

General Education Course Proposal

Proposed Course: Math 75 Mathematical Analysis I Units 4
Prefix No. Title

Department: Mathematics School: Natural Sciences

GE Category (Indicate one category only):

Foundation: A1___; A2___; A3___; B4 X
 Breadth: B1___; B2___; C1___; C2___; D___; E___
 Integration: B X; C___; D___; International/Multicultural___

Existing Course X; Revised Course ___; New Course ___

Course Included in Current GE Program X

New courses require the Undergraduate Course Proposal form in addition to this form.

Revised courses require the Undergraduate Course Change Request in addition to this form.

Proposed catalog description: Limit course description to 40 words using succinct phrases. Include prerequisites, limitations, lecture/lab hours. Indicate former course number, e.g., (Former Biol 105)

Two units of credit if taken after Math 70; 3 units of credit if taken after Math 71; 2 units of credit if taken after Math 72. Prerequisite: elementary geometry, intermediate algebra, trigonometry, or Math 6. In addition, students must meet the ELM requirement. Inequalities, functions, graphs, limits, continuity, derivatives, antiderivatives, the definite integral, and applications. Using *Mathematica*™ software as an exploratory tool. General Education CORE, Quantitative Reasoning. (CAN MATH 18)

Enrollment limit per section: 30

Expected number of sections per semester – Year 1 6; Year 3 6

Attachments:

1. A statement presenting the ways in which this course meets the Specifications provided in the appropriate section of the General Education Policy as well as in the Policies for Inclusion and Evaluation of General Education Courses.
2. A statement of elements common to all sections of this course, identifying content, objectives, required student activities, grading policy, representative texts, and an approximate schedule for the course. Required student activities include such things as papers, research projects, homework, laboratory and/or studio performance, recitations, participation, attendance, and exams.
3. A typical syllabus for a particular offering of the course.
4. Any special cost factors associated with this course.

Approval for Inclusion in General Education

<p><u>Robert Arnold</u> <u>2/20/98</u> <small>Department Chair Date</small></p>	<p><u>Glammser</u> <u>2/23/98</u> <small>School Curriculum Committee Date</small></p>
<p><u>Glammser</u> <u>2/23/98</u> <small>School Dean Date</small></p>	<p><u>Robert Arnold</u> <u>12/10/98</u> <small>General Education Subcommittee Date</small></p>
<p><u>Brandt Kehoe</u> <u>12/20/98</u> <small>Associate Provost Date</small></p>	

1/14/98

FEB 27 1998

Attachment #2: General Syllabus

Proposed Course: Math 75 - Mathematical Analysis I

Math 75 Mathematical Analysis I

Catalog Description: (4 units) Prerequisite: elementary geometry, intermediate algebra, trigonometry, or Math 6. Inequalities, functions, graphs, limits, continuity, derivatives, anti-derivatives, the definite integral and applications

General Education: No GE credit will be given unless a student earns a "C" grade or higher. Courses in B4 are part of the foundation for the student's university education. A student must complete a B4 course by the time the student has completed thirty (30) semester units. If students fail to complete successfully (C or better) a course in this area, they must continuously register for an appropriate course until they remediate that deficiency.

Instructor: Name

Office: Instructor's office

Office hours: Instructor's office hours (minimum of five hours per week)

Phone/email:

Dept. Office: PB 381

Dept. phone: 278-2992

Textbooks:

Course goals:

In addition to the obvious goal of mastering the concepts listed in the catalog description, it is intended that each student will :

1. Learn to write mathematical arguments clearly and logically, using the mathematical terminology and notation developed in this course.
2. Learn to verbalize mathematical arguments clearly and logically, using the mathematical terminology developed in this course.
3. Learn to use the mathematics in this course to solve problems from fields other than mathematics (for example: learn what the derivative is, and how to use it to solve problems, rather than simply learn how to differentiate a function).
4. Learn to work cooperatively with other students to solve problems in the course. This includes analyzing other students arguments, as well as, constructing his/her own arguments.
5. Learn to depend on himself/herself to decide on the validity of an argument.
6. Learn to experiment and explore using hand calculators or computers to answer their own questions or find possible solutions that arise throughout the course.

