistical Computing**  credit: 3 OR 4 hours.
Same as STAT 428. See STAT 428.

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<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tr>
<td>33959</td>
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<td>C</td>
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<td>TR</td>
<td>106B8 - Engineering Hall</td>
<td>Vasudevan, S</td>
</tr>
</tbody>
</table>

Credit Hours: 4 hours
Restricted to Graduate - Urbana-Champaign.

MATH 496  **Honors Seminar**  credit: 3 hours.
Careful study of a selected area of mathematics, carried out either deductively from axioms or inductively through problems; subject matter varies with instructor. 3 undergraduate hours. No graduate credit. May be repeated to a maximum of 6 hours. Prerequisite: Consent of Mathematics Honors Committee.

<table>
<thead>
<tr>
<th>CRN</th>
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<tr>
<td>36198</td>
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<td>MWF</td>
<td>2 - Illini Hall</td>
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</table>

Credit Hours: 3 hours
Restricted to Undergrad - Urbana-Champaign.

MATH 499  **Introduction Graduate Research**  credit: 1 hours.
Seminar is required of all first-year graduate students in Mathematics. It provides a general introduction to the courses and research work in all of the areas of mathematics that are represented at the University of Illinois at Urbana-Champaign. Approved for S/U grading only. May be repeated to a maximum of 2 hours. Prerequisite: Graduate standing or consent of instructor.

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<thead>
<tr>
<th>CRN</th>
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<tr>
<td>40657</td>
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<td>MWF</td>
<td>243 - Altgeld Hall</td>
<td>Reznick, B</td>
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</tbody>
</table>

MATH 501  **Abstract Algebra II**  credit: 4 hours.
Solvable groups, finite p-groups, semidirect products, Sylow's theorem; Galois Theory, transcendental extensions, separable and normal extensions, finite Galois groups, Theorem of the Primitive Element, Fundamental Theorem of Galois Theory, symmetric Function Theorem, examples, cyclotomic, cyclic and radical extensions; Modules over Arbitrary Rings, exact sequences, projective and injective modules, Tensor products, Matrix rings, Schur's lemma, Wedderburn's theorem on semisimple rings, group algebras, Maschke's theorem; Algebraic Geometry, varieties, morphisms of varieties, Noetherian properties, Irreducible varieties and prime ideals. Prerequisite: MATH 500.
CRN | Type          | Section | Time            | Days | Location          | Instructor
---|---------------|---------|-----------------|------|-------------------|----------------
38154 | Lecture-Discussion | C1      | 10:00 AM - 10:50 AM | MWF  | 143 - Altgeld Hall | Robinson, D

**MATH 503  Group Theory**  credit: 4 hours.
Structure of groups, derived groups, nilpotence and solvability, and extensions and products. Prerequisite: MATH 501 or equivalent.

CRN | Type          | Section | Time            | Days | Location          | Instructor
---|---------------|---------|-----------------|------|-------------------|----------------
39508 | Lecture-Discussion | S1      | 02:00 PM - 03:20 PM | TR   | 445 - Altgeld Hall | Ivanov, S

**MATH 511  Algebraic Geometry**  credit: 4 hours.
Properties of affine and projective varieties defined over algebraically closed fields; rational mappings, birational geometry and divisors, especially on curves and surfaces; introduction to the language of schemes; and Riemann-Roch theorem for curves. Prerequisite: MATH 501.

CRN | Type          | Section | Time            | Days | Location          | Instructor
---|---------------|---------|-----------------|------|-------------------|----------------
38163 | Lecture-Discussion | M1      | 09:00 AM - 10:20 AM | TR   | 57 - Everitt Laboratory | Li, L

**MATH 519  Differentiable Manifolds II**  credit: 4 hours.
Vector bundles, principal bundles, connections, parallel transport, curvature, Chern-Weyl theory, Hodge-DeRham theory. Other topics may include Riemannian geometry, symplectic geometry, spin geometry, and harmonic maps. Prerequisite: MATH 518 or consent of instructor.

CRN | Type          | Section | Time            | Days | Location          | Instructor
---|---------------|---------|-----------------|------|-------------------|----------------
49968 | Lecture-Discussion | B1      | 11:00 AM - 11:50 AM | MWF  | 447 - Altgeld Hall | Leininger, C

**MATH 526  Algebraic Topology**  credit: 4 hours.
CW-complexes, relative homeomorphism theorem, cellular homology, cohomology, Kunneth theorem, Eilenberg-Zilber theorem, cup products, Poincare duality, examples. Prerequisite: MATH 525, MATH 500; or consent of instructor. MATH 501 is recommended but not required.

