Syllabus for
MAT 202--Calculus II
4 Credit hours
Fall 2006

I. COURSE DESCRIPTION

An extension of the techniques used in MAT 201, with an emphasis on standard methods of integration and infinite sequences and series.
Prerequisite: MAT 201.
Academic technology fee: $45.

II. COURSE GOALS

The course is designed to introduce the student to the integral calculus of functions of a single variable. This course and its predecessor on differential calculus, along with one following calculus course on functions of several variables, provide a thorough study of the foundations of calculus. Occasionally, the students are encouraged independently to explore the use of calculator and computer skills, so basic in the modern world of technology, in order to solve some of the homework problems.

III. STUDENT LEARNING OUTCOMES FOR THIS COURSE

A. Unit Objectives

1. Unit 1: Integrals
   As a result of successfully completing Unit 1, the student will be able to do the following:
   a. Write sums and find sums using sigma notation.
   b. Find the area under the curve by using the definition
   c. Find a definite integral and apply properties of the definite integral.
   d. Use the Fundamental Theorem of Calculus to evaluate definite integrals.
   e. Use the substitution rule to evaluate integrals.
   f. Interpret the natural logarithm as an integral function.

2. Unit 2: Applications of Integration
   As a result of successfully completing Unit 2, the student will be able to do the following:
   a. Calculate the area between curves.
   b. Calculate the volume of a solid using the disk and washer methods.
   c. Calculate the volume of a solid using the shell method.
   d. Calculate the work required to perform a task.
   e. Find the average value of a function.

3. Unit 3: Techniques of Integration
   As a result of successfully completing Unit 3, the student will be able to do the following:
   a. Use integration by parts to evaluate an integral.
   b. Evaluate trigonometric integrals.
   c. Evaluate integrals using trigonometric substitutions.
   d. Use partial fractions to evaluate an integral.
   e. Evaluate integrals using rationalizing substitutions.

f. Use a combination of a table of integrals and strategies to evaluate an integral.
g. Use a computer algebra system to evaluate an integral.
h. Use numerical methods to approximate an integral.
i. Evalute an improper integral.

4. Unit 4: Further Applications of the Integral

As a result of successfully completing Unit 4, the student will be able to do the following:

a. Define a differential equation and solve a separable differential equation.
b. Solve a first-order linear differential equation.
c. Determine the arc length of a curve..
d. Calculate the area of a surface of revolution.
e. Calculate the moment and center of mass of a point mass system.
f. Calculate hydrostatic pressure and force.
g. Apply integration principles to economics and biology.

5. Unit 5: Infinite Sequences and Series

As result of successfully completing Unit 5, the student will be able to do the following:

a. Define and find the limit of a sequence.
b. Define and find the sum of a series.
c. Apply comparison tests to determine convergence of a series.
d. Apply various other tests to determine the convergence of a series.
e. Define a power series and determine the convergence of a power series.
f. Represent a function as a power series.
g. Find a Taylor and Maclaurin series and apply Taylor's inequality to determine the error in approximation.
h. Define and apply the binomial series.
i. Apply the definition of a Taylor polynomial.

6. Unit 6: Project.

The student will submit at least one project during the semester. Students will work on the assigned project in small groups of size at most 4, but each student must write his or her own final project report. These project reports must be written like a term paper and handed in at the appointed time (see handout from instructor for specific details).

B. Objectives for Students in Teacher Preparation Programs

The course goals for the Teacher Preparation Program now meet the "competency-based" requirements established by the Oklahoma Commission on Teacher Preparation. This course meets Subject Competencies 5,6,7,8, and 9.

SC5: Has a broad and deep knowledge of the concepts, principles, techniques, and reasoning methods of mathematics that is used to set curricular goals and shape teaching.

SC6: Understands significant connections among mathematical ideas and the applications of these ideas to problem solving in mathematics, in other disciplines, and in the world outside of school.

SC7: Has experiences with practical applications of mathematical ideas and is able to

incorporate these in curricular and instructional decisions.

SC8: Is proficient in, at least, the mathematics content needed to teach the mathematics skills described in Oklahoma's core curriculum, from multiple perspectives. This includes, but is not limited to, a concrete and abstract understanding of number systems and number theory, geometry and measurement, statistics and probability, functions, algebra, discrete mathematics, and calculus necessary to effectively teach the mathematics skills addressed in the sixth through twelfth grade in the Oklahoma core curriculum. (The depth and breadth of knowledge should be much greater than for the Intermediate Mathematics certification.)

SC9: Is proficient in the use of a variety of instructional strategies to include, but is not limited to, cooperative learning, use of concrete materials, use of technology (i.e., calculators and computers), and writing strategies to stimulate and facilitate student learning.

