Syllabus for
MAT 113—Mathematical Analysis I
3 Credit hours
Spring 2000

I. COURSE DESCRIPTION

A treatment that develops the concepts of number systems, absolute value, inequality, domain, range, local extremes, zeros, relations, and functions. Functions studied include those that are linear, polynomial, radical, absolute value, exponential, and logarithmic. This is the first course in a two-semester sequence, preparing students for calculus and is a prerequisite for MAT-114, Mathematical Analysis II. The prerequisites for this course are two years of high school algebra and one year of high school geometry, or permission of the Computer Science/Math Department.. This course is not counted toward a major or minor in mathematics.

The graphics calculator will be used to aid in the algebraic solutions and graphs of functions and their applications.

II. COURSE GOALS

This course is the first of a two course series in mathematical analysis that provide the prerequisites for the study of calculus. This course, in concert with Mathematical Analysis II (MAT 114), provides students in pre-medicine, computer science, and pre-engineering (as well as other scientific disciplines) the background required in their science or mathematical courses.

III. COURSE OBJECTIVES

A. Terminal Objectives

See Section B below

B. Objectives for Students in Teacher Preparation Programs

The Teacher Preparation Program meets the competency-based requirements established by the Oklahoma Commission on Teacher Preparation. This course meets the following competencies: Subject Competencies (SC).

This course is designed to help students meet subject competencies:

SC 8: Identify number sets and apply their basic operations.

SC 8: Define function and relation; domain and range.

SC 8: Determine domain and range of a given function.

SC 8: Determine symmetries of a graph for: x-axis, y-axis, origin, x=y line.

SC 8: Identify functions as increasing, decreasing, odd, even, periodic, etc.

SC 8,9: Graph given functions and their inverses.

SC 8: Construct sum, difference, quotient, product functions from other functions.

SC 5,6: Find roots of functions (polynomials) through various methods, such as graphing, factoring, synthetic division, etc.

SC 7: Define composite functions and apply this definition.

SC 7: Define and use exponential and logarithmic functions.

IV. TEXTBOOKS

A. Required Textbook

Demana, Waits, Clemens and Foley. Precalculus: Functions and Graphs. Third Edition. New York: Addison-Wesley, 1997.

B. Required Materials

A graphing calculator is required.

V. POLICIES AND PROCEDURES

A. University Policies and Procedures

1. Attendance at each class or laboratory is mandatory at Oral Roberts University.
2. Double cuts will be assessed for absences immediately preceding or following holidays.
3. Excessive absences can reduce a student's grade or deny credit for the course.
4. Students taking a late exam because of an unauthorized absence will be charged a late exam fee.
5. Students and faculty at Oral Roberts University adhere to all laws addressing the ethical use of others' materials, whether it is in the form of print, video, multimedia, or computer software.

B. Course Policies and Procedures

1. Evaluation Procedures:
   a. One-period examinations (up to 4 in number) will count 100 to 120 points and the cumulative final examination 150 to 200 points.
   b. Quizzes (if given) and homework are worth up to a total of 340 points.
   c. Semester Test will be comprehensive and count from 150 to 200 points.
   d. The final grade will be determined by the percentage of total points accumulated: 80-100%, A; 70-79%, B; 60-69%, C; 50-59%, D; Below 50%, F.

2. Portfolio Requirements

   For Professional Education Program Students Only—Portfolio to include semester test.

3. Other Policies and Procedures
   a. Homework. Because mathematics builds upon previously developed concepts,your progress in the learning process depends upon proper pacing. A continuous learning effort is required and cannot be replaced by a "cram session" the night before an examination. The best way to ensure maximum learning is for each student to give immediate attention to each assignment presented. Specific homework assignments are given in Part VI of this syllabus.

   b. Credit by Examination. All Oral Roberts University students are expected to take one

college-level mathematics course. If the material in this course along with the material in Math Analysis 2 (MAT-114) was studied in high school, the student is expected to take Calculus I (MAT 201). Consequently, credit by examination is not possible in this course.

VI. COURSE CALENDAR

Lesson	Section	Topic	Homework Assignment	#
1		Introduction	Read Section 7 of Prerequisite Chapter, pp. 43-47	
	Prerequisite Chapter			
2	7	Linear Equations and Inequalities	pp. 48-49: 3,5,7,23,27,31,33,41,47,61	1
3	8	Cartesian Coordinate System	pp. 54-55: 7,9,13,15,17,35,39,45,47,49	2
	Chapter 1: Functions and Graphs			
4	1.1	Problems and Their Representations	pp. 64-67: 1,5,8,11,15,22,25,27,28,29, 31,32,33,36,39	3
5,6	1.2	Functions	pp. 75-79: 1,3a,4d,6,9,11e,12e,13,19-26	4
7	1.3	Linear Functions and Their Graphs	pp. 91-94: 2,9,11,14,20,25,28,34,37,38, 44,61,69,72,76	5
8,9	1.5	Using Graphs To Study Characteristics of Functions	pp. 115-119: 2,3,5,6,12,13,16,20,33,34 40,43,51,53	6
10	1.6	Applying Mathematics	pp. 126-129: 4,6,9,12,17,21,27,33,41	7
11		REVIEW		
12		Test Over Chapter 1		
	Chapter 2: Solving Equations and More On Functions			
13	2.1	Solving Equations Graphically	pp. 142-144: 2,12,22,33,43,44,57	8
14	2.2	Solving Equations Algebraically	pp. 155-158: 1,7,11,15,17,26,29, 37,49,55,77	9
15,16	2.3	Solving Absolute Value, Radical Equations and Inequalities	pp. 167-171: 3,6,11,14,19,25,37, 54,61,69,75,78	10
17	2.4	Operations On Functions, and Composition of Functions	pp. 179-181: 4,9,13,15,17,21,22, 25,36,41	11
18	2.5	Relations and Parametric	pp. 187-188: 3,14,19,22,27,30,	12

