Department of Mathematics
The Ohio State University

2012-2013 Mathematics Courses

Course Number	Course Title
1050	Precollege Mathematics I
1074	Transition Precollege Mathematics II
1075	Precollege Mathematics II
1114	Calculus 1 Transition Course
1116	Excursions in Mathematics
1118	Mathematics for Architects
1124	Transition Math for Elementary Teachers
1125	Mathematics for Elementary Teachers I
1126	Mathematics for Elementary Teachers II
1130	College Algebra for Business
1131	Calculus for Business
1134	Transition Calculus for Business
1144	Transition Precalculus
1148	College Algebra
1149	Trigonometry
1150	Pre-Calculus
1151	Calculus I
1152	Calculus II
1156	Calculus for the Biological Sciences
1157	Mathematical Modeling for the Biological Sciences
1161.01	Accelerated Calculus I
1161.02	Accelerated Calculus I for Honors Engineers
1164	Transition Math for Middle School Teachers
1165	Math for Middle School Teachers I
1166	Math for Middle School Teachers II
1172	Engineering Mathematics A
1181H	Honors Calculus I
1187	Problem Solving
1295#	Introductory Seminar
1534	Transition Calculus I
1544	Transition Engineering Calculus
2153	Calculus III
2162.01	Accelerated Calculus II

Course Number	Course Title
2162.02	Accelerated Calculus II for Honors Engineers
2167	Calculus for Middle School Teachers
2168	History of Mathematics for Middle School Teachers
2173	Engineering Mathematics B
2174	Linear Algebra & Differ. Equations for Engineers
2177	Mathematical Topics for Engineers
2182H	Honors Calculus II
2255	Differential Equations and Their Applications
2366	Introduction to Discrete Mathematics
2415	Ordinary and Partial Differential Equations
2568	Linear Algebra
3345	Foundations of Higher Mathematics
3350	Introduction to Mathematical Biology
3532	Mathematical Foundations of Actuarial Science
3588	Practicum in Actuarial Science
3589	Introduction to Financial Mathematics
3607	Beginning Scientific Computing
3618	Theory of Interest
4181H	Honors Analysis I
4182H	Honors Analysis II
4504	History of Mathematics
4507	Geometry
4512	Partial Differential Equations for Science & Eng.
4530	Probability
4544	Transition Intro to Analysis II
4545	Analysis Overview
4547	Introductory Analysis I
4548	Introductory Analysis II
4551	Vector Analysis
4552	Complex Analysis
4556	Dynamical Systems
4557	Partial Differential Equations
4568	Linear Algebra for Engineering Graduate Students
4573	Elementary Number Theory
4575	Combinatorial Mathematics
4578	Discrete Mathematical Models
4580	Abstract Algebra I
4581	Abstract Algebra II
4584	Transition Abstract Algebra II
5520H	Honors Linear Algebra and Differential Equations

Course Number	Course Title
5522H	Honors Complex Analysis
5529H	Honors Combinatorics
5530H	Honors Probability
5540H	Honors Differential Geometry
5576H	Honors Number Theory
5590H	Honors Abstract Algebra I
5591H	Honors Abstract Algebra II
5630	Life Contingencies I
5631	Life Contingencies II
5632	Financial Economics for Actuaries
5633	Loss Models I
5634	Loss Models II

Mathematics 1050   **5 credits**   **Precollege Mathematics I**
Au, Sp, Su

Catalog Description:
Fractions and decimals, basic algebra, graphing lines, factoring, systems of equations.

Prerequisite:
Math Placement Level T; or Math 1040 or 40 or 50; or permission of department.

Exclusions: Not open to students with credit for any higher numbered math class, or for any quarter math class numbered higher than 50.

Purpose of Course:
Mathematics 1050 is designed to meet the needs of the students entering The Ohio State University at the lowest placement, course code T. This course will prepare students for Math 1075. Math conditions are removed by completion of 1050 and 1075; however, credit will not count toward graduation in any degree program.

Follow-up Course:
Math 1075

Sequencing Chart:
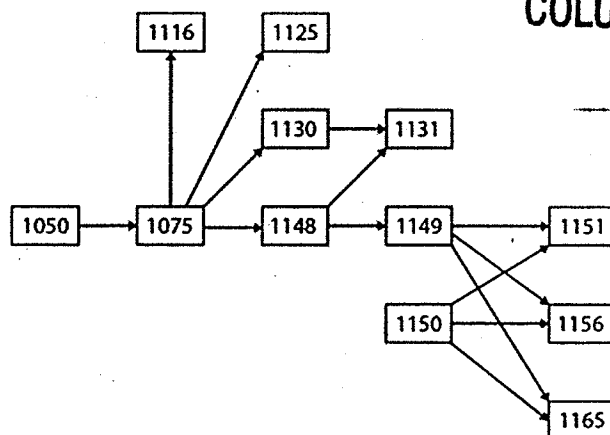
Cont.

Math 1050
Course Coordinator: C. Roman
2012-2013

Math 1050, cont.
Pg 2

Text:
Beginning Algebra, 8th edition, by Aufmann/Lockwood, publisher Cengage, ISBN=9781285101279

Topics List:

1. Review: real numbers, number line, integral exponents, scientific notation, negative numbers, fractions, order of operations.
2. Linear equations and inequalities in one variable, word problems.
3. Graphical representations, straight lines as graphs, slope, intercepts, slope-intercept form, point-slope form.
4. Systems of two linear equations in two unknowns.
5. Polynomials: addition, subtraction, multiplication, factoring, division.
6. Solving quadratic equations by factoring. Applications.
7. Further topics: introduction to function notation, some rational expressions.

Math 1050
Course Coordinator: C. Roman
2012-2013

Mathematics 1074
Au 2012

3 credits   **Transition Precollege Mathematics II**

Catalog Description:
Graphing lines, systems of two equations, factoring, rational expressions, quadratic equations.
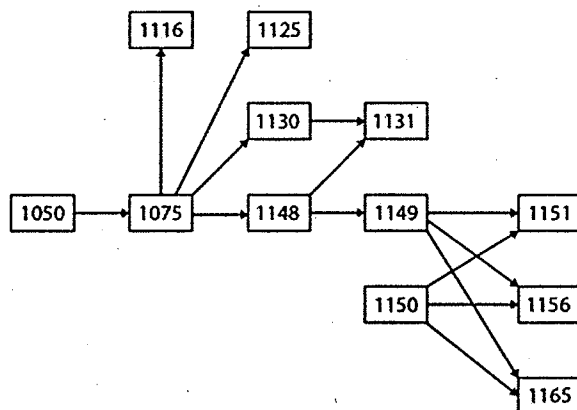
Prerequisite:
Mathematics 50

Exclusions:
Restricted to students with credit for 50 but not 75 at start of Autumn 2012.

Purpose of Course:
Transition: Math 75 done in a semester. Offered Autumn 2012 only.

Sequencing Chart:

Cont.

Math 1074
Course Coordinator: B. McEnnis
2012-2013

Text:

Beginning Algebra with Applications, 7th Edition, Aufmann/Barker/Lockwood, Cengage ISBN 9780618969913

Topics List:

1. Graphing lines.
2. Systems of two linear equations.
3. Factoring.
4. Rational expressions, roots and radicals.
5. Quadratic equations.

Mathematics 1075   4 Credits   Pre-College Mathematics II
Au, Sp, Su

Catalog Description:
Algebraic, rational, and radical expressions; functions and graphs; quadratic equations; absolute value; inequalities; and applications.

Prerequisite:
Math Placement Level S, or C- or better in 1050; or credit for 75 or 1074.

Exclusions: Not open to students with credit for any higher numbered math class, or for any quarter math class numbered higher than 75.

Follow-up Courses:
- Math 1125 for students intending to pursue MEd in early or middle childhood.
- Math 1116 for students in liberal arts or students in the precertification programs on regional campuses.
- Math 1130 College Algebra for Business
- Math 1148 Traditional College Algebra

Sequencing Chart:
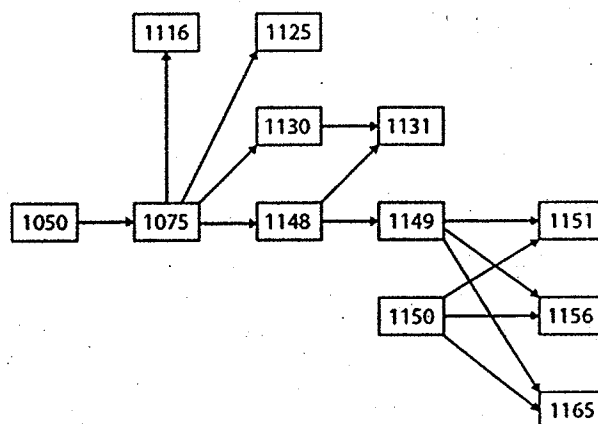
Text:
Beginning and Intermediate Algebra, 3rd OSU custom edition, Hall and Mercer, McGraw Hill, Soft-cover: 007768219X. Loose-leaf: 0077682017

Math 1075
Course Coordinator: B. McEnnis
2012-2013

Cont.
Math 1075, cont.
Pg 2

Topics List:

4.1–4.5	Linear inequalities
	Solving linear inequalities
	Solving compound inequalities
	Solving absolute value equations & inequalities
	Graphing systems of inequalities in two variables
6.1–6.6	Factoring polynomials
	Introduction to factoring polynomials
	Factoring trinomials
	Factoring special forms
	Factoring by grouping
	General strategy for factoring
	Solving equations by factoring
7.1–7.5	Solving quadratic equations
	Extraction of roots and properties of square roots
	Solving quadratic equations by completing the square
	The quadratic formula
	Applications of quadratic equations
	Complex numbers
	Solving quadratic equations with complex solutions
8.1, 8.3, 8.4	Functions
	Functions and representations of functions
	Absolute value functions
	Quadratic functions
9.1–9.6	Rational functions
	Graphs of rational functions
	Reducing rational expressions
	Multiplying & dividing rational expressions
	Adding & subtracting rational expressions
	Combining operations & complex rational expressions
	Solving equations containing rational expressions
	Inverse & joint variation
	Other applications yielding equations with fractions
10.1–10.5	Square root & cube root functions and rational exponents
	Evaluating radical expressions
	Adding & subtracting radical expressions
	Multiplying & dividing radical expressions
	Solving equations containing radical expressions
	Rational exponents & radicals
12.3	A preview of college algebra
	Horizontal & vertical translations of graphs of functions

Math 1075
Course Coordinator: B. McEnnis
2012-2013

Mathematics 1114   **2 credits**   **Calculus 1 Transition Course**
Su12, Au12

Catalog Description:
Transition of Calculus 1, from quarter to semester.

Prerequisite:
C- or better in 151.

Exclusions:
Restricted to students with credit for Math 151 but not 152 at start of Au12.

Purpose of Course:
This course bridges the gap between Calculus I under quarters and Calculus I under semesters.
Students obtain an understanding of the meaning of the integral and how to apply it.

This course is a Hybrid course. This course includes online video lectures in place of traditional
lectures, online recitations in specially designated sections of 1114, online homework, and online
discussion boards. Final exams for all sections are in person, paper and pencil, and proctored.

Follow-up Courses:
After finishing 114 or 1114, students will be able to take Calculus II (1152) or Engineering Math
A (1172) in the semester system. This course will fulfill the math requirement for all students
whose major or degree math requirement will be fulfilled by Calculus I (1151) in the semester
system.

Text:
Calculus: Early Transcendentals, 1st Edition, by Briggs/Cochran, Pearson, ISBN-10:
0321570561, ISBN-13: 978-0321570567

Cont.

Math 1114
Course Coordinator: E. Miller
2012-2013

Topics List:

- Review of Derivatives, Anti-Derivatives (4.8 in Briggs)
- Approximating Area Under Curves (5.1 in Briggs)
- Definite Integrals (5.2 in Briggs)
- Fundamental Theorem of Calculus (5.3 in Briggs)
- Working with Integrals (5.4 in Briggs)
- Substitution Rule (5.5 in Briggs)
- Applications: Velocity and Net Change (6.1 in Briggs)
- Regions Between Curves (Briggs 6.2)
- Volume by Slicing (Briggs 6.3)
- Volume by Shells (Briggs 6.4)
- Physical Applications (Briggs 6.6)

Mathematics 1116　　　　　**3 credits**　　　　　**Excursions in Mathematics**
Sp

Catalog Description:
Critical thinking and problem solving, with relevant topics met in everyday life. Appropriate for non-science majors.

Prerequisite:
Math Placement Level R or higher; or credit for 1075, 75, 104, 1073 or 1074.

Exclusions:
Not open to students with credit for Math 1152 or higher, or for quarter math class numbered 153 or higher.

Purpose of Course:
The emphasis in this course is on intuitive understanding and developing some facility for applying mathematical ideas to problem solving.

Follow-up Courses:
None. Math 1116 is a terminal course.

Text:
Excursions in Modern Mathematics, 7th edition, by Tannenbaum/Arnold, Prentice-Hall, ISBN 0321568036

Cont.

Math 1116
Course Coordinator: G. Kennedy
2012-2013

Topics List:

1. Graph theory: graphs, Euler and Hamilton circuits, algorithms for Traveling Salesman Problem, spanning trees, etc.
2. Voting & apportionment: preference ballots; apportionment paradoxes; Congressional apportionment; methods of Jefferson, Adams, and Webster.
3. Patterns & growth: Fibonacci and recursive sequences, golden ratio, population growth models: linear, exponential, and logistic.
4. Symmetry: Rigid motions, rosettes, friezes, rudiments of group theory.
5. Counting & probability: counting principles, permutations and combinations, multiplication rule, randomness, probability.
6. Fractals: recursive definitions, standard examples (Koch snowflake, Sierpinski gasket etc.), self-similarity, fractional dimension.
7. Linear programming: mixture problems, examples in low dimension, corner point principle, algorithms.

Catalog Description:
Topics in geometry for architecture majors.

Prerequisite:
Enrollment in the School of Architecture and: Math Placement Level L or M; C- or better in 1148 or 1150; or credit for 148 or 150.

Purpose of Course:
The majority of the audience is made up of Architecture majors for whom the course is a requirement. The intent of the course is to introduce these students to the derivative and definite integral of single-variable functions, using rate of change and slope as a conceptual model for the derivative, and net change and area as a conceptual model for the definite integral. Emphasis will be placed on using these concepts to model and solve problems in the physical world. Algebraic, graphical, and tabular representations of these ideas will be used.

Follow-up Courses:
There are really no follow-up courses. To start any other mathematics sequence will probably involve beginning at an appropriate entry level course. Students interested in further course work in mathematics should consult the Mathematics Advisors in 250 Mathematics Bldg.

Text:
Course Notes, by Snapp

Topics List:

- Geometric models, transformations, matrices.
- Plane tessellations, concepts of symmetry.
- Polyhedra: Platonic and Archimedean.
- Invariants: area, volume, Euler characteristic.
- Mathematics of perspective drawing.
- String art: curves defined as envelopes of tangent lines, ruled surfaces.
- Discrete curvature: Descartes theorem and beyond.
- Higher dimensions: tesseracts and other 4-D polyhedra.

Mathematics 1124
Au12

3 credits

Transition Math for
Elementary Teachers

Catalog Description:
Numbers, counting, and algebra for prospective elementary school teachers.

Prerequisite:
Math 106.

Exclusions:
Restricted to students with credit for Math 106 but not 107.

Text:
Course Notes, by B. Snapp

Topics List:

- Number systems (whole, integer, rational, real).
- Combinatorial counting.
- Number theory, divisibility.
- Algebraic structures, complex numbers.

Mathematics 1125   5 credits   **Mathematics for**
Au, Sp   **Elementary Teachers I**
Currently taught in either lecture/recitation or workshop format.

Catalog Description:
Math 1125 involves numbers, operations, geometry, measurement, and mathematical reasoning
for prospective elementary school teachers.

Prerequisite:
A grade of C- or above in 1075, or credit for 1074, 75, or 104, or Math Placement Level R or
above; and enrollment in Early Childhood or Special Education major, or in Middle Childhood
major or pre-major with area of concentration different than Math. Not open to students with
credit for 106.

Purpose of Course:
To develop an appreciation of, and basic competency in, the use of analytical thought in the
development of a cohesive body of useful mathematical knowledge, with special emphasis on
topics encountered in elementary and middle school mathematics programs. Math 1125 deals
with whole numbers, integers, rational numbers, and operations with these as well as introducing
length, area, volume, angle, Euclidean geometry, symmetry and rigid motion, and knowledge of
general spatial skills. *Appropriate only for those preparing to become early childhood educators
and for those preparing to teach subjects other than math in middle school.*

Follow-up Courses:
Math 1126.

