Motivation
Calculus is the mathematical study of change. How does a quantity change with respect to other quantities on which it depends? What is the rate of change? What is the total, accumulated, change? These questions arise in physics, chemistry, biology, ecology, psychology, economics, and other disciplines. Calculus was one of the greatest intellectual triumphs of the 17th and 18th centuries, and its concepts and techniques remain applicable today.

Learning Objectives
1. Describe and manipulate polynomial, trigonometric, exponential, logarithmic, piecewise, combined, composed, and multivariate functions.
2. Interrelate and use symbolic, graphical, numeric, and verbal representations of functions, differentiation, antidifferentiation, integration, and separable differentiable equations to solve pure and applied problems;
3. Use technology to investigate, visualize, and solve calculus problems;
4. Learn mathematics by reading, listening, exploring, and conversing in an effective manner;
5. Explain mathematical reasoning through writing in a precise and articulate manner in both informal and formal settings; and
6. Exhibit curiosity, playfulness, creativity, confidence, perseverance, interest in multiple perspectives, and a collaborative spirit.

Prerequisites
A grade of C or higher in Math 170 Functions, Data, and Models or grades of A or B in 3-4 years of high-school mathematics, including precalculus or advanced math. An SAT math score of 600 or more or an ACT math score of 26 or more is highly recommended.

Instructor
David Housman, SC 117, dhousman@goshen.edu, 535-7405, 875-0339 (home)
Office hours posted on office door and at http://people.goshen.edu/~dhousman/Schedule13Fall.htm

Class Time
MWF 12:00-12:50 p.m. in SC 107. R 2:00-3:15 p.m. or 7:00-8:15 p.m. in GL 102.

Textbook

On-line

Software
Wolfram Mathematica will be used for computation and is available from any lab computer. If desired, you can purchase or rent a student license for your personal computer at http://www.wolfram.com/mathematica/how-to-buy/education/students.html.

Notebook
A three-ring binder with loose-leaf lined and graph paper is recommended so that you can keep a written record of problem solving attempts, questions, math discoveries, and skill assessments.

Activities
The study of mathematics is not a spectator sport! Reading, listening, solving problems, writing explanations, reflecting upon ideas, and receiving feedback are essential to learning mathematics. Read with paper and pencil in hand, and take an anticipatory approach: try to obtain solutions, explanations, and proofs before reading what the author provides. Write down specific questions when you do not understand a portion of the text or a lecture.

Moodle will announce the text section(s) to be covered during a class and homework to be completed before the next class. Read at least some of the sections to be covered before class. Class will complement and supplement your preparatory reading.

An average student can obtain an average grade with an average of twelve hours each week devoted to this course—adjust if you are not average or desire a grade that is not average.

Grading
Course grades will be based on performance on homework (10%), quizzes (10%), labs (15%), three midterm exams (45%), and a comprehensive final exam (20%). If helpful, the final exam grade will
replace one of the exam scores or the homework and quizzes scores.

**Homework**  Achieve and exhibit understanding by completing the assigned exercises. Homework will be assigned in almost every class and be collected at the beginning of the next class. You are encouraged to collaborate and seek assistance when having difficulties; however, you should eventually write your own solutions. You will have achieved the expected level of understanding when you are able to obtain your own solutions, independently reproduce solutions developed in collaboration or with assistance, and/or explain a solution to others.

**Quizzes**  Check your mastery of the material in a five-minute closed notes, closed book exercise, given at the beginning of class on Fridays.

**Exams**  Exhibit your ability to solve problems and describe mathematical concepts without assistance or collaboration. There will be both an in-class portion and a take-home portion that will be due when the in-class portion is taken.

**Labs**  Apply the concepts and techniques of calculus to more substantive problems. Develop and refine written communication skills through reports.

**Extra Credit**  Receive extra credit toward your homework grade by doing one or more of the following: (1) find errors in the text or posted course materials and describe the error in writing; (2) attend a quantitative presentation (e.g., Science Speakers) or participate in a quantitatively based activity and describe in writing some interesting mathematical aspect of the presentation or activity; or (3) participate in a Career Services event and describe your most important discovery. The description should be a substantive paragraph or two and be submitted to the instructor.

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<thead>
<tr>
<th>Tentative Schedule</th>
<th>Topic</th>
<th>Sections</th>
<th>Exam Date</th>
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<tbody>
<tr>
<td>Functions</td>
<td>1.1-10, 9.1-2</td>
<td>Mon Sept 23</td>
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<tr>
<td>Intro to Derivatives and Integrals</td>
<td>2.1-4, 5.1-4, 3.1-5</td>
<td>Fri Oct 25</td>
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<tr>
<td>Derivatives, Integrals, and Applications</td>
<td>4.1-3, 5.5, 7.1-5, 9.3-6</td>
<td>Fri Nov 22</td>
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<tr>
<td>Differential Equations</td>
<td>10.1-4</td>
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<tr>
<td>Everything</td>
<td>All above</td>
<td>Wed Dec 18, 10:30-12:30</td>
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**Tutoring and Disabilities**  Goshen College wants to help all students be as academically successful as possible. If you have a disability and require accommodations, please contact Lois Martin, the Director of the Academic Resource & Writing Center early in the semester. In order to receive accommodations, documentation concerning your disability must be on file with the Academic Resource & Writing Center, Good Library 112, x7576, lmartin@goshen.edu. All information will be held in the strictest confidence. The Academic Resource & Writing Center offers tutoring and writing assistance for all students. For further information please see http://www.goshen.edu/campuslife/arwc/.

**Collaboration and Academic Integrity**  You are encouraged to use all available resources in order to learn the concepts and techniques discussed in this course. In particular, conversations with other students and the instructor can be an effective learning method. Reading other books and web pages can be another effective learning method. However, copying someone else's work subverts the learning process.

For homework and labs, you may look at and discuss another student's work, but any written work developed during collaboration with another student should be destroyed before writing your own solutions. You should give written acknowledgement to people with whom you have had discussions and to any written materials (other than the text) that were helpful.

For quizzes and exams, you may not use any resources unless a specific exception is stated by the instructor.

Failure to observe the above rules will result in a zero on the assignment or exam. Any violation of academic integrity will be reported to the Academic Dean. Observation of the above rules will help you learn the material well and give you the satisfaction of knowing that you have earned your grade.

**Due Date Policy**  Class participation, assignments, projects, and exams can only be excused, rescheduled, or made up if (1) there is a serious medical problem, a death in the immediate family, or an irreconcilable conflict with another official Goshen College activity; (2) there is written documentation signed by proper authorities; and (3) the instructor is notified prior to the due date or as soon as possible afterwards.