Course Topics:

Topic 1: Techniques of Analytic Geometry	1-2 weeks
Topic 1 includes at least all of the following:	
(a) lines	
(b) graphs of polynomial functions	
(c) translation	
Topic 2: Functions and Limits	2-3 weeks
Topic 2 includes at least all of the following:	
(a) limit of function	
(b) continuity	
(c) curve sketching	
(d) asymptotes	
Topic 3: Rates of Change and the Derivative	2-3 weeks
Topic 3 includes at least all of the following:	
(a) tangent lines	
(b) velocity problems	
(c) more curve sketching	
(d) concavity	
(e) extrema	
(f) the Mean Value Theorem	
Topic 4: Applications of the Derivative	2-3 weeks
Topic 4 includes at least all of the following:	
(a) related rates problems	
(b) max/min problems	
Topic 5: The Definite and Indefinite Integral	2-3 weeks
Topic 5 includes at least all of the following:	
(a) antiderivatives	
(b) Riemann Sums	
(c) The definite integral	
(d) The Fundamental Theorem of Calculus	
Topic 6: Applications of the Integral	2-3 weeks
Topic 6 includes at least all of the following:	
(a) area	
(b) volume	
(c) arc length	
(d) surface area	

The order and emphasis in coverage of these topics may vary according to the discretion of the instructor and in light of the specific textbook used.

Assignments:

1. **Homework / classwork:** Students will be successful in the course only to the extent that they do the homework regularly so as to develop the necessary skills introduced in the course. Homework and other exercises will be covered in nearly every class period with students being given the opportunity to ask or answer questions. Class size is kept low allowing each student the chance to interact with the instructor, as well as with other students in the class.
2. **Quizzes / exams:** Quizzes and/or exams will be used to test memory and mastery of the material.
3. **Final exam:** Day, date, time, place.

Attachment #3: Typical Syllabus

Proposed Course: Math 75 - Mathematical Analysis I

Math 75 Mathematical Analysis I

Instructor: Dr. Anonymous
Highly esteemed professor,
Department of Mathematics

Office: PB 381

Office hours: 4:00 – 5:00 AM, daily (Early to bed, early to rise...)

Phone/email:

Dept. Office: PB 381

Dept. phone: 278-2992

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6. Learn to experiment and explore using hand calculators or computers to answer their own questions or find possible solutions that arise throughout the course.

Textbooks: *Calculus 3rd Edition* by James Stewart (Brooks/Cole Publishing)

Table of Contents :

0. Review and Preview

1. Functions and Their Graphs
2. Types of Functions; Shifting and Scaling
3. Graphing Calculators and Computers
4. Principles of Problem Solving
5. A preview of Calculus

1. Limits and Rates of Change

- 1.1 The Tangent and Velocity Problems
- 1.2 The Limit of a Function
- 1.3 Calculating Limits and using the Limit Laws
- 1.4 The Precise Definition of a Limit
- 1.5 Continuity
- 1.6 Tangents, Velocities, and Other Rates of Change

2. Derivatives

- 2.1 Derivatives
- 2.2 Differentiation Formulas
- 2.3 Rates of Change in the Natural and Social Sciences
- 2.4 Derivatives of Trigonometric Functions
- 2.5 The Chain Rule
- 2.6 Implicit Differentiation
- 2.7 Higher Derivatives
- 2.8 Related Rates
- 2.9 Differentials; Linear and Quadratic Approximations
- 2.10 Newton's Method
- 2.11 Problems Plus

3. The Mean Value Theorem and Curve Sketching

- 3.1 Maximum and Minimum Values
- 3.2 The Mean Value Theorem
- 3.3 Monotonic Functions and the First Derivative Test
- 3.4 Concavity and Points of Inflection
- 3.5 Limits at Infinity; Horizontal Asymptotes
- 3.6 Curve Sketching
- 3.7 Graphing with Calculus and Calculators
- 3.8 Applied Maximum and Minimum Problems
- 3.9 Applications to Economics
- 3.10 Antiderivatives
- 3.11 Applications Plus