Text:
Mathematics for Elementary Teachers with Activity Manual, 3rd Edition, by Sybilla Beckmann,
Pearson, ISBN for the package is 0321654277.

Cont.

Math 1125
Course Coordinator: B. McNeal
2012-2013

Math 1125, cont.
Pg 2

Topics List:
1. The decimal system.
2. Fractions.
3. Addition and subtraction of fractions, decimals, and integers.
4. Multiplication of fractions, decimals, and integers.
5. Division of fractions, decimals, and integers.
6. Combining multiplication and division: proportional reasoning.
7. Measurement: meaning of length, area, and volume, unit conversion, measurement techniques, and actions preserving area/volume.
8. Rigid motions, tessellations, symmetry, constructions with various tools.
9. Problem solving (a theme throughout the course).

Math 1125
Course Coordinator: B. McNeal
2012-2013

Math 1125 ECE Semester 1

1. Course Name: Conceptual Mathematics for Elementary Teachers I; 5 Sem. Cr. Hrs

    i) Short explanation of the goals of the course:

    To develop both knowledge and a disposition to reason mathematically about concepts
    in the early and middle school mathematics curriculum. In this course, some topics will
    be treated informally with investigations and conjectures. These topics will be revisited
    in the second course using formal processes such as generalization and proof.

    ii) 5-7 main topics studied in this course:
    a) Number Systems (whole, integer, rational, real): Their uses, notation (including place
        value), and comparison of size.
    b) Binary Operations (addition/subtraction, multiplication/division (including ratios),
        exponentiation)
    c) Geometry (Definitions of objects in 1, 2, 3-D; Nets; Relationships between shapes;
        Basic Rigid Motions; Tessellations; Platonic Solids, Symmetry; Congruence (one-to-
        one correspondence); Similarity (scaling, ratios); Basic constructions without
        compass and straightedge (different tools); Properties of shapes)
    d) Measurement (Assigning a number as an attribute; Need for Units, Conversion
        between units; What to measure: Length, Area, Volume, and Angle in 2 and 3-D;
        Measurement Techniques (making a ruler; covering/filling: straight and curved);
        Actions preserving Area/volume; Effect of scaling on measurements)
    e) Problem Solving (An overriding theme of all the above topics)

    iii) Course prerequisites: Intermediate Algebra (Currently Math 104 in Quarter system)

    iv) Course book(s) or source material: Beckmann's text and Activity book (2nd or 3rd Edition).
        Also others we can consider, such as Reconceptualizing Mathematics (Sowder et al) and
        Bassarear (good for early childhood audience). Software such as Sketchpad, Geogebra,
        Excel.

Math 1126 ECE Semester 2

2. Course Name: Conceptual Mathematics for Elementary Teachers II; 5 Sem. Cr. Hrs

    i) Short explanation of the goals of the course:

    To develop both knowledge and a disposition to reason mathematically about concepts in the
    early and middle school mathematics curriculum. This course will build on the foundation laid
    in the first course by generalizing processes and proving results.

    ii) 5-7 main topics studied in this course:
    a) Logic (Informal treatment)
    b) Geometric Constructions of objects and motions (compass and straightedge)

c) Geometric proof (via axioms)

d) Algebraic Thinking (Expressions (including arithmetic/geometric sequences and series), Relations/functions, Equations, Role of variable and equal sign; Geometric formulas; General reasoning about effects of scaling; Coordinate geometry (tied to both proof and algebraic thinking)

e) Number Theory (Factors/multiples, Divisibility Tests, Prime numbers and unique prime factorization, Connecting Fraction and Decimal notation)

f) Counting: Applying operation knowledge to efficiently answer the question "how many" (Inclusion/Exclusion; Venn Diagrams; Fundamental Counting Principle; Use of Tree Diagrams; permutations and combinations, Pascal's Triangle).

g) Probability: A special application of ratio (Defining probability, Law of Large Numbers, Misconceptions; Geometric Probability; Inclusion/Exclusion; Complement; Complex events: Independent/dependent, conditional)

h) Problem Solving (An overriding theme of all the above topics)

iii) Course prerequisites: Continuation of Conceptual Mathematics for Elementary Teachers I

iv) Course book(s) or source material: Beckmann's text and Activity book (2nd or 3rd Edition). Also others we can consider, such as Reconceptualizing Mathematics (Sowder et al) and Bassarear (good for early childhood audience). Software such as Sketchpad, Geogebra, Excel.

Mathematics 1126	5 credits	Mathematics for
Sp, Au		Elementary Teachers II

Currently taught in either lecture/recitation or workshop format.

Catalog Description:
Continuation of 1125: Math 1126 involves geometry, measurement, number theory, algebraic thinking, counting techniques, probability, and mathematical reasoning for prospective elementary school teachers.

Prerequisite:
A grade of C- or above in 1125; and enrollment in Early Childhood or Special Education major, or in Middle Childhood major or pre-major with area of concentration different than Math.

Exclusions:
Not open to students with credit for 107.

Purpose of Course:
To develop an appreciation of, and basic competency in, the use of analytical thought in the development of a cohesive body of useful mathematical knowledge, with special emphasis on topics encountered in elementary and middle school mathematics programs. Math 1126 introduces congruent and similar triangles, justifications of geometric relationships, and number theory, algebraic thinking, counting techniques and probability. *Appropriate for those preparing to become early childhood educators and for those preparing to teach subjects other than math in middle school.*

Text:
Mathematics for Elementary Teachers with Activities Manual, 3rd Edition, by Sybilla Beckmann, Pearson, ISBN for the package is 0321654277

Cont.

Math 1126, cont.
Pg 2

Topics List:
1. Algebraic thinking: expressions, measurement formulas, scaling, functions, use of formulas, graphs, and tables, sequences and series, and coordinate geometry.
2. Number theory: factors and multiples, LCM, GCF, divisibility tests, prime numbers, unique factorization, notations for fractions and decimals.
3. Counting: inclusion/exclusion, fundamental counting principle, tree diagrams, permutations and combinations, Pascal's triangle.
4. Basic ideas of probability: Law of Large Numbers, sample and event spaces, use of tree diagrams, simulations, and discussion of common misconceptions.
5. Geometric constructions: compass and straightedge.
6. Deductive proofs.
7. Problem solving (a theme throughout the course).

Mathematics 1130   **4 credits**   **College Algebra for Business**
Au, Sp

Catalog Description:
Algebraic, exponential, and logarithmic functions. Matrix algebra. Applications to business.

Prerequisite:
Math Placement Level N; C- or better in 1075; or credit for 104.

Exclusions:
Not open to students with credit for 1131 or for any math course numbered 1149 or higher, or a quarter-system math course numbered 150 or higher.

Purpose of Course:
Math 1130 is a pre-calculus course with a finance section slanted toward a business program. The applications are business related.

Follow-up Course:
Math 1131

Text:
Introductory Mathematical Analysis for Business, Economics, and the Life and Social Sciences (13th Edition), by Haeussler, Paul, and Wood;   published by Pearson: ISBN 1256660795

Topics List:

Review of Algebra:
    0.7: Equations, In Particular Linear Equations.
    0.8: Quadratic Equations.
    1.2: Linear Inequalities.
    1.3: Applications of Inequalities.
    1.6: Sequences

Cont.

Math 1130
Course Coordinator: S.Wong
2012-2013

Functions:
      2.1: Functions.
      2.2: Special functions.
      2.3: Combinations of functions.
      2.4: Inverse Functions.
      2.5: Graphs of functions

3. Linear and Quadratic Functions:
      3.1: Lines
      3.2: Applications and Linear Functions.
      3.3: Quadratic Functions
      3.4: Systems of Linear Equations.
      3.6: Applications of Systems of Equations.

4. Exponential and Logarithmic Functions:
      4.1: Exponential Functions.
      4.2: Logarithmic functions.
      4.3: Properties of Logarithms.
      4.4: Logarithmic and Exponential Equations.

5. Mathematics of Finance:
      5.1: Compound Interest.
      5.2: Present Value.
      5.3: Interest Compounded Continuously.
      5.4: Annuities
      5.5: Amortization of Loans.

6. Matrix Algebra:
      6.1: Matrices.
      6.2: Matrix Addition and Scalar Multiplication.
      6.3: Matrix Multiplication.
      6.4: Solving Systems by Reducing Matrices.
      6.6: Inverses

Math 1130
Course Coordinator: S.Wong
2012-2013

Mathematics 1131   **5 credits**   **Calculus for Business**
Au, Sp, Su

Catalog Description:
Survey of calculus of one and several variables; applications to business.

Prerequisite:
Math Placement Level L; C- or better in 1130, 1148, 1144, or 1150; credit for 130 or 148, or 131

Exclusions:
Not open to students with credit for a math course numbered 1151 (151.xx) or higher, or for 132 or 1134.

Text:
Introductory Mathematical Analysis for Business, Economics, and the Life and Social Sciences (13th Edition), by Haeussler, Paul, Wood, published by Pearson: ISBN 1256660795

Topics List:

- Idea of limits, continuity, and derivative. Interpret derivative as a limit, slope, and rate of change.
- Calculate derivatives of algebraic, exponential, and logarithmic functions.
- Monotonicity, concavity, extrema of functions, second derivative tests, applications to graphing.
- Applications: marginal analysis in business, optimization.
- Anti-derivatives, separable first-order ODEs.
- Riemann integral, substitution, Fundamental Theorem, area, applications.
- Partial derivatives, extrema and second derivative test for two-variable functions, Lagrange multipliers. Applications to business.

Mathematics 1134   **3 credits**   **Transition Calculus for Business**
Au12

Catalog Description:
Intergral and multi-variable calculus for business.

Prerequisite:
Math 131, 151.xx, 161.xx.

Exclusions:
Restricted to students with credit for Math 131 but not 132 at start of Au12.

Text:
Introductory Mathematical Analysis for Business, Economics, and the Life and Social Sciences,
3rd OSU custom edition, by Haeussler, Paul, Wood, published by Pearson: ISBN 1256660795

Topics List:

- Indefinite and definite integrals, and area.
- Functions of several variables, partial derivatives.
- Critical points and optimization.
- System of linear equations, Gauss elimination.
- Matrices and matrix equations.

DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174

Math 1134
Course Coordinator: S. Wong
2012-2013

Math 1134
Syllabus
Autumn 2012

TEXT: Introduction to Mathematical Analysis, 3nd OSU custom edition, by Barnett, Ziegler & Byleen, ISBN 0558-38192-8 and with MML access: ISBN 0-558-35177-8

CALCULATORS: A graphing calculator is required for this course. It is recommended that you use a TI-83, TI-83 plus, or a TI-84. **Note that the TI-89, TI-92, and calculators that use a Computer Algebra System are not permitted.**

EMAIL, HOMEPAGE & CARMEN: You are responsible for information contained in email messages sent to your official OSU email address: **yourlastname.#@osu.edu.** You should check your email at least once per day. The course homepage can be found at http://www.math.ohio-state.edu/courses/1134. Carmen is a web-based course tool that allows you to view course materials and your scores. You can access Carmen by visiting http://carmen.osu.edu. You will need your OSU ID and password.

RECITATION: You will meet with your recitation instructor on Wednesdays. Your performance in recitation will count for 100 points toward your grade and will consist of 11 online MML homework assignments and 11 in-class quizzes:
- **HOMEWORK:** Your weekly homework assignments are listed under **"Math 1134 Homework /MML Assignments."** You are expected to complete each assignment but they will not be collected.
- **MY MATH LAB (MML): You will have 11 online homework assignments on My Math Lab. They are to be completed by the deadline noted on the "Math 1134 Homework/ MML Assignments" sheet. The ten best MML scores will be counted for a total of 50 points.**
- **QUIZZES:** There will a total of 11 quizzes given by your recitation teacher during the quarter. The 10 best quiz scores will be counted for a total of 50 points.

EXAMS: There will be three midterm exams and a **cumulative** final exam given.
- **EXAM SCHEDULE:** Attendance at the exams at the scheduled time and place is required. You must have your **OSU ID** at each exam:

Midterm 1	Thursday, September 27	5:30-6:20pm
Midterm 2	Thursday, October 25	5:30-6:20pm
Midterm 3	Thursday, November 29	5:30-6:20pm
Final Exam	Monday, December 10	6:00-7:45pm

- **EXAM ROOMS:** Exams will not be held in your regular classroom. **Room assignments will be posted on the course homepage, on Carmen and announced in class** the week before the exam. It is **your duty** to know **where** and **when** each exam is given.
- **MAKE-UPS:** You must have **written permission** from your lecturer to take a make-up exam. To receive a permission slip, you need to provide your lecturer with proper documentation. Students that have a time conflict with *another regularly scheduled OSU course* may take the make-up exam. However, students with other types of time conflicts (like work, social activities, etc.) should prearrange to take the exam at the scheduled time and date. Make-up midterms are scheduled for the morning after each midterm at 8:00-8:55 am. The make-up final is scheduled for Tuesday, December 11th. See your lecturer for the location of a make-up exam. Please note that there will be no early exams given.

COURSE GRADE: Your final grade will be based on your homework, quiz, midterm, and final exam scores. The point values for each are given below

Total Possible Points: QUIZ SCORE (Q SCORE): ..... 50 points (Best 5 of 6 quiz scores)
HOMEWORK SCORE: ....50 points (Best 10 of 11 MML scores)
MIDTERMS: .... 300 points (3 midterms at 100 points each)
FINAL EXAM: .... 200 points
TOTAL: .... 600 points

GRADING SCALE (Percent) (Adjustments to this scale may be made at the end of the quarter):

A	A-	B+	B	B-	C+	C	C-	D+	D
90	87	83	80	77	73	70	67	63	60

HELP WITH THE COURSE: Your lecturer and recitation instructor will have regular office hours for individual help. The Mathematics and Statistics Learning Center is also available for help. More information on the MSLC can be found at: http://www.mslc.ohio-state.edu/courses/132.

GEC INFORMATION: This Mathematics course can be used, depending on your degree program, to satisfy the Quantitative and Logical Skills category of the General Education Requirement (GEC). The goals and learning objectives for this category are:

Goals: Courses in quantitative and logical skills develop logical reasoning, including the ability to identify valid arguments, use mathematical models and draw conclusions based on quantitative data.

Learning objectives: Students comprehend mathematical concepts and methods adequate to construct valid arguments and understand inductive and deductive reasoning, scientific inference and general problem solving.

DISABILITY STATEMENT: Students with disabilities that have been certified by the Office of Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office of Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, VSR(614) 429-1334;
webpage   http://www.ods.ohio-state.edu/.

ACADEMIC MISCONDUCT STATEMENT: It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee. For additional information, see the Code of Student Conduct (http://studentaffairs.osu.edu/resource_csc.asp).

MML DUE DATES:

Assignment	Due Date (by 11:59 p.m.)	Sections
1	August 31	10.6, 13.1
2	September 7	13.2
3	September 4	13.3,13.4
4	September 21	13.5,14.1
5	October 5	14.2,15.1
6	October 12	15.2,17.3
7	October 19	17.3,15.3
8	November 2	15.4,4.1
9	November 9	4.2,4.3
10	November 23	4.3,4.4
11	November 30	4.5

Mathematics 1144
Au12

4 credits

Transition Precalculus

Catalog Description:
Precalculus topics.

Prerequisite:
Math 148.

Exclusions:
Restricted to students with credit for Math 148 but not 150 at start of Au12.

Purpose:
Math 150 done in a semester: Properties and applications of rational, logarithmic, exponential, trigonometric, and inverse trigonometric functions. Introduction to complex numbers.

Text:
Precalculus: Mathematics for Calculus, 6th Edition, by Stewart, Redlin, and Watson, published by Cengage; Loose-leaf: 9781133904489 Hardbound: 0840068077

Topics List:

- Functions and their inverses.
- Polynomial and rational functions. Applications.
- Exponential and logarithmic functions. Applications.
- Trigonometric and inverse trigonometric functions. Applications.
- Complex numbers and polar form.

COURSE INFORMATION   MATH 1144   AUTUMN 2012

Text: *"Precalculus – Mathematics for Calculus"* by Stewart, Redlin and Watson,
6th edition.

