Course Information

<table>
<thead>
<tr>
<th>Course Number:</th>
<th>Math 1496</th>
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<tbody>
<tr>
<td>Course Name:</td>
<td>Calculus I</td>
</tr>
<tr>
<td>CRN:</td>
<td>21872</td>
</tr>
<tr>
<td>Location:</td>
<td>MCS 105</td>
</tr>
<tr>
<td>Class Hours:</td>
<td>12:00pm-12:50pm MWF; 12:15-1:30pm TTh</td>
</tr>
<tr>
<td>Textbook:</td>
<td>Required: Calculus (Early Transcendentals 2nd ed.) by Brigs, Cochran, and Gillett Optional/Supplemental: Calculus for Cats by Amdahl and Loats.</td>
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<tr>
<td>Prerequisites:</td>
<td>C or better in MATH 1390 and C or better in MATH 1392 OR C or better in MATH 1580</td>
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Instructor Information

<table>
<thead>
<tr>
<th>Name:</th>
<th>Dr. Jeffrey Beyerl</th>
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<tbody>
<tr>
<td>Office Location:</td>
<td>MCS 237</td>
</tr>
<tr>
<td>E-mail:</td>
<td><a href="mailto:jbeyerl@uca.edu">jbeyerl@uca.edu</a></td>
</tr>
<tr>
<td>Phone:</td>
<td>501-450-5652</td>
</tr>
</tbody>
</table>

Office Hours:

- **Monday**: 10:00am
- **Tuesday**: 10:00am
- **Wednesday**: 10:00am*
- **Thursday**: 10:00am

*The office hours on Wednesday are in the MRC

Question: Can I only come during office hours? Answer: You can come anytime! I am typically in my office from 8am until 4pm; office hours are merely designated times that I avoid scheduling meetings or running errands.

Learning Assistant Office Hours (MCS 110):

- **Monday**: 3:00-4:00pm
- **Tuesday**: 6:30-8:30pm*
- **Wednesday**: 3:00-4:00pm

*The Wednesday office hours are virtual office hours using Skype (Screen Name = csharpe90)

Course Description

This course is required of all majors or minors in mathematics, chemistry, or physics. Topics include applications of the definite integral, techniques of integration, infinite series, conics, parametric equations, polar coordinates, vectors, and vector functions. This course is a prerequisite for Calculus III and most of the upper division mathematics courses.

Course Objectives and Requirements

The primary objective in this course is to develop the theory and computational skills for the three main topics in calculus:

- Limits
- Derivatives
- Integrals
Grading Policy

- Your grade will be computed from tests, quizzes, oral problem presentations, homework, and a comprehensive final exam.
- Make-up tests/quizzes will only be given for official university events or personal emergencies. In the former case the test must be taken before official test date, in the latter case a short letter explaining why you missed the test, why this justifies a make-up, and supporting documentation must be turned in before the day you’re able to return to class. In the event that a make-up is justified, it must be taken before you are able to return to class. At his discretion, the instructor may choose to administer a make-up test or use the final exam to replace the make-up.
- Borderline grades will be determined based on the final exam and effective participation throughout the course.
- Oral problem presentations are in Dr. Beyerl’s office. Each student will sign up for a time to meet with the instructor. There will be one problem presentation every three weeks, approximately.
- Homework problems will be assigned on a weekly basis and are due every Monday. It is assumed that students with a good attendance record are keeping up with the homework and thus automatically receive full marks and need not turn it in unless you have a specific question.

<table>
<thead>
<tr>
<th>Grade Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Test 1</td>
<td>15%</td>
</tr>
<tr>
<td>Test 2</td>
<td>15%</td>
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<tr>
<td>Test 3</td>
<td>15%</td>
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<tr>
<td>Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Oral Problem Presentations</td>
<td>10%</td>
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<tr>
<td>Homework</td>
<td>10%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25%</td>
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Student Learning Objectives

Upon successful completion of this course, the student will be able to:

- Explain the concept of and evaluate limits graphically, numerically, and algebraically.
- Recognize continuous and discontinuous functions.
- Understand the formal definition of derivative as a difference quotient and what this means, graphically, numerically, and as a rate of change.
- Identify when a function is or is not differentiable.
- Evaluate derivative using basic rules: power, sum, product, quotient, chain rules, and implicit differentiation.
- Solve basic application problems using derivatives
  - Function behavior: increasing, decreasing, maximums, minimums, concavity, inflection points
  - Optimization
  - Related rates
- Explain the formal definition of definite integral as a limit of Riemann sums and what this means graphically, numerically, and as a multiplicative sum.
- Evaluate antiderivatives, integrals, and definite integrals using basic rules and u-substitution.
- Use definite integral to find the area of a region and volume of a solid of revolution.
**Algebra Review**

Algebra is the mathematical foundation on which calculus is built. We cannot do calculus without doing even more algebra. In fact, it is said that most students that fail calculus do so because of the algebra, not the calculus. As such, we’re going to review algebra on a daily basis. At the end of every class, 5 students will be given an algebra review problem to solve on the board at the start of the next class. Each day we’ll start off class by discussing the day’s algebra problem.