IV. TEXTBOOKS AND OTHER LEARNING RESOURCES

Required Materials
Textbooks
Stewart, James. Calculus: Early Vectors (preliminary version). Pacific Grove: Brooks/Cole, 1999.

V. POLICIES AND PROCEDURES

A. University Policies and Procedures

1. Attendance at each class or laboratory is mandatory at Oral Roberts University. Excessive absences can reduce a student's grade or deny credit for the course.
2. Students taking a late exam because of an unauthorized absence are charged a late exam fee.
3. Students and faculty at Oral Roberts University must adhere to all laws addressing the ethical use of others' materials, whether it is in the form of print, video, multimedia, or computer software. By submitting an assignment in any form, the student gives permission for the assignment to be checked for plagiarism, either by submitting the work for electronic verification or by other means.
4. Final exams cannot be given before their scheduled times. Students need to check the final exam schedule before planning return flights or other events at the end of the semester.
5. Students are to be in compliance with University, school, and departmental policies regarding ePortfolio requirements. Students should consult the ePortfolio handbooks for requirements regarding general education and the students' majors.
    a. The penalty for not submitting electronically or for incorrectly submitting an ePortfolio artifact is a zero for that assignment.
    b. By submitting an assignment, the student gives permission for the assignment to be assessed electronically.

B. Department Policies and Procedures

1. Each student who uses the computer is given access to the appropriate computer resources. These limited resources and privileges are given to allow students to perform course assignments. Abuse of these privileges will result in their curtailment. Students should note that the contents of Computer directories are subject to review by instructors and the computer Administrative staff.

2. A fee of $15.00 will be assessed for all late exams. This policy applies to all exams taken without notifying the professor prior to the regularly scheduled exam time, and to all exams taken late without an administrative excuse.

C. Course Policies and Procedures

1. Evaluation Procedures: The standard scale will be used: A (90%-100%), B (80%-89%), C (70%-79%), D (60%-69%), F (0%-59%).
The composite score is determined by the following distribution of percentages:

Four in-class exams	48%
Daily exercises and problems	10%
Maple labs/Quizzes	10%
Written Projects	12%
Final Exam	20%

The ePortfolio artifact is a reflection paper on the Taylor Series Lab that counts as 10% of the Maple Labs score and is therefore 1% of your course grade.
This course participates in the CSC/Math Department Participation Development Points Program.

2. ePortfolio Requirements
   a. An ePortfolio artifact is required for this course. For specific requirements check the departments' ePortfolio handbook at http://www.oru.edu/eportfolio/CSCePHandbook/.
   b. Artifacts not submitted electronically or incorrectly submitted receive a zero for that assignment.
3. Other Policies and/or Procedures
   a. Most of your previous mathematics class time has probably been spent listening to an instructor lecture to you about the material while you take notes. This is a very passive approach, one which I would like to change in this course. Rather than lecture you, I'd prefer to discuss the material with you. You'll be surprised how much clearer things become once you say them out loud. In order for this to work, you must prepare for each class by reading the book prior to class. Class time will largely be spent reviewing the readings and going over problems. Remember, **CALCULUS IS NOT A SPECTATOR SPORT!!!**
   b. There are three types of activities—reading, exercises, and problems. A daily assignment schedule is included in this syllabus. Each section of the text is to be read prior to the class discussion of that section. An asterisk notes "Write-Up" problem(s) for each section. Students should refer to the instructor handout for the correct procedure on "Write-Up" problems.
   c. Reading mathematics is very different from reading a novel. Every word and equation is important, and you should consider each one carefully before going on. Keep a pencil and paper handy as you read so that you can fill in details that may not be written down explicitly. There are numerous questions called "Test Your Understanding" designed to make sure that you grasp the important concepts. You should work on these as you read. There's room for you to work on them in the book; answers, hopefully correct, are at the end of each section. If you can't do them, try re-reading the section. If that doesn't work, be sure to ask about it in class the next day. Don't be afraid to ask; surely, there are others with the same question.
   d. Exercises are generally routine and mechanical, much like the homework you are accustomed to having in mathematics courses. If you get stuck, you may find a related example in the text that will get you started.

e. Growth problems require more thought, and you may find them frustrating at the beginning. We'll talk about some problem-solving strategies, but the best way to learn to solve problems is to persevere. You'll eventually learn what questions to ask yourself, how to try simple cases, and how to generalize. Be patient—the effort is worth it. Problem solving is what mathematics is all about.

f. There will be four exams as scheduled (see the daily assignment schedule) as well as a final exam. The majority of the exam questions will be like the homework problems, possibly including some variations of those that were assigned for homework. From time to time throughout the semester, there may be a quiz on the material covered recently in class. These quizzes may or may not be announced in advance.

g. You are encouraged to ask for help whenever you don't understand something or are stuck with a problem. I will try to be available as much as possible. If my office hours are inconvenient, you may call for help or an appointment.