Calculators
Every student is required to have a graphing calculator comparable in capability
to a TI-83. However, calculators with symbolic algebra capabilities, e.g. a TI-89
or TI-92, are not allowed during exams or quizzes.

Exams
Midterm 1: Thursday, September 27
Midterm 2: Thursday, November 8
Final Exam: Monday, December 10, 8:00 – 9:45 PM (as scheduled by the Registrar)

Makeup exams will be available for students having documented work & class
conflicts or illnesses. STUDENTS SHOULD NOT MAKE TRAVEL ARRANGEMENTS
THAT CONFLICT WITH THE FINAL EXAM. SUCH A CONFLICT IS NOT A VALID
REASON FOR MISSING THE REGULARLY SCHEDULED FINAL EXAM.

Grading scheme:	Maximum points
2 Midterms @ 100 pts.	200
1 Final @ 200 pts.	200
Recitation grade	100
Total	500

The recitation grade includes 50 points for quizzes (top 5 of 6 quiz scores), and
and 50 **points for homework .** Homework assignments consist of a large number
of odd-numbered problems to practice on (answers in the back of the book)
along with selected even-numbered problems to hand in.

In order to do well in this course it is essential that you do the homework on a regular
basis not only because your grade depends on it but also because
DOING THE HOMEWORK IS THE BEST WAY TO PREPARE FOR THE EXAMS!

Grading scale (percentages)
A   A- B+ B   B- C+ C   C- D+ D   E
92 89 85 82 79 75 72 69 65 60 59 or below

In borderline cases the Lecturer will sometimes adjust the grades.
Attendance and class participation will be important factors in such decisions.

Additional help
Your lecturer will have office hours scheduled for individual help. In addition, the
MSLC will have tutoring available for Math 1144 students. The tutoring schedule will be
announced during the first week of classes. The schedule can also be found on the
MSLC website: https://www.mslc.osu.edu/

IMPORTANT NOTE:
The prerequisite for this course is Math 148 or permission of department.

GEC information: This Mathematics course can be used, depending on your degree program, to satisfy the Mathematical and Logical Analysis category of the General

Education Requirement (GEC). The goals and learning objectives for this category are:

Goals: To study the conceptual foundations of precalculus mathematics and to develop the computational and problem solving skills needed for that purpose.

Learning objectives: Understanding the basic properties of "elementary" functions: polynomial, rational, exponential, logarithmic, trigonometric, and inverse trigonometric functions; modeling real-life situations in terms of these functions.

Disability Statement: Students with disabilities that have been certified by the Office of Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office of Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone (614) 292-3307 and VRS (614) 429-1334; webpage http://www.ods.osu.edu

Academic Misconduct Statement: It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee. For additional information, see the Code of Student Conduct (studentaffairs.osu.edu/resource_csc.asp).

DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174

Math 1144   (Tentative) CALENDAR   AUTUMN 2012

Monday	Tuesday	Wednesday	Thursday	Friday
August 20	21	22	23 **2.1**	24
27	28 **2.2, 2.3**	29	30 **2.3, 2.4**	31
September 3 Labor Day No classes	4 **2.5**	5 **QUIZ 1** **(2.1 – 2.4)**	6 **2.6, 2.7**	7
10	11 **2.7**	12	13 **3.1**	14
17	18 **3.2, 3.3**	19 **QUIZ 2** **(2.5 – 3.1)**	20 **3.5, 3.6**	21
24	25 **REVIEW**	26	27 **MIDTERM 1** **(2.1 – 3.6)**	28
October 1	2 **3.7**	3	4 **4.1, 4.2**	5
8	9 **4.2, 4.3**	10 **QUIZ 3** **(3.7 – 4.2)**	11 **4.4**	12
15	16 **4.5**	17	18 **4.6**	19
22	23 **6.1, 6.2**	24 **QUIZ 4** **(4.3 – 4.6)**	25 **5.1, 5.2**	26
29	30 **5.3**	31 **QUIZ 5** **(6.1,6.2, 5.1, 5.2)**	November 1 **5.4**	2
5	6 **REVIEW**	7	8 **MIDTERM 2** **(3.7 – 5.4)**	9
12 No classes	13 **5.5**	14	15 **7.1, 7.2**	16 **REVIEW**
19	20 **7.2, 7.3**	21 No classes	22 Thanksgiving No classes	23 No classes
26	27 **7.3, 7.4**	28 **QUIZ 6** **(5.5 – 7.3)**	29 **7.4, 7.5**	30
December 3	4 **REVIEW**	5 **Reading Day**	6	7
10	11	12 **Final Exam** **2:00 – 3:45 pm**	13	14

HOMEWORK ASSIGNMENTS

MATH 1144   HOMEWORK ASSIGNMENTS   AUTUMN 2012

Section	Practice problems	Hand in problems
2.1	11-29(odd), 37-55(odd), 72, 7	14, 28, 54, 62
2.2	15-25(odd), 33, 35, 39-47(odd), 51-75(odd)	20, 48, 54, 70
2.3	1-15(odd), 21-27(odd), 31,	15, 26,34
2.4	1-21(odd), 23-33(odd	6,13, 24, 30
2.5	7-27(odd), 51-61(odd)	26, 52, 60,65
2.6	1-23(odd), 27-33(odd),45-55(odd	6, 12,22,28,38
2.7	1-9(odd), 17-21(odd), 29753(odd), 74,77,79	8, 34, 38, 50, 68
3.1	5-39(odd), 49-61(odd), 68,79	10,28,52,68
3.2	1-9(odd), 15-29(odd), 33-41(odd), 49-53(odd)	20, 22,42 ,58
3.3	25-49(odd), 57-63(odd)	34, 46. 64
3.5	1-11(odd), 17-29(odd), 35-41(odd), 45, 53, 59-63(odd)	26, 36, 50, 64
3.6	19-27(odd), 35-63(odd), 70	28,40, 54, 66
3.7	9-25(odd), 31-39(odd), 43-51(odd), 57-79(odd)	12, 40, 50, 62
4.1	15-53(odd),56	30, 32, 42,46
4.2	3-31(odd), 34	18,24, 32
4.3	1-33(odd), 41-51(odd),63,69,77,81	22, 32, 44,68
4.4	5-21(odd), 27-33(odd), 39-51(odd),65,67	22, 34, 52,64
4.5	1-11(odd), 15-21(odd), 25-29(odd), 35-73(odd)	14, 26,32,60
4.6	1-9(odd), 15-23(odd), 37, 41,	8,20,38
5.1	1-11(odd), 17-21(odd), 29-35(odd), 45, 49, 54	20, 30, 48
5.2	13-31(odd), 41-71(odd),74,80	14, 30, 50,64
5.3	5-21(odd), 27-33(odd), 49-77(odd)	56, 66, 68, 76
5.4	15-47(odd),52,54	16,24, 46, 52
5.5	1-5(odd), 21-45(odd)	18, 24, 46
6.1	5-9(odd), 13-19(odd), 29, 31, 35, 41, 45, 51, 67	16, 30, 44, 72
6.2	1-17(odd), 23-31(odd), 41-45(odd)	2, 6, 32, 42
7.1	1-9(odd), 15-25(odd), 35-43(odd), 61, 67, 83	10,26, 46,68
7.2	1-7(odd), 13-25(odd), 29-37(odd), 41-67(odd)	20, 32,46,62
7.3	3-33(odd), 41-45(odd),55-91(odd)	24,54,72,92
7.4	5-37(odd),41-55(odd)	22,34,56
7.5	17-47(odd),53-65(odd)	21,32,54,62

Catalog Description:
Functions: polynomial, rational, radical, exponential, and logarithmic. Introduction to right-angle trigonometry. Applications.

Prerequisite:
Math Placement Level N; C- or better in 1075; or credit for 104 or 148.

Exclusions:
Not open to students with credit for 1144 or 1149 or higher, or for a quarter-system math course numbered 150 or higher.

Purpose:
College Algebra provides students a college level academic experience that emphasizes the use of algebra and functions in problem solving and modeling, where solutions to problems in real-world situations are formulated, validated, and analyzed using mental, paper-and-pencil, algebraic and technology-based techniques as appropriate using a variety of mathematical notation. Students should develop a framework of problem-solving techniques (e.g., read the problem at least twice; define variables; sketch and label a diagram; list what is given; restate the question asked; identify variables and parameters; use analytical, numerical and graphical solution methods as appropriate; determine the plausibility of and interpret solutions). – Adapted from the MAA/CUPM CRAFTY 2007 College Algebra Guidelines. This course is intended to satisfy the requirements of the Ohio Board of Regents TMM001 College Algebra course with learning outcomes specified in: http://regents.ohio.gov/transfer/otm/otm-learning-outcomes.php

Text:
Precalculus: Mathematics for Calculus, 6th Edition, by J.Stewart, L.Redlin, and S.Watson, published by Cengage. 1008 pages. ISBN13: 9781133904489, ISBN10: 0840068077

This ISBN includes a loose-leaf version of the Stewart-Redlin-Watson book and Enhanced WebAssign [online homework] access for one student. (Access to online homework with an eBook version of the textbook can also be purchased separately. Contact Cengage for information.)

Technology: All students are required to have a graphing calculator, TI-83 or TI-84.
Note: Any calculators (including TI-89 and TI-92) that use a Computer Algebra System (CAS) are not permitted.

Cont.

DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174

Math 1148
Course Coordinator: J. Louttit
2012-2013

**DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174**

Sequencing Chart:
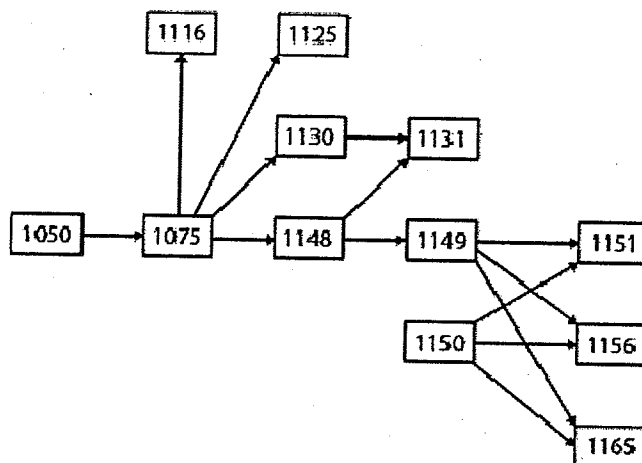
Topics List:

Week 1	Section 2.1 - What is a function?	*Ch 2 Functions*
Week 2	Section 2.2 - Graphs of functions	
	Section 2.3 - Getting information from a function	
Week 3	Section 2.4 - Average rate of change of a function	
	Section 2.5 -Transformations of functions	
Week 4	Section 2.6 - Combining functions	
	Section 2.7 - One-to-one functions and their inverses	
Week 5	Section 3.1 - Quadratic functions and models.	*Ch 3 Rational functions*
	Section 3.2 -Polynomial functions	
Week 6	Test 1	
	Section 3.3 -Dividing polynomials	
Week 7	Section 3.4 -The real zeros of a polynomial function	
	Section 3.7 -Rational functions	
Week 8	Section 4.1 -Exponential functions.	*Ch 4 Exponentials & logarithms*
	Section 4.2 -The natural exponential function	
Week 9	Section 4.3 - Logarithmic functions	
Week 10	Section 4.4 - Laws of logarithms	
	Section 4.5 - Exponential and logarithmic equations	
Week 11	Section 4.6 - Modeling with exponential and logarithmic equations; applications	
	Test 2	
Week 12	Section 10.1 - Linear systems (two variables)	*Ch 10 Systems of equations*
	Section 10.2 - Linear systems in several variables	
Week 13	Section 6.1 - Angle measure	*Ch 6 Trigonometry*
	Section 6.2 - Right triangle trigonometry	
Week 14	Section 6.3 - Trigonometric functions of angles	
	Comprehensive review	
	Final Exam	

Mathematics 1149   **3 credits**   **Trigonometry**
Au, Sp, Su

Catalog Description:
Trigonometric functions and their properties. Vectors, polar coordinates and complex numbers.

Prerequisite:
C- or better in 1148, or permission of department.

Exclusions:
Not open to students with credit for 1144, or for any math course numbered 1150 (150) or higher.

Text:
Precalculus: Mathematics for Calculus, 6th Edition, by J.Stewart, L.Redlin, and S.Watson, published by Cengage. 1008 pages. ISBN13: 9781133904489

This ISBN includes a looseleaf version of the Stewart-Redlin-Watson book and Enhanced WebAssign [online homework] access for one student. (Access to online homework with an eBook version of the textbook can also be purchased separately. Contact Cengage for information.)

Technology:
A graphing calculator is a required component in this course. It is recommended that you use a TI-83, TI-83 plus, or a TI-84. Note that the TI-89, TI-92, and calculators that use a Computer Algebra System are not permitted.

Topics List:

- Angle measurement, unit circle, radians.
- Trigonometric functions: right triangles and unit circles, basic properties, graphs.
- Identities, addition formula, inverse trigonometric functions.
- Trigonometric equations, solving triangles, applications.
- Polar coordinates, vectors, complex numbers, DeMoivre's Theorem.
- Rectangular and polar representations of conics.

SAMPLE STUDENT SYLLABUS

Math 1149   **Course Information**   **Autumn 2012**

TEXT: "Precalculus – Mathematics for Calculus" 6th edition, by Stewart, Redlin and Watson. Enhanced WebAssign with the ebook can be bundled with the text.

CALCULATORS: A graphing calculator is a **required** component in this course. It is recommended that you use a TI-83, TI-83 plus, or a TI-84. **Note that the TI-89, TI-92, and calculators that use a Computer Algebra System are not permitted.**

GEC INFORMATION: This Mathematics course can be used, depending on your degree program, to satisfy the Quantitative and Logical Skills category of the General Education Requirement (GEC). The goals and learning objectives for this category are:

Goals: To study the conceptual foundations of precalculus mathematics and to develop the computational and problem solving skills needed for that purpose.

Learning objectives: Understanding the basic properties of trigonometric, and inverse trigonometric functions; modeling real-life situations in terms of these functions.

COURSE GRADE: Your final grade will be based on your recitation score, midterm scores, and final score. The point values for each are given below.

Total Possible Points:

    RECITATION: .....100 points
    MIDTERMS: ......200 points (2 midterms at 100 points each)
    FINAL EXAM:.... 150 points
    TOTAL: ....450 points

GRADING SCALE (Percent) (Adjustments to this scale may be made):

A	A-	B+	B	B-	C+	C	C-	D+	D
90	87	83	80	77	73	70	67	63	60

RECITATION:

1. **HOMEWORK:** Consists of a weekly assignment of online problems using "Enhanced WebAssign".
2. **QUIZZES:** There will be 6 quizzes, of which your best 5 will count.

EXAM SCHEDULE: Attendance at the exams at the scheduled time and place is required. You must have your **OSU ID** at each exam:

Midterm1	Through 7.1	Tues, Oct 2
Midterm 2	Through 8.4	Tues, Nov 6
Final Exam	Cumulative	Thur, Dec. 6

EXAM ROOMS: Exams will not be held in your regular classroom. Room assignments will **be posted on the Math 1149 website,** http://www.math.ohio-state.edu/courses/1149 and **the Carmen website,** http://carmen.osu.edu , and **announced in class** the week before each exam.

MAKE-UPS: You must have **a permission slip** from your lecturer to take a make-up exam. To receive a permission slip, you need to provide your lecturer with proper documentation. Students who have a time conflict with *another regularly scheduled OSU course* may take the make-up exam. However, students with other types of time conflicts (like work, social activities, etc.) should prearrange to take the exam at the scheduled time and date. Make-up midterms are scheduled for the morning after each midterm between 7:30 and 8:20 am. The make-up final is scheduled for the day after the final exam, from 9:30 - 11:20 am. See your lecturer for the location of a make-up exam.

Carmen: Carmen is a web-based course tool that allows you to view your grades, course materials, and announcements. You can access Carmen by visiting http://carmen.osu.edu. You will need your OSU ID and password (the same ID and password which you use to access the Registrar's website).

HELP WITH THE COURSE:
- **OFFICE HOURS:** Your lecturer and recitation instructor will have office hours for individual help.

- **MATHEMATICS AND STATISTICS LEARNING CENTER (MSLC):** The MSLC offers the following services.
  -TUTOR ROOM
  -EXAM REVIEWS
  -WORKSHOPS

Please visit the MSLC website, http://www.mslc.ohio-state.edu/courses/1149, for more information about these services.