CRN | Type          | Section | Time            | Days | Location          | Instructor
---|---------------|---------|-----------------|------|-------------------|----------------
40561 | Lecture-Discussion | M1      | 09:30 AM - 10:50 AM | TR   | 252 - Mechanical Engineering Bldg | Tolman, S

**MATH 530  Algebraic Number Theory**  credit: 4 hours.
Further development of the theory of fields covering topics from valuation theory, ideal theory, units in algebraic number fields, ramification, function fields, and local class field theory. Prerequisite: MATH 500 or equivalent.

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<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
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<th>Instructor</th>
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<td>B1</td>
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<td>MWF</td>
<td>341 - Altgeld Hall</td>
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</table>

MATH 535  **General Topology**  credit: 4 hours.
Study of topological spaces and maps, including Cartesian products, identifications, connectedness, compactness, uniform spaces, and function spaces. Prerequisite: Consent of instructor.

<table>
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<tr>
<th>CRN</th>
<th>Type</th>
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<th>Time</th>
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<td>MWF</td>
<td>347 - Altgeld Hall</td>
<td>Guillou, B</td>
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</tbody>
</table>

MATH 540  **Real Analysis I**  credit: 4 hours.
Lebesgue measure on the real line; integration and differentiation of real valued functions of a real variable; and additional topics at discretion of instructor. Prerequisite: MATH 447 or equivalent.

<table>
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<tr>
<th>CRN</th>
<th>Type</th>
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<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
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<td>01:00 PM - 01:50 PM</td>
<td>MWF</td>
<td>443 - Altgeld Hall</td>
<td>Loeb, P</td>
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</table>

MATH 541  **Real Analysis II**  credit: 4 hours.
Abstract measure theory; integration on general measure spaces; and introduction to functional analysis. Prerequisite: MATH 540.

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<tr>
<th>CRN</th>
<th>Type</th>
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<th>Days</th>
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<td>MWF</td>
<td>447 - Altgeld Hall</td>
<td>Junge, M</td>
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</table>

MATH 542  **Complex Variables I**  credit: 4 hours.
Topics include the Cauchy theory, harmonic functions, entire and meromorphic functions, and the Riemann mapping theorem. Prerequisite: MATH 446 and MATH 447, or MATH 448.

<table>
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<tr>
<th>CRN</th>
<th>Type</th>
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<tr>
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<td>09:00 AM - 09:50 AM</td>
<td>MWF</td>
<td>343 - Altgeld Hall</td>
<td>Nikolaev, I</td>
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</tbody>
</table>

MATH 546  **Hilbert Spaces**  credit: 4 hours.
Geometrical properties of Hilbert spaces; linear operators; and the spectral theory for self adjoint and related operators. Prerequisite: MATH 541.
### MATH 552  **Numerical Methods for PDEs**  credit: 4 hours.
Same as CS 555 and CSE 510. See CS 555.

<table>
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<tr>
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<th>Type</th>
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<th>Time</th>
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<td>49976</td>
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<td>MWF</td>
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<td>Ruan, Z</td>
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</table>

Credit Hours: 4 hours

### MATH 553  **Partial Differential Equations**  credit: 4 hours.
Basic introduction to the study of partial differential equations; topics include: the Cauchy problem, power-series methods, characteristics, classification, canonical forms, well-posed problems, Riemann's method for hyperbolic equations, the Goursat problem, the wave equation, Sturm-Liouville problems and separation of variables, Fourier series, integral transforms, Laplace's equation, harmonic functions, potential theory, the Dirichlet and Neumann problems, and Green's functions. Prerequisite: Consent of instructor.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
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<td>50119</td>
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<td>TR</td>
<td>1103 - Siebel Center for Comp Sci</td>
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### MATH 555  **Nonlinear Anal & Part Diff Eq**  credit: 4 hours.
Course will provide students with the basic background in nonlinear analysis associated with partial differential equations. The specific topics chosen will be largely up to the instructor, but will cover such areas as existence and uniqueness techniques, nonexistence and finite time blow-up results, hyperbolic conservation laws, weak solutions, stability theory, nonlinear elliptic theory, regularity theory. Prerequisite: MATH 554 or consent of instructor.