VI. COURSE CALENDAR

LESSON	SECTION	EXERCISES	Lab Number
1	6.1	2,4,5,7,11,12,16,22,25,32,35,38*,41,44,51	
2	6.2	1,2,5,9,16,18,24*,25	
3	6.3	1,4,8,11,16,25,27,32,35,38,43,46,49,58, 63,68,71*	
4	6.4	1,4,6,11,12,18,27,32,47,52,61,72,75,78,80, 82*,88,93,101	**Lab 1**
5	6.5	1-45 every other odd (Choose 6) , 49-74 every other odd (Choose 6), 77, 82*,	
6	6.6	1-5 all	
7	7.1	1,3,6,14,18,21,25,28,35,39,43,48,52,55	
8	7.2	1,6,9,13,20,29,33,36,42,46*,49,57,74	**Lab 2**
9	7.3	1-29 every other odd, 32,33-45 every other odd	
10	7.4	1-25 every other odd	
11	7.5	1-19 every other odd	
12		Review	**Lab 3**
13		**Exam 1 over Chapters 6 and 7**	
14	8.1	1-29 every other odd,32,36,38,41,45,49,52,59	
15	8.2	1-43 every other odd,45,50,52,54,58,61	
16	8.3	1-29 every other odd,35,36*	**Lab 5**
17	8.4	1-41 every other odd,58,63,65,70*	
18	8.5	1-33 every other odd	
19	8.6	1-25 every other odd, 35,58,61,70	
20	8.7	1,4,7,14,21,22	**Lab 6**
21	8.8	1-19 every other odd,22,26,30,32,37	
22	8.9	1-41 every other odd,44,49,51,55-61 odd, 67,71	
23		Review	
24		**Exam 2 over Chapter 8**	
25	9.1	1-15 odd,18,23,29,33,36,40,43	
26	9.2	1-19 odd,23,24,28,29,33	
27	9.3	1-15 odd,22,25,27	**Lab 7**
28	9.4	1-25 odd,27,31,33	

29	9.5	1,3,5,9,13,17,19,21,23,25,28	
30	9.6, 9.7	Sec. 9.6: 1-21 odd (Choose 6) Sec. 9.7: 1-19 odd (Choose 6)	
31		Review	**Lab 8**
32		**Exam 3 over Chapter 9**	
33	10.1	1-33 every other odd,38,44,	
34	10.2	1,4,5,12,16,19,22,24,33,41,43,47	
35	10.3	1-35 every other odd	**Lab 9**
36	10.4	1,4,7,12,17,20,23,24,31	
37	10.5	1,3,5,7,10,13,16,23,25	
38	10.6	1-33 every other odd	
39	10.7	1,4,5,9,13,18,30,31,34,44,45,48	**Lab 10**
40	10.8	1-13 every other odd	
41	10.9	1-13 every other odd, 23,28	
42		Review	
43		**Exam 4 over Chapter 10**	
44		Review for Final Exam	

Course Inventory for ORU's Student Learning Outcomes

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This course contributes to the ORU student learning outcomes as indicated below:
Significant Contribution – Addresses the outcome directly and includes targeted assessment.
Moderate Contribution – Addresses the outcome directly or indirectly and includes some assessment.
Minimal Contribution – Addresses the outcome indirectly and includes little or no assessment.
No Contribution – Does not address the outcome.

The Student Learning Glossary at http://ir.oru.edu/doc/glossary.pdf defines each outcome and each of the proficiencies/capacities.

OUTCOMES & Proficiencies/Capacities	Significant Contribution	Moderate Contribution	Minimal Contribution	No Contribution
1 **Outcome #1 – Spiritually Alive** Proficiencies/Capacities				
1A Biblical knowledge				X
1B Sensitivity to the Holy Spirit			X	
1C Evangelistic capability				X
1D Ethical behavior			X	
2 **Outcome #2 – Intellectually Alert** Proficiencies/Capacities				
2A Critical thinking	X			
2B Information literacy			X	
2C Global & historical perspectives			X	
2D Aesthetic appreciation				X
2E Intellectual creativity	X			
3 **Outcome #3 – Physically Disciplined** Proficiencies/Capacities				
3A Healthy lifestyle				X
3B Physically disciplined lifestyle				X
4 **Outcome #4 – Socially Adept** Proficiencies/Capacities				
4A Communication skills		X		
4B Interpersonal skills		X		
4C Appreciation of cultural & linguistic differences				X
4D Responsible citizenship			X	
4E Leadership capacity			X	