DISABILITY STATEMENT: Students with disabilities that have been certified by the Office of Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office of Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; http://www.ods.ohio-state.edu/.

ACADEMIC MISCONDUCT STATEMENT: It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee. For additional information, see the Code of Student Conduct (http://studentaffairs.osu.edu/resource_csc.asp).

Week	Date	Section	Topic
Wednesday	22-Aug.	6.1	Angle measure
Thursday	23-Aug.		
Friday	24-Aug.		
Monday	27-Aug.	6.2	Trigonometry of Right Triangles
Tuesday	28-Aug.		
Wednesday	29-Aug.	6.3	Trigonometric Functions of Angles
Thursday	30-Aug.		
Friday	31-Aug.		
Monday	3-Sept.	No classes	Labor Day
Tuesday	4-Sept.		
Wednesday	5-Sept.	5.1	The Unit Circle
Thursday	6-Sept.		
Friday	7-Sept.		
Monday	10-Sept.	5.2	Trigonometric Functions of Real Numbers
Tuesday	11-Sept.		
Wednesday	12-Sept.	5.3	Trigonometric Graphs
Thursday	13-Sept.		
Friday	14-Sept.		
Monday	17-Sept.	5.3	Trigonometric Graphs
Tuesday	18-Sept.		
Wednesday	19-Sept.	5.4	More Trigonometric Graphs
Thursday	20-Sept.		
Friday	21-Sept.		
Monday	24-Sept.	5.5	Inverse Trigonometric Functions and their Graphs
Tuesday	25-Sept.		
Wednesday	26-Sept.	5.5	Inverse Trigonometric Functions and their Graphs
Thursday	27-Sept.		
Friday	28-Sept.		
Monday	1-Oct.	Review	
Tuesday	2-Oct.	Midterm 1	
Wednesday	3-Oct.	6.5	The Law of Sines
Thursday	4-Oct.		
Friday	5-Oct.		

Week	Date	Section	Topic
Monday	8-Oct.	6.6	The Law of Cosines
Tuesday	9-Oct.		
Wednesday	10-Oct.	7.1	Trigonometric Identities
Thursday	11-Oct.		
Friday	12-Oct.		
Monday	15-Oct.	7.2	Addition and Subtraction Formulas
Tuesday	16-Oct.		
Wednesday	17-Oct.	7.3	Double Angle, Half Angle Formulas
Thursday	18-Oct.		
Friday	19-Oct.		
Monday	22-Oct.	7.4	Basic Trigonometric Equations
Tuesday	23-Oct.		
Wednesday	24-Oct.	7.5	More Trigonometric Equations
Thursday	25-Oct.		
Friday	26-Oct.		
Monday	29-Oct.	8.3	Polar Form of Complex Numbers, De Moivre's Theorem
Tuesday	30-Oct.		
Wednesday	31-Oct.	8.3	Polar Form of Complex Numbers, De Moivre's Theorem
Thursday	1-Nov.		
Friday	2-Nov.		
Monday	5-Nov.	Review	
Tuesday	6-Nov.	Midterm 2	
Wednesday	7-Nov.	9.1	Vectors
Thursday	8-Nov.		
Friday	9- Nov.		
Monday	12-Nov.	No classes	Veteran's Day - No Classes
Tuesday	13-Nov.		
Wednesday	14-Nov.	11.1	Parabolas
Thursday	15-Nov.		
Friday	16-Nov.		
Monday	19-Nov.	11.2	Ellipses
Tuesday	20-Nov.		
Wednesday	21-Nov.	No classes	Holiday - No Classes
Thursday	22-Nov.	No classes	Thanksgiving Day - No Classes
Friday	23-Nov.		

Week	Date	Section	Topic
Monday	26-Nov.	11.3	Hyperbolas
Tuesday	27-Nov.		
Wednesday	28-Nov.	Review	
Thursday	29-Nov.		
Friday	30-Nov.		
Monday	3-Dec.	Review	
Tuesday	4-Dec.		Last Day of Classes
Wednesday	5-Dec.	No classes	Reading Day - No Classes
Thursday	6-Dec.	Final Exam	Final Exams
Friday	7-Dec.		Final Exams
Monday	10-Dec.		Final Exams
Tuesday	11-Dec.		Final Exams
Wednesday	12-Dec.		Final Exams
Sunday	16-Dec.		Autumn Commencement

Mathematics 1150   **5 credits**   **Precalculus**
Au, Sp, Su

Catalog Description:
Functions: polynomial, rational, radical, exponential, logarithmic, trigonometric, and inverse trigonometric. Applications.

Prerequisite:
Math Placement Level M.

Exclusions:
Not open to students with credit for 1144, 1148, 1149, for any higher numbered math course, or for any quarter-system math course 150 or higher.

Text:
Precalculus: Mathematics for Calculus, 6th Edition, by J.Stewart, L.Redlin, and S.Watson, published by Cengage, 1008 pages, ISBN13: 9781133904489

This ISBN includes a loose-leaf version of the Stewart-Redlin-Watson book and Enhanced WebAssign [online homework] access for one student. (Access to online homework with an eBook version of the textbook can also be purchased separately. Contact Cengage for information.)

Technology:
Every student is required to have a graphing calculator comparable in capability to a TI-83 or TI-84. However, calculators with symbolic algebra capabilities are not allowed during exams or quizzes.

Topics List:

2.1   Functions
2.2   Graphs of Functions
2.3   Information from Graphs
2.4   Average Rate of Change
2.5   Transformations of Functions
2.6   Combining Functions
2.7   One-to-One Functions and Their Inverses

Cont.

Math 1150, cont.
Pg 2

DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174

Math 1150
Course Coordinator; R. Aboughazi
2012-2013

Mathematics 1151   5 credits   Calculus I
Au, Sp, Su

Catalog Description:
Differential and integral calculus of one real variable.

Prerequisite:
Math Placement Level L, or C- or better in: 1150, or in both 1148 & 1149; or in 150 or 1144. or 151

Exclusions:
Not open to students with credit for any higher numbered math class.

Text:
Calculus for Scientists and Engineers: Early Transcendentals, by W. Briggs,
L. Cochran, and B. Gillett, published by Pearson. Students will use MyMathLab, an automated homework system from Pearson.

Topics List:

1.5	Exponential Functions
1.6	Inverse Functions and Logarithms
2.1	The Tangent and Velocity Problems
2.2	The Limit of a Function
2.3	Calculating the Limits Using the Limit Laws
2.5	Continuity
2.6	Limits at Infinity: Horizontal Asymptotes
2.7	Derivatives and Rate of Change
2.8	The Derivative of a Function
3.1	Derivatives of Polynomials and Exponential Functions

Midterm 1

3.2	The Product and the Quotient Rules
3.3	Derivatives of Trigonometric Functions
3.4	The Chain Rule
3.5	Implicit Differentiation
3.6	Derivatives of Logarithmic Functions
3.7	Rates of Change in the Natural and Social Sciences

Math 1151, cont.
Pg 2

Math 1151
Course Coordinator: C. Ogle
2012-2013

Mathematics 1152 **5 credits** **Calculus II**
Au, Sp, Su

Catalog Description:
Integral calculus, sequences and series, parametric curves, polar coordinates, vectors.

Prerequisite:
C- or better in 1151, 1156, 152.xx, 161.xx or 161.01H; or 114 or 1114 ~~;~~ 1161.xx *[handwritten: or 1161.xx]*

Exclusions:
Not open to students with credit for any higher numbered math class or with credit for quarter-system Math courses numbered 153.xx or above.

Text:
Calculus for Scientists and Engineers: Early Transcendentals, 1st OSU custom edition, by Briggs, Cochran, Gillett, published by Pearson, Loose-leaf 125678771X, Hardcover 1256776467.

Topics List:

- Regions between Curves
- Volume by Slicing, Volume by Shells
- Lengths of Curves
- Physical Applications
- Exponential Models
- Basic Approaches to Integration
- Integration by Parts
- Trigonometric Integrals
- Trig Substitution
- Partial Fractions
- Improper Integrals
- Basic Ideas of Differential Equations
- Differential Fields and Euler's Method
- Separable Differential Equations
- Sequences

Cont.

Math 1152
Course Coordinator: D. McGinnis
2012-2013

Math 1152, cont.
Pg 2

- Series
- Divergence and Integral Tests
- Ratio and Root Tests
- Comparison Tests
- Alternating Series
- Approximate Functions with Polynomials
- Properties of Power Series
- Taylor Series
- Parametric Equations
- Polar Equations
- Calculus in Polar Coordinates
- Conic Sections
- Vectors in the Plane and 3-space (optional)
- Dot Products (optional)
- Cross Products (optional)
- Lines and Curves in Space (optional)

Mathematics 1156   5 credits   Calculus for Biological Sciences
Au

Catalog Description:
Limits, continuity, derivatives, mean value theorem, extrema, curve sketching, related rates, differentiation of the trig, log, and exponential functions, basic integration techniques, with particular motivations from and application to the Biological Sciences.

Prerequisite:
A grade of C- or above in 1148 and 1149, or a grade of C- or above in 1150, or credit for 150, or Math Placement Level L. Not open to students with credit for 1151 (151.xx) or above. GE quant reason math and logical any course.

Exclusions:
Not open to students with credit for 1151, or with credit for any higher numbered math class.

Purpose of Course:
To provide students with a solid foundation in one-variable differential calculus, to model and analyze phenomena in the Biological Sciences.

Follow-up Course:
Math 1157

Text:
Calculus for Biology and Medicine, 3rd Edition, by Claudia Neuhauser, Pearson, ISBN 9780321644688

Topics List:
- Discrete models.
- Limits and continuity.
- Derivatives and applications of differentiation.
- Antiderivatives, integrals, Fundamental Theorem.
- Team modeling projects.

Mathematics 1157   **5 credits**   **Mathematical Modeling**
Sp   **for the Biological Sciences**

Catalog Description:
Models in life sciences using multivariable calculus, linear algebra, dynamical systems, and ordinary differential equations.

Prerequisite:
C- or better in: 1156 or 1151; or credit for 152.xx.

$1161.xx, 1181 H$

Exclusions:
Not open to students with credit for 1152 or with credit for any higher numbered math class.

Purpose of Course:
To provide students with a solid foundation in one-variable calculus, to model and analyze phenomena in the life sciences.

Text:
Calculus for Biology and Medicine, 3rd Edition, by Claudia Neuhauser, Pearson, ISBN 9780321644688

Topics List:
- Integration.
- Linear algebra.
- Dynamical systems.
- Multivariable calculus: vector fields, gradients, etc.
- Team modeling projects.

Mathematics 1161.01	5 credits each	Accelerated Calculus I
Mathematics 1161.02		Accelerated Calculus I for
Au		Honors Engineers

Catalog Description:
Differential and integral calculus of one real variable.

Prerequisites:
Math Placement Level L and previous calculus experience.

Exclusions:
For 1161.01: Not open to students with credit for any math course numbered 1152 or higher, or for the quarter-system math courses 151.xx and 152.xx, or for any quarter-system course numbered 162.xx or higher.
For 1161.02: Intended for students in Freshman Engineering Honors.

Text:
Calculus for Scientists and Engineers: Early Transcendentals, 1st OSU custom edition, by Briggs, Cochran, Gillett, Person, Loose-leaf 125678771X, Hardcover 1256776467

Topics:
2.1; 2.2	The Idea of Limits; Definition of Limits
2.2; 2.3	Definition of Limits; Limit Laws
2.4; 2.5	Infinite Limits; Limits at Infinity
2.5; 2.6	Limits at Infinity; Continuity, the Intermediate Value Theorem
2.7	Precise Definition of Limits
3.1	Introducing the Derivative
3.2; 3.3	Rules of Differentiation; Product and Quotient Rules
3.4; 3.5	Derivatives of Trig Functions; Derivatives as Rate of Change
3.5; 3.6	Derivatives as Rate of Change; The Chain Rule
3.7	Implicit Differentiation

MIDTERM 1

Cont.

DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174

Math 1161.01, Math 1161.02
Course Coordinator: D. Terman
2012-2013

Math 1161.01, 1162.02, cont.
Pg 2

Mathematics 1164   3 credits   Transition Math for Middle School Teachers
Au 2012

Catalog Description:
Algebraic thinking and probability.

Prerequisite:
Math 109.

Exclusions:
Restricted to students with credit for Math 109 but not 110 at start of Au12.

Purpose of Course:
The purpose of the course is to prepare teachers of middle school students. In particular, it intends to deepen and extend the prospective teachers' content knowledge of the mathematics they will teach as well as their ability to reason with and communicate that knowledge.

Text:
Lecture Notes

Topics List:
- Representations of variables and formulas.
- Functions and relations.
- Probability and randomness.
- Expected value, binomial and geometric probabilities, simulations.

DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174

Math 1164
Course Coordinator: V. Ferdinand
2012-2013

Mathematics 1165   5 credits   Math for Middle School Teachers
Au

Catalog Description:
Algebra and reasoning for middle school teachers.

Prerequisite:
A grade of C- or above in 1148 and 1149, or grade of C- or above in 1150, or credit for 150, or Math Placement Level L; and enrollment in Middle Childhood Education major within either College of Arts and Sciences or College of Education and Human Ecology with Math as an Area of Concentration.

Purpose of Course:
The purpose of the course is to prepare teachers of middle school students. In particular, it intends to deepen and extend the prospective teachers' content knowledge of the mathematics they will teach as well as their ability to reason with and communicate that knowledge.

Follow-up Courses:
Math 1166, Math 2167, and Math 2168

Text:
Course Notes
Recommended Text: Algebra Connections, by Papick, published by Pearson, ISBN 9780131449282

Topics List:
1. Number systems (whole, integer, rational, real): uses, notations (including place value), and comparison of size. Addition and Subtraction
2. Division algorithm, Euclidean algorithm, Diophantine equations, counting techniques.
3. Algebra: polynomials, their structure and arithmetic, division algorithm.
4. Solving equations: linear, quadratic, etc., using complex numbers.
5. Introduction to mathematical induction.
6. Applications: modeling real-world topics.
7. Problem solving (a theme throughout the course).

DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174

Math 1165
Course Coordinator: H. Clemens
2012-2013

Mathematics 1166 **5 credits** **Math for Middle School Teachers II**
Sp

Prerequisite:
C- or better in 1165, and enrollment in Middle Childhood Education major with Math as an Area of Concentration.

Catalog Description:
Geometry for middle school teachers.

Purpose of Course:
The purpose of the course is to prepare teachers of middle school students. In particular, it intends to deepen and extend the prospective teachers' content knowledge of the mathematics they will teach as well as their ability to reason with and communicate that knowledge.

Follow-up Courses:
Math 2167 and Math 2168

Text:
Course Notes.

Topics List:
1. Visual reasoning via "proofs without words." Measurement (also teaching measurement in middle school)
2. Geometric constructions, congruence, similarity, and problem solving.
3. Coordinate geometry with emphasis on solving equations.
4. Non-Euclidean geometries.
5. Geometric transformations coordinate geometry, complex numbers.
6. Scaling and relationship between perimeter and area.
7. Measurement issues.
8. Modeling real-world situations.

Mathematics 1172   **5 credits**   **Engineering Mathematics A**
Au, Sp

Catalog Description:
Techniques of integration, Taylor series, differential calculus of several variables.

Prerequisites:
C- or better in 1151, 152.xx, 161.xx, 161.01H, 1114, or 114.

1161.XX , 1156.

Exclusions:
Not open to students in math, pre-actuarial science, or actuarial science. Not open to students with credit for any higher numbered math class, or for 1152; or for 254.xx or higher numbered math class.

Text:
Calculus for Scientists and Engineers: Early Transcendentals, 1st OSU custom edition, by Briggs, Cochran, Gillett, published by Pearson,
ISBN: 125678771X Loose-leaf (binder ready), full book with OSU custom chapters
ISBN: 256776467 Hardcover, full book with OSU custom chapters

Topics:
6.2	Regions between Curves
6.3	Volume by Slicing
6.4	Volume by Shells
6.5	Lengths of Curves
6.7	Physical Applications
6.8, 6.9	Exponential Models
7.1	Basic Approaches to Integration
7.2	Integration by Parts

Midterm 1

Cont.

Math 1172
Course Coordinator: N. Lakos
2012-2013

Math 1172, cont.
Pg 2

Midterm 2

Midterm 3

Final

Math 1172
Course Coordinator: N. Lakos
2012-2013

Mathematics 1181H   **5 credits**   **Honors Calculus I**
Au

Catalog Description:
Single variable calculus treated in depth.

