# GOSHEN COLLEGE
# MATHEMATICS DEPARTMENT
# MATH 211 CALCULUS I (4 Credit Hours) - FALL 2019-20

**Motivation**

Calculus is the mathematical study of change. How does a quantity change with respect to other quantities? 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.

**Catalog Description**

Concepts of calculus emphasizing applications in the natural and social sciences. Topics include differential calculus of one and several variables, integration, mathematical modeling using differential equations. Prerequisites: three and one-half units of high school mathematics including trigonometry or Math 170.

**Learning Objectives**

The student will

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. SAT math 600+ or ACT math 26+ is highly recommended.

**Instructor**

David Housman, SC 117, dhousman@goshen.edu, 535-7405 (office), 574-612-7185 (cell)
Office hours posted on office door and on Moodle

**Class Time**

MWF 12:00-12:50 p.m. in SC 107. R 9:30-10:45 a.m. or 12:30-1:45 p.m. in GL 102.

**Electronic Textbook**

*Applied Calculus*, by Deborah Hughes-Hallett, Andrew Gleason, Patti Lock, and Daniel Flath, 6th Edition WileyPLUS Student Package, ISBN: 978-1-119-39927-8 is the required resource. Use a browser to visit www.WileyPlus.com. Log in or register for the first time. Enter your course ID, 705236. You can use the materials and do the assignments free for two weeks. Purchase a registration code from the Goshen College Bookstore or WileyPlus. The text is also optionally available in paperback form, ISBN: 978-1-119-27556-5.

**On-line**

Moodle https://moodle.goshen.edu contains all course information. Announcements posted to the forum will be emailed to all students. WileyPlus https://www.wileyplus.com contains the text and homework exercises. CoCalc https://cocalc.com will be used for computation and most lab assignments.

**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. Homework will deepen your understanding.

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 and quizzes (15%), labs (20%), three midterm exams (45%), and a comprehensive final exam (20%). If helpful, the final exam grade will replace the lowest midterm exam or homework and quizzes score.

**Homework** Achieve and exhibit understanding by completing the assigned exercises in WileyPlus. Before you enter an answer in WileyPlus, solve the problem on paper and keep your work for later reference. You are encouraged to collaborate and seek assistance when having difficulties. 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. Homework is typically assigned after each class and worth about 20 points.

**Quizzes** Check your basic understanding of the material with short in-class exercises. These will be announced during the previous class, will be similar to recently assigned homework exercises, will be completed without notes or other resources, and will be worth 10-25 points each.

**Exams** Exhibit your ability to solve problems and describe mathematical concepts without assistance or collaboration.

**Labs** Apply the concepts and techniques of calculus to more substantial problems. Develop and refine written communication skills through reports. You are encouraged to complete these in groups.

**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 on paper. Up to 10 points will be earned for each report and a maximum of 100 points can be earned in total.

**Tentative Schedule**

| Topic | Sections | Exam Date |
|---|---|---|
| Functions | 1.1-10, 8.1-2 | Fri Sept 20 |
| Intro to Derivatives and Integrals | 2.1-4, 5.1-4, 3.1-5 | Fri Oct 25 |
| Derivatives, Integrals, and Applications | 4.1-3, 5.5, 6.1-3, 6.6-7, 8.3-6 | Mon Nov 22 |
| Differential Equations | 9.1-5 | |
| Everything | All of the above | Thu Dec 12, 3:30-5:30 |

**Study Sessions and Tutoring** Nick Schrock will be the Student Teaching Assistant (STA) for this course. He will run study sessions at scheduled times to assist with your learning of the concepts and techniques developed during this course. The schedule will be announced shortly after the beginning of the semester. The Academic Success Center provides individual tutoring by appointment at tutorcal.goshen.edu.

**Disability Services** Goshen College is committed to providing all students equal access to programs and facilities. Students who need accommodations based on disability should contact the Director of the Academic Success Center (ASC). Students must register with ASC before faculty are required to provide reasonable accommodations. For more information or to register, please contact the Director of the ASC, Judy Weaver, Good Library 112, jweaver@goshen.edu or 574-535-7560. To ensure that learning needs are met, contact the director of the ASC the first week of classes.

**Other Assistance** Any student who has difficulty accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Dean of Students Gilberto Pérez Jr. (gperez@goshen.edu) for support. Furthermore, please notify the instructor if you are comfortable in doing so. He may be able to provide additional assistance or flexibility in meeting the requirements of the course.

**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.

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.