<table>
<thead>
<tr>
<th>CRN</th>
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<td>39528</td>
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<td>MWF</td>
<td>343 - Altgeld Hall</td>
<td>Bronski, J</td>
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</tbody>
</table>

### MATH 561  **Theory of Probability I**  credit: 4 hours.
Mathematical foundations of probability and stochastic processes; probability measures, random variables, distribution functions, convergence theory, the Central Limit Theorem, conditional expectation, and martingale theory. Same as STAT 551. Prerequisite: MATH 541 or consent of instructor.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
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<td>443 - Altgeld Hall</td>
<td>Song, R</td>
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</table>
MATH 567  **Topics in Actuarial Theory I**  credit: 4 hours.
Selected topics in advanced actuarial science. May be repeated to a maximum of 16 hours. Prerequisite: Consent of instructor.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tr>
<td>38188</td>
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<td>D14</td>
<td>11:00 AM - 11:50 AM</td>
<td>MWF</td>
<td>114 - Kinley Hall</td>
<td>Johnson, P</td>
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</table>

MATH 568  **Topics in Actuarial Theory II**  credit: 4 hours.
Topics in mathematical theory of actuarial science beyond basic life contingencies, such as graduation of mortality tables, survival models, mathematics of demography. See Class Schedule or department office for current topics. A paper will generally be required. May be repeated to a maximum of 16 hours. Prerequisite: STAT 409 or STAT 410 or equivalent; credit or concurrent registration in MATH 471.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
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<td>38193</td>
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<td>269 - Everitt Laboratory</td>
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MATH 578  **Computational Complexity**  credit: 4 hours.
Same as CS 579 and ECE 579. See CS 579.

<table>
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<td>1103 - Siebel Center for Comp Sci</td>
<td>Prabhakaran, M</td>
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Credit Hours: 4 hours

MATH 581  **Extremal Graph Theory**  credit: 4 hours.
Extremal problems and parameters for graphs. Distance and connectivity, matching and factors, vertex and edge colorings, perfect and imperfect graphs, intersection classes and intersection parameters, Turan's theorem, graph Ramsey theory, graph decomposition and other extremal problems. Same as CS 572. Prerequisite: MATH 580 or consent of instructor.

<table>
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<tr>
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<th>Days</th>
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<td>MWF</td>
<td>147 - Altgeld Hall</td>
<td>West, D</td>
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</tbody>
</table>

MATH 589  **Conjugate Duality and Optim**  credit: 4 hours.
Convex analysis for constrained extremum problems; convex sets, cones, and functions; separation; Fenchel transform; duality correspondences; differential theory; nonlinear programming; sensitivity; and perturbational duality for primal, dual, and Lagrangian problems. Prerequisite: MATH 415 and MATH 447, or consent of instructor.

<table>
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<tr>
<th>CRN</th>
<th>Type</th>
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<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
</table>
MATH 595  **Advanced Topics in Math**  credit: 1 TO 4 hours.
May be repeated in the same or separate semesters. Prerequisite: Consent of instructor.

<table>
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<tr>
<th>CRN</th>
<th>Type</th>
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<th>Location</th>
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<tr>
<td>46008</td>
<td>Lecture-Discussion</td>
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<td>12:00 PM - 12:50 PM</td>
<td>MWF</td>
<td>345 - Altgeld Hall</td>
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Credit Hours: 4 hours

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<th>CRN</th>
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<th>Location</th>
<th>Instructor</th>
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<td>01:00 PM - 01:50 PM</td>
<td>MWF</td>
<td>347 - Altgeld Hall</td>
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Credit Hours: 2 hours
Meets 20-Jan-09 - 13-Mar-09.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
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<th>Time</th>
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<tbody>
<tr>
<td>49979</td>
<td>Lecture-Discussion</td>
<td>APA</td>
<td>03:00 PM - 03:50 PM</td>
<td>MWF</td>
<td>345 - Altgeld Hall</td>
<td>Boca, F</td>
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Credit Hours: 4 hours

<table>
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<tr>
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<tbody>
<tr>
<td>49992</td>
<td>Lecture-Discussion</td>
<td>AVA</td>
<td>02:00 PM - 02:50 PM</td>
<td>MWF</td>
<td>445 - Altgeld Hall</td>
<td>Sabitova, M</td>
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Credit Hours: 2 hours
Meets 16-Mar-09 - 06-May-09.

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<tbody>
<tr>
<td>51394</td>
<td>Lecture-Discussion</td>
<td>BVM</td>
<td>10:30 AM - 11:50 AM</td>
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<td>141 - Altgeld Hall</td>
<td>Kirr, E</td>
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Credit Hours: 4 hours

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<th>Instructor</th>
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<tr>
<td>45995</td>
<td>Lecture-Discussion</td>
<td>CSF</td>
<td>12:00 PM - 01:20 PM</td>
<td>TR</td>
<td>141 - Altgeld Hall</td>
<td>Yong, A</td>
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Credit Hours: 4 hours
Topic: Combinatorics of Symmetric Functions See http://www.math.uiuc.edu/timetable/ for the full course description.