Prerequisites:
1151 or 151.xx, and permission of department.

Exclusions:
Not open to students with credit for any higher numbered math class.

Text:
Calculus with Analytic Geometry, 2nd edition, by Simmons, published by McGraw-Hill, ISBN: 0070576424

Topics:

2.1	The Problem of Tangents
2.2	How to Calculate the Slope of the Tangent
2.3	The definition of the Derivative
2.4	Velocity and Rate of Change
2.5	The Concept of a Limit; Two Trigonometric Limits
A2	Theorems about Limits;
3.1	Derivatives of Polynomials
3.2	The Product and Quotient Rules
3.3	Composite Functions and the Chain Rule
3.4	Some trg Derivatives;
3.5	Implicit Functions and Fractional Exponents
3.6	Derivatives of Higher Order
12.2	Indeterminate Form 0/0, L'Hopital's Rule
4.1	Increasing and Decreasing Functions, Maxima and Minima
4.2	Concavity and Points of Inflection
4.3	Applied Maxima and Minima Problems
4.4	Reflection & Refraction
4.5	Related Rates
2.6	Continuous Functions
A4	The Mean Value Theorem
MIDTERM I	
5.2	Differentials and Tangent Line Approx'n
5.3	Indefinite Integrals, Integration by Substitution;
5.4	Differential Eqns, Separation of Variables
6.1	Introduction
Cont.	

Math 1181H, cont.
Pg 2

Mathematics 1187   **1-2 credits each**   **Problem Solving**
Au

Prerequisite:
Permission of Department.

Catalog Description:
An advanced enrichment course for interested and capable students.

Purpose of Course:
To offer an experience in problem solving in mathematics for interested and talented students beyond what they would encounter in a standard program. It is preparation for the National Putnam Mathematics Exam. This course is repeatable to a maximum of 6 credit hours, and is graded S/U. This course may not be counted in a major or minor program in Mathematics.

Topics:
Interesting special problems as chosen by the instructor.

Mathematics 1295   **1 credit**   **Introductory Seminar**

Catalog Description:
Seminar on mathematical topics for beginning math and actuarial science majors.

Prerequisite:
Enrollment in math or actuarial science major, or permission of department.

Topics List:
- Overview of the scope of mathematics, its subfields, and its applications.
- Discussion of the OSU math major and differences among the tracks.
- Outline of programs and activities that can benefit math majors.
- Presentation of various different sorts of career opportunities for math majors.

Math 1295
2012-2013

Mathematics 1534   **3 credits**   **Transition Calculus I**

Catalog Description:
Integral calculus, Taylor series, differential calculus of several variables. Applications.

Prerequisite:
C- or better in 152.xx, 161.xx, or 161.01H.

Exclusions:
Not open to students with credit for Math 153, 154, or math classes numbered 162 or higher.

Topics List:
~~6 credit semester course combining the last 4 weeks of 1151 and all of 1152.~~

Indeterminate forms; Taylor's formula; improper integrals; infinite series; parametric curves; vectors in the plane; vectors, curves & surfaces in space

Math 1534
Course Coordinator: U. Gerlach
2012-2013

Math 1534 (Call Number : 6026)
Autumn 2012

Lectures : 10:20am - 11:15am on WF in SH 0100
Instructor : Raeyong Kim
Office : MA (Math Building) 458
Email : kimr@math.ohio-state.edu
Phone : 292-1482
Office Hours : 12:30pm - 2:30pm on WF
Website : Important class information will be available on Carmen(http://carmen.osu.edu)

TEXTBOOK

Calculus for Scientists and Engineers: Early Transcendentals, OSU Custom Edition, by Briggs, Cochran and Gillett (See Textbook Buying Guide)

Grading Scheme

- Midterm Exams : $2 \times 100 = 200$

- Final Exam (comprehensive) : 200

- Quiz : $(6 - 1) \times 15 = 75$

- Paper homework : $9 \times 5 = 45$

Exams
Exam 1 : Wednesday, Oct. 10
Exam 2 : Wednesday, Nov. 7
Final Exam : TBA

Recitations
Teaching Assistant : Zhenan Sui
Office : MA (Math Building) 340
Office Hours : TBA

Quiz
There will be SIX in-class quizzes throughout the semester. Each quiz is out of 15 points and the LOWEST will be dropped. Each quiz will take place during the last 15 minutes of the recitation class. (See the calendar.)

Paper homework
You need to submit NINE paper homeworks(See the calendar below), each of which is out of 5 points. Homework problems will be posted on Carmen.

Make-ups

You are required to provide written documentation(e.g. doctor's note) to justify your absence for an Examination or Quiz in order to qualify for a makeup. If such an absence is due to a foreseeable cause(e.g. you are part of an OSU sports team which will be on a road trip during a quiz or exam), you need to discuss this with me(or TA) before the exam(or quiz).

MSLC Tutoring
Tutoring in The Mathematics and Statistics Learning Center will begin on Wednesday, Aug. 29. See the webpage(https://www.mslc.osu.edu/) for the details.

MyMathLab
MyMathLab is new online system for calculus courses. THIS COURSE DOES NOT USE MyMathLab. But it contains many helpful materials to study calculus. For example, the electronic version of the textbook, the ability to assign online homework problems, a study plan with practice problems from each section, etc. In order to have an access to MyMathLab, OSU custom edition of the textbook or online-only access to the textbook is required.

Calculators
Calculators are permitted except for those with symbolic algebra or calculus capabilities. You may not use calculator memory to store notes.

Disability statement
Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone (614) 292-3307 and VRS (614) 429-1334; webpage http://www.ods.ohio-state.edu.

Academic Misconduct Statement
It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term academic misconduct includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee. For additional information, see the Code of Student Conduct: http://studentaffairs.osu.edu/resource csc.asp

AUTUMN 2012 SEMESTER (Tentative)   THE OHIO STATE UNIVERSITY

Monday	Tuesday	Wednesday	Thursday	Friday
August 20	21	22 **First day of classes** 4.7	23	24 7.8
27	28	29 9.1, 9.2	30	31 9.2, 9.3
September 3 Labor Day No classes	4	5 9.4	6	7 9.5
10 Quiz 1(-9.4), HW1,2	11	12 9.5, 9.6	13	14 **Last day to drop w/o a "W"** 9.6, 10.1
17 HW3	18	19 10.1, 10.2	20	21 10.2
24 Quiz 2(-9.6)	25	26 10.3	27	28 10.4
October 1 Quiz 3(-10.3), HW4	2	3 11.1	4	5 Review
8	9	10 EXAM 1	11	12 11.2
15 HW5	16	17 11.3	18	19 12.1
22 Quiz 4(-11.3)	23	24 12.2, 12.3	25	26 **Last day to drop w/o petitioning** 12.3
29 Quiz 5(-12.3), HW6	30	31 12.4	November 1	2 12.5
5 HW7	6	7 EXAM 2	8	9 12.5
12 **No classes**	13	14 12.6	15	16 12.7
19 HW8	20	21 **No classes**	22 **Thanksgiving No classes**	23 **No classes**
26	27	28 12.8	29	30 12.9
December 3 Quiz 6(-12.6), HW9	4 **Last Day of Classes**	5 **Reading Day**	6 **Final Exams**	7 **Final Exams**
10 **Final Exams**	11 **Final Exams**	12 **Final Exams**	13	14

Dec 24, 25, Jan 1: Offices closed.

Monday, January 7: Spring Semester 2013 begins.

Mathematics 1544   **3 credits**   **Transition Engineering Calculus**

Catalog Description:
Integral calculus, Taylor series, differential calculus of several variables. Applications.

Prerequisite:
C- or better in 152.xx, 161.xx, or 161.01H.

Exclusions:
Not open to students in math, pre-actuarial science, or actuarial science.
Not open to students with credit for Math 153, 154, or math classes numbered 162 or higher.

Topics List:
154 = tweaked version of 153, done in a semester.

| Mathematics 2153 | 4 credits | Calculus III |
Au, Sp

Catalog Description:
Multivariable differential and integral calculus.

Prerequisites:
C- or better in 1152, 1172, 1534, 1544, 1181H, or 4181H; or credit for 153.xx, 154, 162.xx, or 162.01H.

Exclusions:
Not open to students with credit for any higher numbered math class, or for any quarter math class numbered 254 or higher.

Text:
Calculus for Scientists and Engineers: Early Transcendentals, 1st OSU custom edition, by Briggs, Cochran, Gillett, Pearson, published by Pearson, Loose-leaf 125678771X, Hardcover 1256776467

Topics:
Week 1
   13.1 Vector Functions and Space Curves
   13.2 Derivatives and Integrals of vector Functions
   13.3 Arc Length and Curvature
Week 2
   13.4 Motion in Space: Velocity and Acceleration; Kepler's Laws of Planetary of Motion
   14.1 Functions of Several Variables
   14.2 7 Limits and Continuity
Week 3
   14.3 Partial Derivatives (1-D, 2-D, and Higher Order)
   14.4 Tangent Planers and Linear Approximation
   14.5 The Chain Rule
Week 4
   Review
   Midterm 1
   14.5 The Chain Rule

Cont.

Math 2153, cont.

Pg 2

Week 5

14.6 Directional Derivative and the Gradient Vector (Part I: Dir-Derivative in 2-d)

14.6 Directional Derivative and the Gradient Vector (Part II: Gradient in 3-d and its Meaning)

14.7 Maximum and Minimum Values

Week 6

14.8 Lagrange Multipliers

15.1 Double Integrals over Rectangles

15.2 Iterated Integrals

Week 7

15.3 Double Integrals over General Regions

15.4 Double Integrals in Polar Coordinates: Change of Coordinates

15.6 8 Triple Integrals

Week 8

15.7 Triple Integrals in Cylindrical Coordinates

15.8 Triple integrals in Spherical Coordinates

15.9 Change of Variables in Multiple Integrals

Week 9

Review

Midterm 2

16.1 Vector Fields

Week 10

16.2 Line Integrals (3-D)

16.2 Line Integrals (2-D)

16.3 The Fundamental Theorem for Line Integrals; Independence of Path

Week 11

16.4 Green's theorem

16.5 Curl and Divergence

16.6 Parametric surfaces and their areas

Week 12

16.6 Parametric surfaces and their areas

16.7 Surface integrals: of parametric surfaces and oriented surfaces

16.7 Surface integrals: of Vector Fields

Week 13

Review

Midterm 3

16.8 Stokes' Theorem

Week 14

16.9 The Divergence Theorem

16.1 Summary of the Integral Theorems of Multivariable Calculus

Review for Final

Mathematics 2162.01	5 credits each	Accelerated Calculus II
Mathematics 2162.02		Accelerated Calculus II
Au, Sp		for Honors Engineers

Catalog Description:
Multivariable calculus; introduction to Taylor series.

Prerequisites:
C- or better in 1161.xx or 1181 H

Exclusions:
For 1161.01: Not open to students with credit for any higher numbered math class numbered 162 or higher.
For 1161.02: Open only to students in Freshman Engineering Honors.

Text:
Calculus for Scientists and Engineers: Early Transcendentals, 1st OSU custom edition, by Briggs, Cochran, Gillett, Person, published by Pearson,
Loose-leaf 125678771X, Hardcover 1256776467

Topics:
9.1; 9.2	An Overview; Sequences
9.2; 9.3	Sequences; Infinite Series
9.4	Divergence and Integral Tests
9.5	Ratio, root, and Comparison Tests
9.5; 9.6	Ratio, root, and Comparison Tests; Alternating Series;
10.1; 10.2	Approximating Functions with Polynomials; Properties of power Series
10.3; 10.4	Taylor Series; Working with Taylor Series
11.1; 11.2	Parametric Equations; Polar Coordinates
11.2; 11.3	Polar Coordinates; Calculus in Polar Coordinates

MIDTERM 1

Cont.

Math 2162.01, Math 2162.02
Course Coordinator: D. Terman
2012-2013

12.1; 12.2	Vectors in the Plane; Vectors in Three Dimensions
12.3;12.4	Dot Products; Cross Products
12.5	Lines and Curves in Space
12.6	Calculus of Vector-Valued Functions
12.7; 12.8	Motion in Space; Length of Curves
12.9	Curvature and Normal Vectors
13.1; 13.2	Planes and Surfaces; Graphs and Level Curves
13.3	Limits and Continuity
13.4;13.5	Partial Derivatives; Chain Rule
13.6	Directional derivative and the Gradient

MIDTERM 2

13.7	Tangent Plane and Linear Approximation
13.8	Maximum/Minimum Problems
13.9	Lagrange Multipliers
14.1; 14.2	Double Integral over Rectangular Regions; Double Integrals over General Regions
14.2; 14.3	Double Integrals over General Regions; Double integrals in Polar Coordinates
14.4; 14.5	Triple Integrals; Triple Integrals in Cylindricals and Sphericals
14.5; 14.6	Triple Integrals in Cylindricals and Sphericals; Integrals for Mass Calculations
15.1	Vector Fields
15.2	Line Integrals
15.3	Conservative Vector Fields

MIDTERM 3

15.4	Green's Theorem
15.5	Divergence and Curl
15.6	Surface Integrals
15.7	Stokes' Theorem
15.8	Divergence Theorem

Mathematics 2167   **3 credits**   **Calculus for Middle School Teachers**
Au, ~~Sp~~

Catalog Description:
Concepts of Calculus for Middle School Math teachers.

Prerequisite:
A grade of C- or above in 1165, or credit for 1164 or 110; and enrollment in Middle Childhood
Education major with Math as area of concentration. *& pre-majors*

Exclusions:
Not open to students with credit for 111.

Purpose of Course:
The purpose of the course is to prepare teachers of middle school students. In particular, it
intends to deepen and extend the prospective teachers' content knowledge of the mathematics
and mathematical reasoning that they will teach as well as their ability to reason with and
communicate that knowledge.

Follow-up Courses:
Math 2168

Text:
Under Consideration
Supplementary Text: Course Notes

Topics List:
1. Rates described pictorially, in writing, and with symbols.
2. Informal and formal measurement of (instantaneous) rates and their connection to middle school mathematics.
3. Informal and formal measurement of (accumulated) areas and their connection to middle school mathematics.
4. The Fundamental Theorem of Calculus.
5. Applications of differential calculus.
6. Applications of integral calculus.

DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174

Math 2167
Course Coordinator: H. Clemens
2012-2013

Mathematics 2168 **3 credits** **History of Mathematics**
Sp **for Middle School Teachers**

Prerequisite:
C- or better in 2167; or credit for 111. Limited to Middle Childhood majors with Math as an
Area of Concentration. *+ premajors*

Catalog Description:
Historical and mathematical discussion of topics in the middle school math curriculum.

Purpose of Course:
The purpose of the course is to prepare prospective middle school math teachers. In particular, it
intends to deepen and extend prospective teachers' connections among topics in mathematics
through the study of the history of mathematics, as well as continuing to develop their ability to
reason with and communicate that knowledge.

Follow-up Courses:
None

Text:
A Gentle History of Mathematics

Course Packet

Topics List:

- History of Mathematics, from ancient to modern times.
- Development of number systems, operations, geometry, trigonometry, algebra, calculus,
  statistics, and probability.
- Applications: modeling real-world topics.
- Problem solving (a theme throughout the course).

DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174

Mathematics 2173   **3 credits**   **Engineering Mathematics B**
Au, Sp

Catalog Description:
Multiple integrals, line integrals, vector fields, second order ordinary differential equations.

Prerequisite:
Math 1172, 1544, or 154.

Exclusions:
Not open to students with credit for 1152, 2153, or for any higher numbered math class, or for any quarter-system math class numbered 254 or higher.

Text:
Calculus for Scientists and Engineers: Early Transcendentals, 1st OSU custom edition, by Briggs, Cochran, Gillett, published by Pearson,
ISBN: 125678771X Loose-leaf (binder ready), full book with OSU custom chapters
ISBN: 256776467 Hardcover, full book with OSU custom chapters

Topics List:

Part I: Multivariable Integral Calculus
14.6	(Review of) Directional Derivatives and the Gradient Vector
14.7	Maximum and Minimum Values
14.8	Lagrange Multipliers
15.1	Double Integrals over Rectangles
15.2	Iterated Integrals
15.3	Double Integrals over General Regions
15.4	Double Integrals in Polar Coordinates: Change of Coordinates
15.6	Triple Integrals
15.7	Triple Integrals in Cylindrical Coordinates
15.8	Triple integrals in Spherical Coordinates
15.9	Change of Variables in Multiple Integrals
	Midterm 1
16.1	Vector Fields
16.2	Line Integrals (3-D)
16.2	Line Integrals (2-D)
16.3	The Fundamental Theorem for Line Integrals; Independence of Path
	Midterm 2

Cont.

