Syllabus for
MAT 201—Calculus I
4 Credit Hours
Spring 2014

I. COURSE DESCRIPTION

A thorough course in the differential calculus (with the introduction to anti-differentiation), dealing with the following functions and their applications: algebraic, vector, and transcendental and their inverses.
Prerequisite: MAT 106 or an appropriate score on the ORU calculus placement exam.

This course is a study of the introductory concepts of single variable calculus and is designed for students in engineering, economics, life science, mathematics, and physical science seeking basic skills and knowledge in those disciplines. Following a brief review of algebra and trigonometry, an intuitive study of the limit concept is made. Then the derivative is introduced followed by a study of techniques of differentiation. The properties of the transcendental exponential and logarithmic functions as well as the application of the derivative to these functions are then studied. A study of vectors and parametric equations is then made followed by applications of the derivative. There is a computer laboratory component to this course in which the student explores calculus through the use of the computer.

II. COURSE GOALS

The purpose of this course is to enable the student to be able to do the following:

A. Understand the differential calculus of functions of a single variable so that they are prepared for subsequent technical courses and possess experience in solving realistic, multi-step problems.

B. Understand problem solving skills, especially flexibility, including the use of numerical, graphical, and symbolic representations of a problem or its solution.

C. Use Wolfram|Alpha® to explore the concepts of calculus and to find solutions to the more difficult problems.

III. STUDENT LEARNING OUTCOMES FOR THIS COURSE

A. Unit Objectives

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

Unit 1: Functions and Limits

1. Represent vector quantities graphically.
2. Explain slope as a rate of change.
3. Use the tangent line to a distance curve to compute velocity.
4. Calculate the limits of functions algebraically, numerically, and graphically.
5. Explain the derivative as a limit of the slope function.

Unit 2: The Derivative of a Function

1. Find the derivative of inverse functions.
2. Use the power, product, quotient, and chain rules for differentiation.
3. Find the equation of the line tangent to a graph.

Unit 3: Applications of the Derivative

1. Find maximums and minimums of functions.
2. Find asymptotes of functions.
3. Graph functions using calculus.

Unit 4: Projects

The student is expected to submit one project during the semester. The instructor has some related project topics. Most of the projects require use of a calculator or a computer algebra system. Students may work on an assigned project in small groups of no more than four (individual work is permitted if preferred). These project reports must be written up like a term paper and handed in at the appointed time.

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) 5, 6, 7, 8, and 9.

SC 5: 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.

SC 6: 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.

SC 7: Has experiences with practical applications of mathematical ideas and is able to incorporate these in curricular and instructional decisions.

SC 8: 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.)

SC 9: 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

A. Required Materials

1. Textbooks

   Briggs, William, and Lyle Cochran. *Calculus: Early Transcendentals*. Boston: Pearson Education, 2011. ISBN-13: 9780321725271
   (includes textbook, MyMathLab access code, and student solutions manual)

2. Other

   MyMathLab packet
   A MyMathLab packet (access code) should have been packaged with the textbook. The student also has the option to purchase a separate MyMathLab packet in order to be able to complete the homework assignments. The MyMathLab packet includes an online version of the textbook.
   ISBN-13: 9780321199911

B. Optional Materials

1. Textbooks

   None

2. Other

   None

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. A fee of $15.00 is assessed for all late exams. The university's late exam 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.
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, electronic, video, multimedia, or computer software. Plagiarism and other forms of cheating involve both lying and stealing and are violations of ORU's Honor Code: "I will not cheat or plagiarize; I will do my own academic work and will not inappropriately collaborate with other students on assignments." Plagiarism is usually defined as copying someone else's ideas, words, or sentence structure and submitting them as one's own. Other forms of academic dishonesty include (but are not limited to) the following:
   a. Submitting another's work as one's own or colluding with someone else and submitting that work as though it were his or hers;
   b. Failing to meet group assignment or project requirements while claiming to have done so;
   c. Failing to cite sources used in a paper;
   d. Creating results for experiments, observations, interviews, or projects that were not done;
   e. Receiving or giving unauthorized help on assignments.