4. Integrals

- 4.1 Sigma Notation
- 4.2 Area
- 4.3 The Definite Integral
- 4.4 The Fundamental Theorem of Calculus
- 4.5 The Substitution Rule
- 4.6 Problems Plus

5. Applications of Integration

- 5.1 Areas Between Curves
- 5.2 Volume
- 5.3 Volumes by Cylindrical Shells²⁴
- 5.4 Work
- 5.5 Average Value of a Function
- 5.6 Applications Plus

We will attempt to adhere to the following schedule:

FALL 1998

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
AUG	23	24	25	26	27	28	29
		0.1	0.2	LAB 0.3	0.4		
SEPT	30	31	1	2	3	4	5
		0.5	1.1 <small>Last day to drop</small>	LAB 1.2	1.3	Last day to add	
OCT	6	7	8	9	10	11	12
		Labor Day	1.4	LAB 1.5	1.6		
NOV	13	14	15	16	17	18	19
		Exam 1	2.1	LAB	2.2		
DEC	20	21	22	23	24	25	26
		2.3	2.4	LAB	2.5		
JAN	27	28	29	30	1	2	3
		2.6	2.7	LAB	2.8		
FEB	4	5	6	7	8	9	10
		2.9	2.10	LAB 2.11	2.11		
MARCH	11	12	13	14	15	16	17
		3.1	3.2	LAB 3.3	3.4		
APRIL	18	19	20	21	22	23	24
		3.5	3.6	LAB 3.7	3.8		
MAY	25	26	27	28	29	30	31
		3.9	3.10	LAB 3.11	4.1		
JUNE	1	2	3	4	5	6	7
		Exam 2	4.2	LAB	4.3	Last day to drop *	
JULY	8	9	10	11	12	13	14
		4.4	4.5	LAB 4.6	5.1		
AUG	15	16	17	18	19	20	21
		5.2	5.3	LAB	5.4		
SEPT	22	23	24	25	26	27	28
		5.5	5.6	Thanksgiving		Recess	
OCT	29	30	1	2	3	4	5
		5.6	5.6	LAB Exam 3	Review		
NOV	6	7	8	9	10	11	12
		Review	Review	LAB Review	Faculty consultation	Faculty consultation	
DEC	13	14	15	16	17	18	19
				Final 115-315			

Grade: Your final grade will be determined by your final overall average of scores received in four areas: classroom participation, exams, group projects and extra credit. The following chart will be used:

<u>Average</u>	<u>Grade</u>
90-100	A
80-90	B
70-80	C
60-70	D
0-60	F

Classroom Participation – 100 points. This score will be determined subjectively by the instructor based on the following criteria:

1. Attendance (This includes being on time)
2. Preparedness for class – Homework, etc.
3. Attitude
4. Participation in classroom discussions

Exams - 500 points. There will be three exams and a final with point values:

Exam 1	100 points
Exam2	100 points
Exam3	100 points
Final	200 points

****Note:** All exams are comprehensive. (including the final)

Extra credit – up to 100 points. Assignments will be given in class. We will discuss them later. Extra credit assignments are completely voluntary – not doing them will not negatively effect your grade, but doing them can raise it. *All extra credit assignments must be done in a study group and only one copy turned in per study group.*

Group projects – 100 points. There will be two group projects assigned worth 50 points each with the same rules as extra credit

Homework: Homework will be given which is due at the beginning of the class period following the assignment. Homework will not be collected, but you will be expected to respond to questions about it or, on some occasions, you may be asked to write your solution on the board for classroom discussion.

Note: If you have special needs as addressed by the Americans with Disabilities Act (ADA) and need course materials in alternative formats, notify your course instructor immediately. Reasonable efforts will be made to accommodate your special needs.