Math 2173
2012-2013

Part II: 2nd Order Constant Coefficient O.D.E.'s

| Mathematics 2174 | 3 credits | Linear Algebra and |
| Au, Sp | | Differential Equations |

Catalog Description:
Matrix theory, eigenvectors and eigenvalues, ordinary and partial differential equations.

Prerequisite:
~~2153~~, 2173, ~~or 254.xx;~~ and either major in ENG, Physics, or Chemistry or permission of math department. *Only*

Exclusions:
Not open to students with credit for both (i) 2415 (415) or 2255 (255) and (ii) 2568 (568 or 571).

Text:
Part II: Elementary Ordinary & Partial Differential Equations, OSU custom edition, by Boyce, published by Wiley, ISBN: 9781119934462
Introduction to Linear Algebra, 5th edition, by Johnson, Riess and Arnold, published by Pearson, ISBN: 0321628217

Topics List:

Part One = Matrix Algebra, Textbook sections from Arnold, Riess, and Johnson
Introduction to Linear Algebra
Chapter 1: Matrices and Linear Systems of Equations
Chapter 3: The Eigenvalue Problem

- 1.1 Introduction and Gaussian Elimination
- 1.2 Solution Sets for Linear systems
- 1.3 Matrices and Echelon form
- 1.4 Consistent Systems of Linear Equations
- 1.6 Matrix Operations
- 1.7 Algebraic Properties of Matrix operations
- 1.8 Linear Independence and Nonsingular Matrices
  Midterm 1

Cont.

Mathematics 2177   **4 credits**   **Mathematical Topics for Engineers**
Au, Sp

Catalog Description:
Multiple integrals, line integrals; matrix algebra; linear (ordinary and partial) differential
equations.

Prerequisite:
Major, pre-major, or minor in BiomedE, CEEGS, FABEng, MatScEn, CBE, or WeldEn; and:
1172, 2153, 1544 (154), 254.xx, 263.xx, 263.01H, or 264H

Exclusions:
Not open to students with credit for 2174 or 5520H; or with credit for both (i) 2415 (415), 2255
(255) or 4512 (512) and (ii) 2568 (568 or 571).

Text: *Math 2177, Custom Edition for OSU*, Pearson, ISBN-13 978-1-256-82676-7 or ISBN-10
1-256-82676-6 –**OR**– the textbooks listed below.

Topics List:

> **PART ONE: Multivariable Integral Calculus**
> Textbook Sections from *Calculus for Scientists and Engineers: Early Transcendentals*,
> by Briggs, Cochran, Gillett and Shulz, Chapters 13-15

2177 Custom	Original Text	Topic
1.8	13.8	Maximum/Minimum Problems
1.9	13.9	Lagrange Multipliers
2.1	14.1	Double Integrals over Rectangular Regions
2.2	14.2	Double Integrals over General Regions
2.3	14.3	Double Integrals in Polar Coordinates
2.4	14.4	Triple Integrals
2.5	14.5	Triple Integrals in Cylindrical and Spherical Coordinates
2.7	14.7	Change of Variables in Multiple Integrals
3.1	15.1	Vector Fields
3.2	15.2	Line Integrals
3.3	15.3	Conservative Vector Fields
		Midterm 1

Cont.

PART TWO: Matrices and Linear Systems of Equations

Textbook Sections from *Introduction to Linear Algebra*, by Johnson, Riess, and Arnold, 5th edition, Chapter 1: Matrices and Systems of Linear Equations

2177 Custom	Original Text	Topic
4.1	1.1	Introduction to Matrices and Systems of Linear Equations
4.2	1.2	Echelon Form and Gauss-Jordan Elimination
4.3	1.3	Consistent Systems of Linear Equations
4.4	4.4	Applications (optional)
4.5	1.5	Matrix Operations
4.6	1.6	Algebraic Properties of Matrix operations
4.7	1.7	Linear Independence and Nonsingular Matrices
4.8	1.8	Data Fitting, Numerical Integration and Numerical Differentiation

Midterm 2

PART THREE: 2nd Order Constant Coefficient O.D.E.' s

Textbook Sections from *Calculus for Scientists and Engineers: Early Transcendentals*, by Briggs, Cochran, Gillett and Shulz, Chapter 16 and Appendix C

2177 Custom	Original Text	Topic
5.1	16.1	Basic Ideas
Appx C	Appx C	Complex Numbers
5.2	16.2	Linear Homogeneous Equations
5.3	16.3	Linear Nonhomogeneous Equations
5.4	16.4	Applications

Midterm 3

PART FOUR: Fourier Series & Partial Differential Equations

Textbook Sections from *Fundamentals of Differential Equations and Boundary Value Problems*, by Nagle, Saff and Snider, 8th Edition, Chapter 10

2177 Custom	Original Text	Topic
6.1	10.1	Introduction: A Model for Heat Flow
6.2	10.2	Method of Separation of Variables
6.3	10.3	Fourier Series
6.4	10.4	Fourier Cosine and Sine Series
6.5	10.5	The Heat Equation
6.6	10.6	The Wave Equation

Mathematics 2182H   **5 credits**   **Honors Calculus II**
Sp

Catalog Description:
Multivariable calculus treated in depth.

Prerequisite:
C or better in 1181H or 4181H.

Exclusions:
Not open to students with credit for both 162.01H and 263.01H

Text:
Calculus with Analytic Geometry, 2nd Edition, by George F. Simmons

Topics List:
15.1; 15.2	Conic sections: Ellipse, Parabola, Hyperbola
15.3; 15.4	Conic sections: Ellipse, Parabola, Hyperbola
16.1	Polar coordinate system
16.2	Graphs of polar equations
16.3	Polar Equations of conics and spirals
16.3; 16.4	Polar Equations of conics and spirals; Arc length and tangent lines
16.5	Areas in polar coordinates
17.1	Parametric Equations of Curves
17.2	Cycloids and other similar Figures
17.3	Vector Algebra, the Unit Vectors i and j;
17.4	Derivatives of Vector Functions, Velocity and Acceleration
17.5	Curvature and the Unit Normal Vector
17.6	Tangential and Normal Components of Acceleration
17.7	Kepler's Laws and Newton's Law of Universal Gravitation

MIDTERM 1

Cont.

Math 2182H
2012-2013

Math 2182H, cont.
Pg 2

MIDTERM 2

MIDTERM 3

Math 2182H
2012-2013

Mathematics 2255   **3 credits**   **Differential Equations and**
Au, Sp, Su   **Their Applications**

Catalog Description:
Ordinary differential equations, their series solutions, numerical methods, Laplace transforms, physical applications.

Prerequisite:
C- or better in 2153, 2162.xx, 2173, 2182H, or 4182H; or credit for 254.xx, 263.xx, 263.01H, or 264H.

Text:
Ordinary Differential Equations and their Applications, OSU custom edition, by Boyce, published by Wiley, ISBN 9781119934455

Topics List:

INTRODUCTION
1.3   Classification of Differential Equations
2.1   Linear Equations with Variable Coefficients

FIRST ORDER DIFFERENTIAL EQUATIONS
2.2   Separable Equations
2.4   Differences between Linear and Nonlinear Equations
2.5   Autonomous Equations and Population Dynamics
2.6   Exact Equations and Integrating Factors
2.7   Numerical Approximations: Euler's Method
2.8   The Existence and Uniqueness Theorem
2.9   First Order Difference Equations

SECOND ORDER LINEAR EQUATIONS
3.1   Homogeneous Equations with Constant Coefficients
3.3   Complex Roots of the Characteristic Equation
3.2   Solutions of Linear Homogeneous Equations; the Wronkian
3.4   Repeated Roots; Reduction of Order
        MIDTERM #1

Cont.

Math 2255
Course Coordinator: W. Luo
2012-2013

Math 2255, cont.

Pg 2

Math 2255
Course Coordinator: W. Luo
2012-2013

Mathematics 2366 **2 credits** **Introduction to Discrete Mathematics**
Sp

Catalog Description:
Mathematical reasoning, logic, sets, functions, recursive definitions, elementary counting principles.

Prerequisites:
C- or better in 1131 or 1151; credit for 132 or 152.xx; or permission of department.

Exclusions:
Open only to majors in MIS (Management Information Systems). Not open to students with credit for 366.

Follow-up Course:
2566

Topics List:
TOPICS for this discrete math course depend on future discussions with colleagues in Management Information Systems.

Math 2366
2012-2013

Mathematics 2415   **3 credits**   **Introduction to Discrete Mathematics**
Au, Sp, Su

Catalog Description:
Ordinary and partial differential equations: Fourier series, boundary and initial value problems.

Prerequisite:
2153, 2162.xx, 2173, 2182H, 4182H, both (1172 or 1544 or 154) **and** 2568, 254.xx, 263.xx, 263.01H, or 264H.

Exclusions:
Not open to students with credit for Math 2255, 5520H, 2174, 255, 415.xx, or 521H.

Textbook:
Lecture Notes

Topics List:
1.1   Some Basic Mathematical Models & Direction Fields
1.3   Classification of Differential Equations
1.2   Solutions to some Differential Equations
2.2   Separable Equations
2.1   Linear Equations with Variable Coefficients
2.3   Modeling with First Order Differential Equations
2.4   Difference between Linear and Nonlinear Equations
2.5   Autonomous Equations and Population Dynamics
3.1   Homogeneous Equations with Constant Coefficients;
3.3   Complex Roots of the Characteristic Equation
3.4   Repeated Roots
        Midterm 1
3.2   Solutions of Linear Homogeneous Equations; the Wronskian
3.4   Reduction of Order
4.5   Non-homogeneous Equations; Method of Undetermined Coefficients
3.7   Mechanical and Electrical vibrations
3.9   Forced Vibrations
10.1   Two-point Boundary Value Problem
        Midterm 2

Cont.

Math 2415
Course Coordinator: U. Gerlach/G. Baker
2012-2013

Math 2415
Course Coordinator: U. Gerlach/G. Baker
2012-2013

Mathematics 2568   **3 credits**   **Linear Algebra**
Au, Sp, Su

Catalog Description:
Matrix algebra, vector spaces and linear maps, bases and dimension, eigenvalues and eigenvectors, applications.

Prerequisite:
C- or above in 1172, 1544, 2153, 2162.xx, 2182H, or 4182H; or C- or above in both 1152 and CSE 2321; or credit for 154, 254.xx, 263.xx, 263.01H, or 264H.

Exclusions:
Not open to students with credit for 4568 (568), 5520H (520H), or 572.

Text:
Introduction to Linear Algebra, 5th edition, by L.W. Johnson, R.D. Riess, and J.T. Arnold, published by Pearson, ISBN Softcover: 0321628217, Hardcover: 0201658593

Topics List:
Part I
1.1   Introduction to Matrices and Systems of linear equations
1.2   Echelon Form and Gaussian-Jordan Elimination
1.3   Consistent Systems of linear Equations
1.5   Matrix Operations
1.6   Algebraic Properties of Matrix operations
1.7   Linear Independence and Nonsingular Matrices
1.9   Matrix Inverses and Their Properties
      Midterm 1

Cont.

Math 2568, cont.
Pg 2

Math 2568
Course Coordinator: C. Ogle
2012-2013

Mathematics 3345 **3 credits** **Foundations of Higher Mathematics**
Au, Sp

Catalog Description:
Introduction to logic, proof techniques, set theory, number theory, real numbers.

Prerequisite:
Major or minor in Math, CSE, or CIS.

Math: C- or better in 2153, 2162.xx, 2173, or 2182H; or credit for 254.xx, 263.xx or 263.01H.

CIS or CSE:
C- or better in both CSE 2321 and: C- or better in 1152, 1161.xx, 1172, 1181H, 4181H, 1534, or 1544; or credit for 153.xx, 154, 162.xx, or 162.01H.

Exclusions:
Not open to students with credit for 345.

Text:
Lecture Notes, Falkner

Topics List:
- Propositional calculus; quantifiers.
- Simple examples of mathematical proofs.
- Mathematical induction.
- Sets and functions: surjections, injections, bijections.
- Infinite sets: countable and uncountable.

Mathematics 3350   **3 credits**   **Introduction to Mathematical Biology**
Sp

Catalog Description:
Introduction to quantitative and qualitative analysis of several mathematical models for biological systems.

Prerequisite:
C- or better in Math 2255, 2415, 5520H; or credit for 255, 415.xx, or 521H.

Topics List:
- Population dynamics: Logistic growth.
- Population dynamics: Lotka-Volterra predator-prey model.
- Modeling specific diseases (e.g. HIV, cancer).
- Competition model.
- Dynamics of a neuron.
- Enzyme kinetics.
- Cell proliferation and death.

Math 3350
Course Coordinator: C. Chou
2012-2013

Mathematics 3532
Sp

3 credits

Mathematical Foundations of Actuarial Science

Catalog Description:
Problem workshop for applications of calculus and probability to actuarial science and risk management.

Prerequisite:
C- or better in Math 4530, 5530H, or Stat 4201; or credit for 530, 531H, or Stat 420.

Topics List:
- Random variables.
- Discrete distributions.
- Continuous distributions.
- Central Limit Theorem and law of large numbers.
- Risk models.

Math 3532
Course Coordinator: C. Ban
2012-2013

Mathematics 3588   **3 credits**   **Practicum in Actuarial Science**
Sp

Catalog Description:
Presentations by practicing actuaries on topics drawn from their fields of expertise; oral presentations by students on selected topics in actuarial science.

Prerequisite:
3rd year standing and completion of second writing course.

Exclusions:
Open only to actuarial science majors and math majors.

Topics List:
- Business communication.
- Problems in life insurance.
- Problems in property and casualty insurance.
- Problems in pension consulting.
- Problems in health care consulting.
- Risk management.

Mathematics 3589 **3 credits** **Introduction to Financial Mathematics**
Au

Catalog Description:
Introduction to mathematics used in financial asset pricing, based on the binomial asset pricing model. This course prepares students for further study of stochastic calculus in continuous time.

Prerequisite:
{C- or better in 3345 or credit for 345}; and {C- or better in 4530, 5530H, or Stat 4201, or credit for 530, 531H, 345 or Stat 420}; or permission of department.

Text:
Stochastic Calculus for Finance, by Shreve, published by Springer, ISBN: 9780387249681

Topics List:
- No-arbitrage pricing.
- One-period and multi-period models.
- Conditional expectations.
- Martingales.
- Change of measure.
- Capital asset pricing model.
- General American derivatives.

DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174

Math 3589
Course Coordinator: D. Warren
2012-2013

Mathematics 3607   **3 credits**   **Beginning Scientific Computing**
Au, Sp

Catalog Description:
Introduction to uses of computers to solve problems arising in the physical and biological sciences, and in engineering and finance.

Prerequisite:
{C- or better in 2255, 2415, or 5520H; and C- or better in 2568 or 5520H}; or:
{credit for 255, 415.xx, or 521H; and credit for 568, 571, or 520H}.

Purpose:
Math 3607 is a course which has three main goals: it introduces students to MATLAB (or improves their knowledge of MATLAB); it uses MATLAB to solve practical problems from various areas of mathematics, physics, engineering, business, and finance; and it presents the numerical analysis needed to use MATLAB effectively. The principle underlying this course is that the way to learn MATLAB and numerical analysis is by doing it, not by reading about it. This course is taught in a computer lab and MATLAB will be used to some extent every class.

Textbook:
Learning MATLAB and Numerical Analysis through Examples, by Ed Overman (e-book)

Topics List:
- MATLAB as a scalar calculator, round-off errors, debugging.
- Arrays in MATLAB, probability theory, Markov processes.
- Graphics in MATLAB, applications of probability theory, histograms.
- Programming in MATLAB, more probability theory, mathematical biology.
- Function m-files in MATLAB, more Markov processes, chaos.
- More about functions, randomness.
- Solving linear systems of equations.
- Interpolation and approximation.
- The solution of nonlinear equations and unconstrained optimization.
- Numerical differentiation and integration
- Time-evolution ordinary differential equations, boundary-value ordinary differential equations, stochastic differential equations, examples from many disciplines.
- Eigenvalues, Fourier series.

DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174

Math 3607
Course Coordinator: E. Overman
2012-2013

Mathematics 3618   **3 credits**   **Theory of Interest**
Au, Sp, Su

Catalog Description:
Financial transactions involving interest: measurement of interest, force of interest, annuities-certain, introduction to financial derivatives.

Prerequisite:
C- or better in 1152, 2162.xx, 1172, 2182H, 4181H; or credit for 153, 162, 162H, or 191H.

Exclusions: Open only to actuarial science majors and pre-majors, and to math majors.

Text:
Mathematics of Investment & Credit, 5th edition, by Broverman, published by Actex. ISBN: 9781566987677
Derivatives Markets, 2nd edition, by McDonald, published by Pearson, ISBN: 032128030X

Topics List:
- Compound and simple rates of interest and discount, force of interest.
- Annuity certain and annuity due.
- Mortgage amortizations.
- Evaluation of bonds.
- Durations.
- Asset and liability matching.
- Introduction to options, futures, and other derivatives.

Mathematics 4181H   **5 credits**   **Honors Analysis I**
Au

Catalog Description:
4181H-4182H is an enriched honors sequence introducing students to mathematical underpinnings of calculus.

Prerequisite:
Permission of department.

Topics List:
- Functions and limits.
- Continuity.
- Derivatives and integrals.
- Infinite sequences and series.

Math 4181H
Course Coordinator: V. Bergelson
2012-2013

Mathematics 4182H   **5 credits**   **Honors Analysis II**
Sp

Catalog Description:
Continuation of Math 4181H.

Prerequisite:
B- or better in 4181H, or permission of department.

Topics List:
- Uniform convergence and power series. Taylor series and remainder terms.
- Multiple integrals.
- Line integrals and vector fields; surface integrals.
- Green's Theorem.
- Curl, divergence, Stokes' Theorem, Divergence Theorem.
- Functions defined by series or integrals.

Mathematics 4504　　　　　　**3 credits**　　　　　　**History of Mathematics**
Sp, Su

Catalog Description:

Development of mathematics from primitive origins to present forms. Topics include: development of arithmetic, algebra, geometry, trigonometry, and calculus.

Prerequisite:

C- or better in 2568, 4507, or 5520H; or credit for 568, 571, 507, 580, or 520H; or permission of department.

Exclusions:

Open only to math majors, or students with graduate standing in Ed T&L.

Topics List:

- Development of arithmetic; Babylonian tablets and Egyptian papyri.
- Development of geometry: Pythagoras, Thales, Euclid, Archimedes, Ptolemy, and non-Euclidean geometry.
- Development of algebra and calculus.

Mathematics 4507 **3 credits** **Geometry**
Au, Sp

Catalog Description:
Topics in Euclidean, spherical, and hyperbolic geometries.

Prerequisite:
C- or better in 3345 and in C- or better in 2568 or 5520H; or credit for 345, and credit for 568, 571, or 520H; or graduate standing.

Text:
None.

Topics List:
- Euclidean geometry.
- Spherical geometry.
- Hyperbolic geometry.

Mathematics 4512   **3 credits**   **Applied Partial Differential Equations**
Au, Sp, Su

Catalog Description:
Second-order PDEs; boundary value problems; Fourier series; wave, heat and Laplace equations; applications.

Prerequisite:
C- or better in 2173, 2153, 2162.xx, 2182H, or 4182H; or credit for 254.xx, 263.xx, 263.01H, or 264H. Intended for undergraduate and masters degree students in Engineering and Science.

Exclusions:
Not open to students with credit for 4557, 512, or 557.
Not open to students with a math major, math minor or actuarial science major.

Text:
Elementary Differential Equations & Boundary Value Problems, 9th OSU Custom, by Boyce & DiPrima, published by Wiley, ISBN: 9781119935148

Cont.

Math 4512
2012-2013

Math 4512, cont.
Pg 2

Topics List:

Part I: ODE's via The Laplace Transform (Chapter 6);
Euler's and Bessel's Equation (½ of Chapter 5)

3.1   Homogeneous Equations with Constant Coefficients
3.4   Complex Roots of the Characteristic Equation
6.1   Definition of the Laplace Transform
6.2   Solution of Initial Value Problems
6.3   Step Functions
6.4   Diff'l Equations with Discontinuous Forcing Functions
6.5   Impulse Functions
6.6   Convolution Integral
5.4   Euler's Equation; Regular Singular Points
5.5   Series Solution Near a Singular Point: Part I
5.6   Series Solution Near a Singular Point: Part II
5.7   Bessel's Equation
      Midterm I

Part II: Partial Differential Eq'n and Fourier Series (Chapter 10)

10.1   The Two-Point Boundary Value Problem
10.2   Fourier Series
10.3   Fourier Convergence Theorem
10.4   Even and Odd Functions
10.8A Heat Conduction Eq'n: Motivation via Derivation
10.5   Separation of Variables; Heat Conduction in a Rod
10.6   Other Heat Conduction Prob's: Nonhomogeneous, Neuman, Mixed Boundary Cond'ns
10.8B Wave Equation: Motivation via Derivation;
10.7   Vibrations of an Elastic String
10.8   Laplace's Equation: Separation in Cartesian Coordinates Dirichelet vs. Neuman
       Boundary Condxns
10.8   Separation and Solution in Polar and Cylindrical Coordinates
       Midterm II

Part III: Boundary Value Problems (Chapter 11)

11.1   Two-point Boundary Value Problems
11.2   Sturm-Liouville Boundary Value Problems I
11.2   Sturm-Liouville Boundary Value Problems II
11.3   Nonhomogeneous Boundary Value Problems
11.4   Singular Sturm-Liouville Problems
11.5   Bessel Series Expansion: Vibrating Drum
11.6   (If time permits: Series of Orthogonal Functions: Mean Convergence)

Mathematics 4530   **3 credits**   **Probability**
Au, Sp, Su

Catalog Description:
Combinatorial probability, random variables, independence, expectation, variance.

Prerequisite:
C- or better in 2153, 2162.xx, 2173, 2177, 2182H, 4182H; or credit for 254.xx, 263.xx, 263.01H, or 264H.

Exclusions:
Not open to students with credit for any of 530, 5530H (531H), or Stat 4201.   *Stat 420v*

Text:
Probability, by Pitman, published by Springer, ISBN: 9780387979748

Topics List:
- Rules of probability.
- Conditional probability and independence.
- Binomial distributions, normal approximation, Poisson approximation.
- Random variables, expectation, variance.
- Continuous distributions and continuous joint distributions.
- Dependence, conditional distribution, conditional expectations.

Math 4530
Course Coordinator: D. Warren
2012-2013

Math 4530 Schedule

To: Math 530 Instructors
From: Neil Falkner (Math 530 coordinator)

Below is a suggested schedule for Math 530. It assumes 25 lectures.
The other 5 class meetings may be used for two in-class midterms and
three review sessions (one before each midterm and one at the end of the quarter).
The pace is about 13 pages per lecture. The text is `Probability' by Jim Pitman.
The number of lectures per section shown below is intended only as a rough guide.
The material to be covered consists of chapters 1 through 5, with some omissions.
However, depending on the class, it may be appropriate to cover just chapters 1 through 4.
If you have any questions, please feel free to contact me.

Section	No. of Pages	No. of Lectures	Finish by	Topic
1.1	9	0.7	0.7	Equally Likely Outcomes
1.2	8	0.6	1.3	Interpretations
1.3	14	1.0	2.3	Distributions
1.4	14	1.1	3.4	Conditional Probability and Independence
1.5	9	0.6	4.0	Bayes' Rule
1.6	16	1.0	5.0	Sequences of Events
App. 1	8	1.0	6.0	Counting
2.1	13	1.0	7.0	The Binomial Distribution
2.2	18	1.0	8.0	Normal Approximation: Method
2.3	6	1.0	9.0	Normal Approximation: Derivation
2.4	6	0.5	9.5	Poisson Approximation
2.5	7	0.5	10.0	Random Sampling
REVIEW				
MIDTERM ONE				
3.1	23	1.6	11.6	Introduction to Random Variables
3.2	23	1.7	13.3	Expectation
3.3	23	1.7	15.0	Standard Deviation and Normal Approximation
3.4	14	1.0	16.0	Discrete Distributions
3.5	15	1.0	17.0	The Poisson Distribution
4.1	18	1.5	18.5	Probability Densities
4.2	18	1.5	20.0	Exponential and Gamma Distributions
REVIEW				
MIDTERM TWO				
4.4	9	0.7	20.7	Change of Variable
4.5	14	1.0	21.7	Cumulative Distribution Functions
5.1	6	0.3	22.0	Uniform Distributions
5.2	11	1.0	23.0	Densities
5.3	14	1.0	24.0	Independent Normal Variables
5.4	15	1.0	25.0	Operations
REVIEW				
FINAL EXAM				
Total:	331			

The topics for Math 4530 will be almost the same as the ones for
Math 530 have been. The only difference is that 4530 will include
a brief introduction to Chi-Square, t, and F distributions that
530 has not included. A copy of the topics list for 530 is attached.

Mathematics 4544　　　　　**3 credits**　　　　　**Transition Intro to Analysis II**
Au 2012

Catalog Description:
Theory of integrals, sequences and sequences of functions.

Prerequisite:
Math 548.

Topics List:
- Taylor's Theorem.
- Riemann integral, integrable functions, Fundamental Theorem, techniques of integration.
- Exponential and logarithmic functions, improper integrals.
- Functional sequences and series, uniform convergence.
- Power series, analytic functions.

Catalog Description:
Topics in calculus and analysis.

Prerequisites:
Either C- or better in 2153, 2162.xx, 2173, 2182H, or 4182H; or credit for 254, 263.xx, 263.01H, 264H, or equivalent;
-and- C- or better in Math 2568, 5520H, or equivalent.

Exclusions: Entry to this course is restricted to graduate students in Statistics or Biostatistics who have permission from the Departments of Statistics or Biostatistics.

Text:
None

Topics List:
- Limits and continuity of functions.
- Derivative, mean value theorem, optimization.
- Sequences and series, uniform convergence, power series, Taylor's theorem.
- Riemann integral, substitution, bounded variation, limit properties, Rieman-Stieltjes integral.
- Multivariable functions, directional derivatives, chain rule, Taylor's theorem.
- Inverse and implicit function theorems, Lagrange multipliers, multiple integrals, Jacobians, differentiation under the integral sign.

Mathematics 4547   **3 credits**   **Introductory Analysis I**
Au, Sp

Catalog Description:
4547-4548 involves advanced calculus covering: sequences, limits, continuity, differentiation, Riemann integral, sequences and series of functions, Taylor series, and improper integrals.

Prerequisite:
C- or better in 3345; or credit for 345.

Text:
Introduction to Real Analysis, 4rd edition, by Bartle & Sherbert, published by Wiley, ISBN: 9780471433316

Topics List:
- Sequences and their limits.
- Bolzano-Weierstrass Theorem and Cauchy's criterion.
- Convergence and absolute convergence of series. Tests for convergence.
- Power series.
- Continuous functions.

Subject: RE: Math 4547
From: "Tian, Fei-ran" <tian@math.ohio-state.edu>
Date: 10/26/12 3:00 PM
To: "DeVol Bevilacqua, Diana" <dbevilacqua@math.ohio-state.edu>

In Math 4547, we are using the textbook: Introduction to Real Analysis by Bartle & Sherbert. We are covering the following topics for this course.

Chapter 1: finite and infinite sets

Chapter 2: The real number system, infimum and supremum

Chapter 3: Monotone sequences, Bolzano-Weierstrass Theorem, Cauchy criterion,

Chapter 4: Limits of functions,

Chapter 5: Continuous function, uniform continuity.

DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174

Math 4547
2012-2013

Mathematics 4548   **3 credits**   **Introductory Analysis II**
Au, Sp

Catalog Description:
Continuation of Math 4547.

Prerequisite:
C- or better in 4547, or credit for 548.

Topics List:
- Uniform continuity.
- Derivatives.
- Mean Value Theorem, L'H^opital's rule.
- Taylor series.
- Riemann integral.
- Exponential and logarithmic functions.
- Sequences and series of functions.

Mathematics 4551   **3 credits**   **Vector Analysis**

$A\cup,Sp$

Catalog Description:
Vector operations; Jacobian and change of variables; div, grad and curl; Green's Stokes', and divergence theorems; applications.

Prerequisite:
C- or better in 2153, 2162.xx, 2173, or 2182H; or credit for 254.xx, 263.xx, 263.01H, or 264H.

Exclusions:
Not open to students with credit for Math 4182H, 513, 551 or 264 H

Text:
Advanced Calculus, 5th edition, by Kaplan, published by Pearson, ISBN: 9780201799378

Topics List:
- Vector operations, multiple integrals, line and surface integrals.
- Vector operators: div, grad, and curl.
- Jacobians and change of variables.
- Green's Theorem, Stokes theorem.
- Divergence Theorem.
- Applications.

Mathematics 4552　　　　　　**3 credits**　　　　　　**Complex Analysis**
Sp

Catalog Description:
Introduction to analytic functions of a complex variable, integral theorems, power series, residues, conformal mapping.

Prerequisite:
C- or better in 2153, 2162.xx, 2173, 2182H, or 4182H; or credit for 254.xx, 263.xx, 263.01H, or 264H.

Exclusions:
Not open to students with credit for Math 5522H, 552 or 514.

Purpose:
This course provides a comprehensive introduction to complex analysis, emphasizing applications that are useful in science and engineering.

Topics List:
　　　Complex numbers, polar form (Ch. 1)
　　　Analyticity, Cauchy-Riemann equations (Ch. 2)
　　　Elementary functions (Ch. 3)
　　　Cauchy integral theorem and consequences (Ch. 4)

　　Midterm 1

　　Power series (Ch. 5)
　　Residues and poles (Ch. 6)
　　Applications of residues (Ch. 7)
　　Mapping by elementary functions (Ch. 8)
　　Conformal mapping (Ch. 9)

　　Midterm 2

　　Applications of conformal mapping (Ch. 10)
　　Schwarz-Christoffel transformation (Ch. 11)
　　Poisson integral, Dirichlet problem (Ch. 12)

Mathematics 4556   **3 credits**   **Dynamical Systems**
Au

Catalog Description:
Systems of linear, first-order differential equations; existence and uniqueness theorems;
numerical methods; qualitative theory (phase plane analysis, linearization, stability, limit cycles);
and physical applications.

Prerequisite:
C- or better in 2153, 2162.xx, 2173, 2182H, or 4182H; or credit for 254.xx, 263, 263H, or 264H.

Text:
Nonlinear Dynamics and Chaos, Steven H. Strogatz, Perseus, ISBN 9780738204536

Topics List:
1. One-dimensional flows: geometric way of thinking; fixed points and stability; population
    growth and other applications.
2. Bifurcations in one-dimensional flows: saddle-node, transcritical and pitchfork
    bifurcations; imperfect bifurcations.
3. Theory: existence; uniqueness; continuous dependence.
4. Phase planes: phase portraits; vector fields; nullclines; fixed points; stability;
    linearization.
5. Linear systems: classification of linear systems; what does the linear system say about the
    nonlinear system?
6. Limit cycles; introduction; Poincare-Bendixson theorem; conservative systems.
7. Bifurcations of two-dimensional flows; saddle-node, transcritical, and pitchfork
    bifurcations; Hopf bifurcation theorem.
8. XPPAUT: phase planes; bifurcations; applications.
9. Global bifurcations: homoclinic orbits; Poincare map; stability of periodic orbits.
10. Singular perturbations: Relaxation oscillator; averaging.
11. Applications: (e.g., Neurons).
12. One-dimensional maps: Logistic map.
13. Smale horseshoe: symbolic dynamics.
14. Applications.

Mathematics 4557   **3 credits**   **Partial Differential Equations**
Sp

Catalog Description:
First and second-order PDE's; existence and uniqueness, initial and boundary value problems, Fourier series; Green's functions; wave, heat and Laplace equations; nonlinear PDE's; applications.

Prerequisite:
C- or better in 2255, 2415, 4556, or 5520H; or credit for 255, 415.xx, or 521H.

Exclusions:
Not open to students with credit for Math 4512 or 512.

Text:
Partial Differential Equations, an Introduction, 2nd edition, Walter A.Strauss, Wiley.