		Equations	36,37	
19,20	2.6	Describing Graphs Using Transformations	pp. 197-200: 3,10,11,14,17,21,25, 25,30,33,36,39,47,53,57,65,75,77	13
21	2.7	Inverse Relations and Inverse Functions	pp. 204-207: 3,6,9,19,25,29,32,37, 41,45,48,55	14
22		REVIEW		
23		Test Over Chapter 2		
		Chapter 3: Polynomial Functions		
24	3.1	Quadratic Functions	pp. 220-224: 1-6,7,10,13,18,24,27, 29,30,37,41,59,69	15
25,26	3.2	Polynomial Functions of Higher Degree	pp. 223-237: 1,5,7,9,18,26,33,37, 40,44,49,52,53,58,67,68	16
27	3.3	Polynomial Division and The Factor Theorem	pp. 246-249: 3,8,9,15,20,23,32,35, 39,45,49	17
28,29	3.4	Real Zeros of Polynomial Functions	pp. 258-262: 5,7,9,11,15,17,21,23, 25,33,35,37,39,40,47,49	18
30	3.5	Complex Numbers	pp. 268-269: 5,7,11,15,21,23,25, 27,29,31,37,41,45,47,53,57	19
31	3.6	Fundamental Theorem of Algebra	pp. 276-279: 5,7,9,15,21,23,31, 33,35,37,41,49	20
32		REVIEW		
33		Test Over Chapter 3		
		Chapter 4: Exponential and Logarithmic Functions		
34,35	4.1	Exponential Functions; Comparison's With The The Power Function	pp. 294-297: 5,7,9,13,15,16,19,21, 27,31,37,41,45,49,53,57,58	21
36	4.2	Logarithmic Functions: Inverses of Exponential Functions	pp. 306-309: 1,3,5,7,9,11,13,15,19, 21,23,25,31,39,47,49	22
37,38	4.3	Properties of Logarithmic Functions; Equation Solving	pp. 316-318: 1,5,7,9,11,13,15,19,27, 29,33,35,37,39,41,43,45,47,49,51,55, 59,61,65,67	23
39,40	4.4	More Equation Solving and Applications	pp. 326-329: 1,3,5,7,9,17,19,21,27, 29,41,47,49	24

41,42	4.5	Interest and Annuities	pp. 340-342: 1,3,5,7,9,11,13,15,17 31,37,39,41,43,45	25
43		REVIEW		
44		Test Over Chapter 4		
45		REVIEW for Final Examination		

James McGinnis
Name of Instructor

MISSION

The lifestyle at ORU is rooted in the word "Wholeness." ORU seeks to educate the whole person, with balanced emphasis placed on the development of the mind, spirit, and body.

GENERAL OUTCOMES

1. Spiritual Development
2. Physical Development
3. Communication
4. Analysis
5. Problem Solving
6. Valuing in Decision-making
7. Social Interaction
8. Global Perspectives
9. Effective Citizenship
10. Aesthetic Responsiveness

MAT 113
Course #

MAJOR OUTCOMES

Creative & Analytical Thinking/ Communicating:
Demonstrates ability to thin abstractly, discern patterns, recognize relationships, and order ideas into a sequence of logical deductions. Effectively communicates his analyses to others in both symbolism and grammatically correct English.

Problem Solving Skills:
Demonstrates ability to read and analyze problems, construct and implement strategies for resolving problems, and interpreting and verifying the resulting solutions.

Aesthetic Responsiveness:
Appreciates the origin of mathematical ideas, relationships between ideas and processes for refining solutions, models and methodologies.

Social Interaction:
Effectively learns teamwork whole working with a group on open ended multiple solution problems.

Mathematical Analysis I
Title of Course

COURSE OUTCOMES

Provide pre-engineering, pre-medicine, computer science, and mathematics students with the mathematics tools required for their major course work. To demonstrate mastery the student will:

A. define function and relation; determine the domain and range of a given function.
B. identify functions as increasing, decreasing, odd, even, periodic, etc.
C. graph and analyze given functions (linear, polynomial, exponential, logarithmic, etc.) and their inverses with the aid of a graphing calculator.
D. construct sum, difference, quotient, and product functions from other functions.
E. find the roots of functions using graphing, factoring, synthetic division, sign charts, etc.
F. create, graph, and analyze composite functions.

MATH/CSC
Name of Department

ASSESSMENT OF COURSE GOALS

STIMULI:
Examinations
Problem solving
Group Interaction

CRITERIA:
1. One-period examinations (up to 4 in number) will count 100 to 120 points and the cumulative final examination 150 to 200 points.
2. Quizzes (if given) and homework are worth up to a total of 150 points.
3. The final grade will be determined by the percentage of total points accumulated: 90-100%, A; 80-89%, B; 70-79%, C; 55-69%, D; Below 55%, F.