<table>
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<tr>
<td>49974</td>
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<td>DST</td>
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<td>MWF</td>
<td>447 - Altgeld Hall</td>
<td>Solecki, S</td>
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Credit Hours: 4 hours
Topic: Descriptive Set Theory. See http://www.math.uiuc.edu/timetable/ for the full course description.

<table>
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<tbody>
<tr>
<td>49977</td>
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Credit Hours: 4 hours  

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<tr>
<td>51887</td>
<td>Lecture-Discussion</td>
<td>HDS</td>
<td>09:00 AM - 10:20 AM</td>
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<td>341 - Altgeld Hall</td>
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Credit Hours: 2 hours  
**Meets:** 16-Mar-09 - 06-May-09.  

<table>
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<tr>
<th>CRN</th>
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<td>51218</td>
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<td>141 - Altgeld Hall</td>
<td>Di Francesco, P</td>
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Credit Hours: 4 hours  
**Topic:** Integrable Combinatorics. See [http://www.math.uiuc.edu/timetable/](http://www.math.uiuc.edu/timetable/) for the full course description.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
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<tr>
<td>49972</td>
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<td>IMF</td>
<td>11:00 AM - 11:50 AM</td>
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<td>441 - Altgeld Hall</td>
<td>Rouse, J</td>
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Credit Hours: 4 hours  
**Topic:** Introduction to Modular Forms. See [http://www.math.uiuc.edu/timetable/](http://www.math.uiuc.edu/timetable/) for the full course description.

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<tr>
<td>43505</td>
<td>Lecture-Discussion</td>
<td>LC2</td>
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<td>341 - Altgeld Hall</td>
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Credit Hours: 4 hours  
**Topic:** Local Cohomology II. See [http://www.math.uiuc.edu/timetable/](http://www.math.uiuc.edu/timetable/) for the full course description.

<table>
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<tr>
<td>49971</td>
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<td>345 - Altgeld Hall</td>
<td>Nevins, T</td>
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Credit Hours: 4 hours  
**Topic:** 0-Modules and Beilinson-Bernstein Localization. See [http://www.math.uiuc.edu/timetable/](http://www.math.uiuc.edu/timetable/) for the full course description.

<table>
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<tr>
<td>39574</td>
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<td>NA</td>
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<td>MWF</td>
<td>243 - Altgeld Hall</td>
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**Topic:** Nonstandard Analysis. See [http://www.math.uiuc.edu/timetable/](http://www.math.uiuc.edu/timetable/) for the full course description.

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<tr>
<td>41543</td>
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<td>RB</td>
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Credit Hours: 4 hours  

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<tr>
<td>49969</td>
<td>Lecture-Discussion</td>
<td>SGA</td>
<td>09:00 AM - 09:50 AM</td>
<td>MWF</td>
<td>447 - Altgeld Hall</td>
<td>Tyson, J</td>
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</table>

Credit Hours: 2 hours  
**Meets:** 16-Mar-09 - 06-May-09.  
**Topic:** Sub-Riemannian Geometry and Analysis. See [http://www.math.uiuc.edu/timetable/](http://www.math.uiuc.edu/timetable/) for the full course description.

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**MATH 597  Reading Course**  
Credit: 1 TO 8 hours.  
Approved for both letter and S/U grading. May be repeated in the same or separate terms to a maximum of 8 hours. Prerequisite: Consent of instructor.

<table>
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<th>Instructor</th>
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</thead>
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page 51 - Mathematics, Spring 2009
MATH 598  **Literature Seminar in Math**  credit: 0 TO 4 hours.
Seminar on topics of current interest in mathematics. Students present seminars and discussions on various topics. See Class Schedule for current topics. Recommended for all Mathematics students. Approved for both letter and S/U grading. Prerequisite: Consent of instructor.

<table>
<thead>
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<tr>
<td>52024</td>
<td>Lecture-Discussion</td>
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<td>W</td>
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Credit Hours: 1 hours

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<tr>
<td>45371</td>
<td>Lecture-Discussion</td>
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<td>341 - Altgeld Hall</td>
<td>Berndt, B</td>
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</table>

Credit Hours: 2 hours
Not intended for Undergrad - Urbana-Champaign.

MATH 599  **Thesis Research**  credit: 0 TO 16 hours.
May be repeated. Approved for S/U grading only. Prerequisite: Consent of instructor.

<table>
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Instructor approval required.