Topics List:
1. Definition of a PDE, linearity; solution of first-order linear (transport) equation; modeling with PDEs.
2. Well-posed problems, initial- and boundary conditions; secondorder equations; classification into types; the wave equation.
3. Causality and energy; diffusion equation; diffusion on the whole line.
4. Solution of the wave and diffusion equations on a half-line; diffusion and waves with sources.
5. Separation of variables for the wave equation, Dirichlet, Neumann and Robin conditions.
6. Fourier series; sine and cosine series; orthogonality and general Fourier series; completeness and convergence.
7. Midterm. Gibbs phenomenon.
8. Laplace's equation; maximum principle; rectangular coordinates.
9. Poisson's formula; Laplace's equation in circular coordinates.
10. Green's identities; maximum principle; Dirichlet principle; Green's second identity.
11. Green's functions; symmetry; half-space and sphere.
12. Wave equation in two and three dimensions; energy; causality; Huyghens' principle.
13. Rays and characteristics; relativistic geometry; sources; the diffusion equation.
14. The Schrödinger equation; the hydrogen atom.

Mathematics 4568   **3 credits**   **Linear Algebra**
Au, Sp, Su

Catalog Description:
Matrix algebra, vector spaces and linear maps, bases and dimension, eigenvalues and eigenvectors, applications.

Prerequisite:
C- or better in 2153, 2162.xx, 1172, 2182H, or 4182H; or credit for 254, 263.xx, 263.01H or 264H.

Exclusions:
Restricted to graduate students in engineering. No open to students with credit for 2568 (568), 5101 (601), 5520H (520H) or 572.

Text:
Introduction to Linear Algebra, 5th edition, by L.W. Johnson, R.D. Riess, and J.T. Arnold, published by Pearson, ISBN Softcover: 0321628217, Hardcover: 0201658593

Topics List:
Part I
1.1   Introduction to Matrices and Systems of linear equations
1.2   Echelon Form and Gaussian-Jordan Elimination
1.3   Consistent Systems of linear Equations
1.5   Matrix Operations
1.6   Algebraic Properties of Matrix operations
1.7   Linear Independence and Nonsingular Matrices
1.9   Matrix Inverses and Their Properties
         Midterm 1

Cont.

Math 4568
Course Coordinator: E. Overman
2012-2013

Math 4568, cont.
Pg 2

Mathematics 4573　　　　　　**3 credits**　　　　　　**Elementary Number Theory**
Sp

Catalog Description:
Prime numbers, modular arithmetic, Diophantine equations, combinatorial analysis; introduction to concepts of abstract algebra.

Prerequisite:
C- or better in 3345 or 4181H; or credit for 345 or 264H.

Exclusions:
Not open to students with credit for Math 5576H.

Topics List:
- Prime numbers and factorization.
- Congruences and modular arithmetic.
- Diophantine equations.
- Elementary combinatorial analysis.
- Concepts of abstract algebra.

DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174

Math 4573
Course Coordinator: W. Sinnott
2012-2013

Mathematics 4575   **3 credits**   **Combinatorial Mathematics**
Sp

Catalog Description:
Classic puzzles of recreational mathematics; matching theory and graph theory; enumeration techniques; combinatorial analysis.

Prerequisite:
C- or better in 2568 or 5520H; credit for 568, 571, or 520H.

Exclusions:
Not open to students with credit for Math 5529H.

Topics List:
- Counting principles.
- Combinatorial identities.
- Graphs.
- Matchings.
- Latin squares and finite projective planes.
- Block designs.

Mathematics 4578 　　　　**4 credits** 　　　　**Discrete Mathematical Models**
Sp

Catalog Description:
Homogeneous and non-homogeneous difference equations of one or several variables, Markov chains, graph theory, network flows.

Prerequisite:
{C- or better in 2568 or 5520H; and C- or better in 4530, 5530H or Stat 420}; or {credit for 568, 571, or 520H; and credit for 530, 531H, or Stat 420}.

Exclusions: Not open to students with credit for 578.

Topics List:
- Homogenous and non-homogeneous difference equations.
- Application in finance, genetics, economics.
- Matrix methods, nonlinear equations, stability, bifurcation, harvesting.
- Application of Markov chains with absorbing and non-absorbing states, limiting behavior.
- Graph theoretical algorithms, network flows, applications.

Mathematics 4580 **3 credits** **Abstract Algebra I**
Au, Sp

Catalog Description:
4580-4581 includes elementary number theory, group theory, vector spaces and linear transformation, and field theory.

Prerequisite:
{C- or better in 3345, and C- or better in 2568 or 5520H} or {credit for 345; and credit for 568, 571, or 520H.

Exclusions:
Not open to students with credit for 591H.

Purpose:
Math 4580-4581 constitutes a two-semester sequence on abstract algebra, intended to familiarize students with the principal concepts, mode of thinking, and important theorems in this subject area. Considerable emphasis is placed on connections between this material and the traditional topics of high school mathematics - Euclidean geometry, polynomial equations, and trigonometry.

Math 4580 begins with a careful review of topics in elementary number theory. There is a study of number systems along with an introduction to the theory of polynomial equation. Groups are introduced in the context of geometrical symmetry and then applied to the constructability problem for regular polygons.

Text:
Notes on Abstract Algebra, by Ron Solomon (in-house notes)

Cont.

Math 4580
Course Coordinator: R. Solomon
2012-2013

Topics List:
1. Basic properties of the integers: division algorithm and Euclid's lemma
2. Basic properties of the rational numbers: fractions and decimals
3. Fermat's Little Theorem and the Euler --function
4. Review and Midterm 1
5. Basic properties of polynomials: division algorithm and Euclid's lemma
6. Complex numbers and polynomials of small degree
7. The cubic and quartic equations revisited
8. Cyclotomic polynomials
9. Review and Midterm 2
10. Isometries: Rotations, reflections, and translations
11. Congruence in geometry, and the definition of a group
12. Symmetry groups and dihedral groups
13. Constructible numbers
14. The Method of Monsieur Gauss

Mathematics 4581   **3 credits**   **Abstract Algebra II**
Au, Sp

Catalog Description:
4580-4581 includes elementary number theory, group theory, vector spaces and linear transformation, and field theory.

Prerequisite:
C- or better in Math 4580; or credit for 581.

Exclusions:
Not open to students with credit for 592H.

Purpose:
Math 4580-4581 constitutes a two-semester sequence on abstract algebra, intended to familiarize students with the principal concepts, mode of thinking, and important theorems in this subject area. Considerable emphasis is placed on connections between this material and the traditional topics of high school mathematics - Euclidean geometry, polynomial equations, and trigonometry. Math 4581 deepens the theory of groups and of polynomial equations, culminating in Galois' theory of equations and the classification of finite symmetry groups in R3.

Text:
Notes on Abstract Algebra, by Ron Solomon (in-house notes)

Topics List:
1. Permutation groups, orbits, and Lagrange's Theorem
2. The Orbit Counting Formula
3. Imaginaries and Galois fields
4. Gaussian integers and Fermat's two squares theorem
5. Review and Midterm 1
6. Symmetric polynomials and the Fundamental Theorem of Algebra
7. Nonconstructibility and a Lagrange Theorem for fields
8. Galois' Theory of Equations
9. The Galois Correspondence
10. Review and Midterm 2
11. The isometry group of R2
12. Linear algebra in R3
13. The Platonic solids and their symmetries
14. The finite subgroups of SO(3)

Catalog Description:
Fields and introduction to Galois theory.

Prerequisite:
Math 581.

Exclusions:
Not open to students with credit for 592H.

Topics List:
- Vector spaces and linear transformations.
- Systems of equations, determinants.
- Spectral theorem.
- Ordinary, linear and nonlinear differential equations.
- Existence and uniqueness theorems.
- Phase space, stability, and periodic points.

DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174

Math 4584
Course Coordinator: R. Solomon
2012-2013

Mathematics 5520H
Au

5 credits

Honors Linear Algebra and Differential Equations

Catalog Description:

Linear transformations and matrices, spectral theorem, ordinary differential equations, existence and uniqueness theorems, phase space, stability, oscillations.

Prerequisite:

C or better in 4182H or in both 2182H and 3345; or C or better in 264H or in both 263H and 345; or permission of department.

Text:

Linear Algebra: An Introductory Approach, revised 4th edition, by Curtis, published by Springer, ISBN: 0387909923

Introduction to Ordinary Differential Equations, by Coddington, published by Dover, ISBN: 9780486659428

Topics List:

- Vector spaces and linear transformations.
- Systems of equations, determinants.
- Spectral theorem.
- Ordinary, linear and nonlinear differential equations.
- Existence and uniqueness theorems.
- Phase space, stability, and periodic points.

Math 5520H
Course Coordinator: V. Bergelson
2012-2013

Mathematics 5522H   **5 credits**   **Honors Complex Analysis**
Sp

Catalog Description:
Theoretical treatment of complex analysis.

Prerequisite:
C or better in 5520H, credit for 521H, or permission of department.

Topics List:
- Analytic functions.
- Residue calculus.
- Series representations.
- Conformal mappings.
- Laplace transform.
- Applications to number theory, geometry, physics.

Math 5522H
Course Coordinator: V. Bergelson
2012-2013

Mathematics 5529H   **5 credits**   **Honors Combinatorics**
Au, of even numbered years

Catalog Description:
Techniques of combinatorial mathematics; connections with geometry, algebra, analysis, and probability.

Prerequisite:
C or better in 4182H, or in both 2182H and 3345; or credit for 264H, or for both 263H and 345; or permission of department.

Text:
Discrete Mathematics, by Lovasz, Pelican & Vestergombi, published by Springer,
ISBN: 9780387955858

Proofs from the Book, 4th edition, by Aigner, Ziegler & Hofmann, published by Springer,
ISBN: 9783642008559

Topics List:
- Counting principles.
- Generating functions.
- Finite fields and applications.
- Theory of partitions.
- Famous graphs.
- Ramsey theory.
- Permutation groups.

Math 5529H
Course Coordinator: V. Bergelson
2012-2013

Mathematics 5530H   **5 credits**   **Honors Probability**
Sp, of odd numbered years

Catalog Description:
Theoretical treatment of probability, with applications within and outside mathematics.

Prerequisite:
C or better in 5529H, or permission of department.

Topics List:
- Historical origins of probability.
- Diverse ways of sampling, allocation, models.
- Random variables, expectation, moments.
- Important distributions.
- Limit theorems: law of large numbers, central limit theorem.
- Random walks and Markov chains.
- Statistical independence in analysis and number theory.

Math 5530H
Course Coordinator: V. Bergelson
2012-2013

Mathematics 5540H   **5 credits**   **Honors Differential Geometry**
Sp, of even numbered years

Catalog Description:

Geometry of curves and surfaces in 3-dimensional space, curvature, geodesics, Gauss-Bonnet Theorem, Riemannian metrics.

Prerequisite:

C or better in 5520H, or in both 2182H and 2568; or credit for 520H, or in both 263.01H and 568; or permission of department.

Topics List:

- Geometry of curves; Frenet-Serret equations.
- Curvature of surfaces, First Fundamental Form, Gauss's Theorema Egregium.
- Geodesics, exponential map.
- Isometries, conformal mappings; mapmaking.
- Gauss-Bonnet Theorem.
- Riemannian metrics, non-Euclidean geometry.

Mathematics 5576H
Au, of odd numbered years

5 credits

Honors Number Theory

Catalog Description:
Elementary analytic and algebraic number theory, tracing its unifying role in the development of mathematics through history.

Prerequisite:
C or better in 4182H, or in both 2182H and 3345; or credit for 264H, or for both 263H and 345; or permission of department.

Topics List:
- Ancient Egyptian and Mesopotamian mathematics, the Greek tradition.
- Famous irrationalities.
- Continued fractions and applications.
- Prime numbers and their asymptotic properties.
- Quadratic reciprocity.
- p-adic numbers, Ostrowski's Theorem.
- Fermat's last theorem: a glimpse into modern developments.

Mathematics 5590H   **5 credits**   **Honors Abstract Algebra I**
Au

Catalog Description:
5590-5591 includes elementary number theory, group theory, ring theory, abstract linear algebra, field theory, and Galois theory.

Prerequisite:
C or better in 5520H or in 520H, or permission of department.

Text:
Abstract Algebra, 3rd edition, by Dummit & Foote, published by Wiley, ISBN: 9780471433349

Topics List:
- Groups and homomorphisms, cosets and Lagrange's Theorem.
- Group actions and Sylow's Theorems.
- Normal subgroups, factor groups, direct and indirect products.
- Rings, homomorphisms, ideals, and factor rings.
- Principal ideal domains, unique factorization domains.
- Polynomial rings.

Math 5590H
Course Coordinator: V. Bergelson
2012-2013

Mathematics 5591H   **5 credits**   **Honors Abstract Algebra II**
Sp

Catalog Description:
Continuation of Math 5590H.

Prerequisite:
C or better in 5590H or in 591H, or permission of department.

Topics List:
- Modules and vector spaces.
- Modules over a PID, applications to linear algebra.
- Finite extensions of fields, minimal polynomials, degree, algebraic numbers.
- Galois theory and its applications.

Math 5591H
Course Coordinator: V. Bergelson
2012-2013

Mathematics 5630 **3 credits** **Life Contingencies I**
Au

Catalog Description:
This course sequence introduces students to the mathematical theory of contingencies. Includes
material from examinations by the Society of Actuaries and the Casualty Actuarial Society.

Prerequisite:
~~Coreq: 3618 or 618~~.
Prereq: C- or better in 3618 **and** C- or better in 4530, 5530H, or Stat 4201; or credit for 530,
531H, or Stat 420; or permission of department.

Exclusions:
Open only to actuarial science majors.

Text:
Actuarial Mathematics for Life Contingent Risks, by Dickson, Hardy & Waters, published by
Cambridge, ISBN: 9780521118255

Topics List:
- Survival distributions.
- Individual risk models.
- Life tables.
- Topics from life insurance.
- Life annuities.
- Benefit premiums.

Math 5630
Course Coordinator: C. Ban
2012-2013

Mathematics 5631   **3 credits**   **Life Contingencies II**
Sp

Catalog Description:
Continuation of Math 5630. *ov 630*

Prerequisite:
C- or better in Math 5630.

Exclusions:
Open only to actuarial science majors, and to MMS students specializing in Financial Math.

Topics List:
- Benefit reserve.
- Multiple life functions.
- Multiple decrement models.
- Random and deterministic survivorship group.
- Valuation of pension plans.
- Applications.

DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174

Mathematics 5632   **3 credits**   **Financial Economics**
Au, Sp

Catalog Description:
Introduction to the evaluation of options, futures, and other derivatives, interest models and risk
management techniques. Includes material from examinations by the Society of Actuaries and
the Casualty Actuarial Society.

Prerequisite:
C- or better in 3618, or credit for 618, or permission of department.   580
4530 (G)
+ C- or better in Stat 420
or Stat (4201) (C-)

Exclusions:
Restricted to actuarial science majors, math majors, and students with graduate standing.

Text:
Derivatives Markets, by McDonald, published by Addison-Wesley, ISBN: 9780321280305

Topics List:
- Option relationships.
- Binomial option pricing.
- Black-Scholes formula.
- Market making and delta hedging.
- Exotic options.
- Brownian motions and Ito's Lemma.
- Interest rate models.

Mathematics 5633   **3 credits**   **Loss Models I**
Au 2013, and every Au thereafter

Catalog Description:
5633-5634 introduces students to the construction and evaluation of actuarial models, with topics covered by examinations of the Society of Actuaries and the Casualty Actuarial Society.

Prerequisite:
{C- or better in 4530, 5530H, Stat 4201, or credit for 530, 531H, or Stat 420}; and {C- or better in Stat 4202 or credit for Stat 421}.

Exclusions:
Open only to actuarial science majors and to MMS students specializing in Financial Math.

Topics List:
- Measures of risk.
- Characteristics of actuarial models.
- Severity models.
- Frequency models.
- Aggregate loss models.

Mathematics 5634 **3 credits** **Loss Models II**
Sp 2014, and every spring thereafter

Catalog Description:
Continuation of 5633.

Prerequisite:
C- or better in 5633.

Exclusions:
Open only to actuarial science majors and to MMS students specializing in Financial Math.

Topics List:
- Estimation of data.
- Parameter estimation.
- Model selection.
- Simulation.
- Credibility.

DEPARTMENT OF MATHEMATICS
THE OHIO STATE UNIVERSITY
231 WEST EIGHTEENTH AVENUE
COLUMBUS, OHIO 43210-1174