   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. Penalties for any of the above infractions may result in disciplinary action including failing the assignment or failing the course or expulsion from the University, as determined by department and University guidelines.

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 Whole Person Assessment (WPA) requirements. Students should consult the WPA handbooks for requirements regarding general education and the students' majors.
   a. The penalty for not submitting electronically or for incorrectly submitting an 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

Any student whose unexcused absences total 33% or more of the total number of class sessions receives an F for the course grade.

C. Course Policies and Procedures

1. Evaluation Procedures

Three fifty-minute exams at 100 points	300 points
Homework, computer labs, and quizzes	200 points
One written project	100 points
One final exam	200 points

Grading scale:
A=90%
B=80%
C=70%
D=60%
F=59% and below

2. Whole Person Assessment Requirements
   a. An WPA artifact is required for this course or MAT 106. For specific requirements, check the WPA handbook at http://wpahandbook.oru.edu.
   b. The WPA artifact is a reflection paper on the student project. The artifact is 10% of the project score and is therefore 1% of your course grade.
3. Other Policies and/or Procedures
   a. The computer labs are designed so students can explore the concepts that are covered in the text. The first lab is designed to introduce the student to Wolfram|Alpha®. Afterwards the first few minutes at the beginning of the lab period are used to introduce the lab exercise. Then the student spends the rest of the time investigating calculus with W|A by going through the lab assignment.
   b. There are three exams as scheduled (see the daily assignment schedule) as well as a final exam. Each exam is like the exercises; the majority are like the problems that are assigned for homework, possibly including some variations of those. 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.

c. All daily assignments are facilitated through coursecompass.com. Students are required to purchase access to this program in order to complete the homework assignments for each section. If a student feels a need for additional practice after completing the MyMathLab homework assignment, then he or she can use additional problems from the text chapters and student study guide.

d. This course is part of the Participation Development Points Program that applies to some Computer Science and Mathematics courses.

VI. COURSE CALENDAR

All homework assignments should be completed through MyMathLab and the coursecompass.com. See details for assignments in MyMathLab.

Lesson	Section	Topic
1	1.1-1.4	Review of Functions/ Read Chapter 1
2	11.1	Vectors in the Plane
3	2.1	The Idea of Limits
4	2.2	Definitions of Limits
5	2.3	Techniques for Computing Limits
6	2.4	Infinite Limits
7	2.5	Limits at Infinity
8	2.6	Continuity
9	2.7	Precise Definition of Limit
10	Review	Review
11	Exam 1	Chapters 1 and 2. 11.1
12	3.1	Introducing the Derivative
13	3.2	Rules of Differentiation
14	3.3	Product and Quotient Rules
15	3.4	Derivatives of Trig Functions
16	3.5	Derivatives as Rates of Change

17-18	3.6	The Chain Rule
19	3.7	Implicit Differentiation
20	3.8	Derivatives of Logs and Exponentials
21	3.9	Derivatives of Inverse Trig Functions
22-23	3.10	Related Rates
24	Review	Review of Chapter 3
25	Exam II	Chapter 3
26	4.1	Maxima and Minima
27	4.2	What Derivatives Tell Us
28	4.3	Graphing Functions
29-30	4.4	Optimization Problems
31	4.5	Linear Approximation
32	4.6	Mean Value Theorem
33	4.7	L'Hopitals's Rule
34	4.8	Antiderivatives
35	Review	Review of Chapter 4
36	Exam III	Chapter 4
37		Project Presentations
38		Project Presentations
39		Project Presentations
40	Review	Review for Final Exam

Course Inventory for ORU's Student Learning Outcomes
MAT 201—Calculus I
Spring 2014

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				
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	