Syllabus for
MAT 202—Calculus II
4 Credit Hours
Summer 2015

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.

II. COURSE GOALS

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

A. Understand the integral calculus of functions of a single variable.

B. Understand the foundations of calculus.

C. Independently explore the use of calculator and computer skills, 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 this unit, 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 this unit, 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 this unit, 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 this unit, 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 a result of successfully completing this unit, 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 the 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 at most four, 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). The project for Calculus II is on the last unit, Chapter 10. As the course advances they will collect more tools to develop the project accordingly. However it is encouraged that the student starts on the project from day one, so they have all semester to work on the project with the guidance of the professor.

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

A. Required Materials

1. Textbooks

   Briggs, William, and Lyle Cochran. *Calculus: Early Transcendentals*. Boston: Pearson Education, 2011. ISBN-10:0321570561

2. Homework

   Mymathlab access: www.mymathlab.com

B. Optional Materials

1. Textbooks

   None

2. Other

   A graphing calculator is required. The instructor uses the TI-83 Plus throughout the course; however, any graphing calculator is acceptable.

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 ($15) 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, 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
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. Any student whose unexcused absences total 33% or more of the total number of class sessions will receive an F for the course grade.

C. Course Policies and Procedures
1. Evaluation Procedures
   a. The composite score is determined by the following distribution:

Four In-Class Exams	40%
Daily Exercises and Problems	20%
Labs	10%
Written Project	10%
Final Exam	20%

   b. The standard grading scale will be used:
      A=90%
      B=80%
      C=70%
      D=60%
      F=59% and below

2. Whole Person Assessment Requirements
    a. An artifact is required for this course for some majors. For specific requirements, check the WPA handbook.
    b. Artifacts not submitted electronically or incorrectly submitted receive a zero for that assignment.
    c. The WPA artifact is a reflection paper on the Taylor Series Lab that counts as 10% of the Maxima Labs score and is therefore 1% of your course grade.
3. Other Policies and/or Procedures
    a. There are four exams as scheduled (see the course calendar) as well as a final exam. The majority of the exam questions are 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 are announced in class.
    b. Any extra-credit or extension on the homework are available to students who have impeccable attendance records.
    c. Any student who scores below 65% on initial assessment test (08/15/14), will need to do 1-2 hours weekly tutoring with professor at his office, during Tuesday or Thursday mornings until substantial improvement is shown on the next exam.

VI. COURSE CALENDAR

Lesson	Topic	Date
AT	**Calculus I, initial assessment test**	
5	**Integration**	
5.1	Approximately Areas Under Curves	
5.2	Definite Integrals	
5.3	Fundamental Theorem of Calculus	
5.4	Working with Integrals	
5.5	Subsititution Rule	
	Review Exercises	
Ex1	**Exam 1, Chapter 5**	
6	**Applications of Integration**	
6.1	Velocity and Net Change	
6.2	Regions Between Curves	
6.3	Volume by Slicing	
6.4	Volume by Shells	
6.5	Length of Curves	
6.6	Physical Applications	
6.7	Logarithmic and Exponental Functions Revisted	
6.8	Exponential Models	
	Review Exercises	
Ex2	**Exam 2, Chapter 6**	
7	**Integration Techniques**	
7.1	Integration by Parts	
7.2	Trigonometric Integrals	
7.3	Trigonometric Substitutions	
7.4	Partial Fractions	
7.5	Other Integration Strategies	
7.6	Numerical Integration	

7.7 Improper Integrals

7.8 Introduction to Differential Equations

Review Exercises

Ex3	Exam 3, Chapter 7

8 Sequences and Infinite Series

8.1 An Overview

8.2 Sequences

8.3 Infinite Series

8.4 The Divergence and Integral Tests

8.5 The Ratio, Root, and Comparison Tests

8.6 Alternating Series

Review Exercises

Ex4	Exam 4, Chapter 8

9 Power Series

9.1 Approximating Functions with Polynomials

9.2 Properties of Power Series

9.3 Taylor Series

9.4 Working with Taylor Series

Review Final Exam

Review Final Exam

Review Final Exam

10 Parametric and Polar Curves

10.1 Parametric Equations

10.2 Polar Coordinates

10.3 Calculus in Polar Coordinates

10.4 Conic Sections

Course Inventory for ORU's Student Learning Outcomes
MAT 202—Calculus II
Summer 2015

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	