**Tentative Course Outline**

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Functions</th>
<th>Limits</th>
<th>Derivatives</th>
<th>Applications of the derivative</th>
<th>Integration</th>
<th>Applications of integration</th>
<th>Integration techniques</th>
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</table>
| Chapter 1 | Review of Functions  
Representing Functions  
Inverse, Exponential, and Logarithmic Functions  
Trigonometric Functions and Their Inverses | The Idea of Limits  
Definitions of Limits  
Techniques for Computing Limits  
Infinite Limits  
Limits at Infinity  
Continuity  
Precise Definitions of Limits | Introducing the Derivative  
Working with Derivatives  
Rules for Differentiation  
The Product and Quotient Rules  
Derivatives of Trigonometric Functions  
Derivatives as Rates of Change  
The Chain Rule  
Implicit Differentiation  
Derivatives of Logarithmic and Exponential Functions  
Derivatives of Inverse Trigonometric Functions  
Related Rates | Maxima and Minima  
What Derivatives Tell Us  
Graphing Functions  
Optimization Problems  
Linear Approximation and Differentials  
Mean Value Theorem  
L’Hospital’s Rule  
Newton’s Method  
Antiderivatives | Approximating Areas under Curves  
Definite Integrals  
Fundamental Theorem of Calculus  
Working with Integrals  
Substitution Rule | Velocity and Net Change  
Regions Between Curves  
Volume by Slicing  
Volume by Shells  
Length of Curves  
Surface Area  
Physical Applications (Maybe)  
Logarithmic and Exponential Functions Revisited (Maybe)  
Exponential Models (Maybe)  
Hyperbolic Functions (Maybe)  
Definitions of Limits (Maybe) | (We may or may not get to this section) |
## Important Dates

<table>
<thead>
<tr>
<th>Event</th>
<th>Date/Time</th>
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<tr>
<td><strong>Last day to Drop</strong></td>
<td>August 24&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td>Drop means the course is not on your record</td>
<td></td>
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<tr>
<td><strong>Test 1</strong></td>
<td>September 22&lt;sup&gt;nd&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Test 2</strong></td>
<td>October 27&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td><strong>Last day to Withdraw</strong></td>
<td>October 28&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td>Withdraw means the course is on your record with a “W” but does not factor into your GPA</td>
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<tr>
<td><strong>Last day for WF/WP</strong></td>
<td>November 28&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
<tr>
<td>WF means withdraw failing and is factored into your GPA as an “F”</td>
<td></td>
</tr>
<tr>
<td>WP means withdraw passing and is not factored into your GPA</td>
<td></td>
</tr>
<tr>
<td>WF/WP will be decided by whether or not your current grade is above or below 60%. Please see me to verify your grade before withdrawing with a WF/WP.</td>
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<tr>
<td><strong>Test 3</strong></td>
<td>November 29&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td><strong>Final Exam</strong></td>
<td>Tuesday, December 6&lt;sup&gt;th&lt;/sup&gt; 11am-1pm</td>
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## Outside of class resources

- **The Textbook**
  - Description of material
  - Example problems
  - Exercise problems
  - Homework problems
- **Blackboard**
  - Quiz/test solutions
  - Notes from class
- **Office Hours**
  - Individual help
- **LA Sessions**
  - Meet with the learning assistant
  - Virtual Office Hours
- **The Math Resource Lab**
  - Study Area
  - Tutors available throughout the day
**Attendance Policy**
Your active participation in this course is expected and required for you to learn the material and earn a passing grade. Students with a good attendance record receive an exemption from turning in the weekly homework assignments. This exemption is lost if you miss three class meetings. It can be regained by attending five consecutive class meetings and achieve 80% on a homework assignment. If you miss more than 20 class meetings throughout the term, you will be administratively dropped from the course.

**Academic Integrity Statement**
The University of Central Arkansas affirms its commitment to academic integrity and expects all members of the university community to accept shared responsibility for maintaining academic integrity. Students in this course are subject to the provisions of the university’s Academic Integrity Policy, approved by the Board of Trustees as Board Policy No. 709 on February 10, 2010, and published in the Student Handbook. Penalties for academic misconduct in this course may include a failing grade on an assignment, a failing grade in the course, or any other course-related sanction the instructor determines to be appropriate. Continued enrollment in this course affirms a student’s acceptance of this university policy.

**Americans with Disabilities Act Statement**
The University of Central Arkansas adheres to the requirements of the Americans with Disabilities Act. If you need an accommodation under this Act due to a disability, please contact the UCA Office of Disability Services, 450-3613.

**Sexual Harassment and Academic Policies Statement**
All students are required to familiarize themselves with the University of Central Arkansas policy on sexual harassment and on academic policies. These policies are printed in the Student Handbook.

**Building Emergency Plan Statement**
An Emergency Procedures Summary (EPS) for the building in which this class is held will be discussed during the first week of this course. EPS documents for most buildings on campus are available at http://uca.edu/mysafety/bep/. Every student should be familiar with emergency procedures for any campus building in which he/she spends time for classes or other purposes.