Math 170: Calculus and Analytic Geometry I   Fall 2012

Instructor:	Kevin Hartshorn Department of Mathematics and Computer Science hartshorn@math.moravian.edu
Course Meeting:	Section C: MWF 10:20am – 11:30am, PPHAC 232 Section D: MWF 1:10pm – 2:20pm, PPHAC 116
Office Hours:	Mon., Wed., 2:30 – 4:00pm, Thu. 10:00-11:30am or by appointment PPHAC 215

Overview

Calculus is the key tool to understanding and modeling many aspects of the real world. Measuring rates of change, speed, area, length, and volume are all in the purview of calculus, as is computing averages, finding centers of mass, or plotting trajectories. It is arguably the most important intellectual tool developed in the past 400 years, finding use in virtually every area of science, including physics, chemistry, biology, sociology, business, medicine, architecture, engineering, psychology, and astronomy.

F2 course objectives

Each course in this category will develop the student's facility in quantitative reasoning through a wide variety of applications chosen from many fields and will involve converting conceptual information into problems that can be solved quantitatively; using appropriate techniques for analyzing and solving such problems; creating and reading pictorial and graphic representations of data and data analysis, including those showing relationships among or between multiple variables; using appropriate technology as a tool for quantitative analysis; and writing and interpreting results and solutions of problems.

Department Outcomes

Read and demonstrate comprehension of new mathematical material

Write mathematics with awareness of audience, mathematical context, and proper notation and terminology

Model a significant real world problem and solve it using mathematical techniques.

Demonstrate awareness of the role specific mathematical concepts play in several areas of mathematics.

Main Ideas for the course

- Continuous changes can be approximated by discrete processes.
- Linearization is the key to understanding many functions.
- Solving problems requires finding the right model.
- Calculus is about the concept of the infinite.

Course Objectives

In working toward internalizing these main ideas for the course, we will work to meet the following objectives:

- Master differentiation and integration methods and the concepts behind them,
- Demonstrate facility with functions graphically, algebraically, numerically, and verbally,
- Apply the methods of calculus to solving real world problems, and
- Discuss and present solutions to mathematical problems in written and oral form.

Required materials and texts

Jon Rogawski's *Calculus* (2nd Edition) is the only required text (ISBN 978-1-4292-3183-1). Note that we are using the Early Transcendentals version of the text, and only require the Single Variable portion.. This course will cover most of the first 5 chapters of the text. Math 171 (Calculus II) will cover chapters 6–10 of the text.
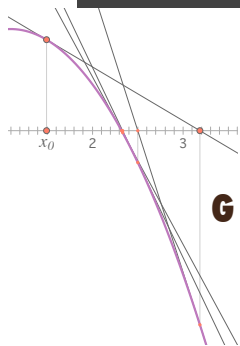
A graphic calculator will be needed for this course. The TI-83 is the standard used at Moravian. Students using a different calculator will bear the responsibility of making it emulate the TI-83.

Grading and Assessment

Your course grade will be computed based on a raw percentage score, broken down as shown in the table below.

20%	Problem sets and class presentations
15%	Discussion and group work
5%	Culture Points
5%	Limit proficiency test
10%	Derivative proficiency test
25%	4 Midterms (average of midterm scores)
20%	Final Exam (see below for date and time)

When computing your score at the end of the semester, an A (+ or –) is typically given to a score of 85% or above, a B (+ or –) to a score between 70% and 85%, a C (+ or –) to a score between 60% and 70%, and a D (+ or –) to a score between 50% and 60%. These values are subject to change and are meant only as a rough guideline, and the final assignment of grades will be determined based on the performance of the entire class and the judgement of the professor.

Problem sets and class presentations

You cannot learn mathematics without actively and personally grappling with problems. You will be given regular problem sets to explore new topics in mathematics. I encourage you to keep a notebook/journal specifically for this class that contains your work on the problems sets. You can use this notebook in class to add comments or extra notes to your problem sets, and then use this in studying for exams.

NOTE: Problem sets are *not* simple rehashing of what we cover in class. They are meant to expand your knowledge and constitute a vital part of the learning process.

Problem sets will be assessed in two ways:

- **Presentations at the board:** I will randomly select students from the class to present selected problems at the board. The class as a collective will be responsible for checking the work and ensuring that the solution is correct as presented.
- **Homework quiz**: I will select a few problems from the homework set and give you a few minutes to transcribe the solution from your notes to the quiz. This is a *closed book* quiz – while you may use your homework notes, you may not use any other resources, including your textbook.

In either case, problems will be assessed on the following 3-point scale.

3 pts	Correct in all essentials
2 pts	Largely correct, but some important mistake or error in work
1 pt	Largely incorrect, but demonstrated effort shown
0 pts	No effort shown or student absent

Discussion and group work

To prepare for class discussion, you will work through one or more sections of the book at home. Reading the text includes noting important definitions, working through examples, answering the "Preliminary Questions" at the end of the section, and trying your hand at several exercises that are similar to the examples in the book.

For most new readings, class will begin with a Readiness Assessment Test (RAT). Sometimes the RAT will be done individually (iRAT), sometimes it will be as a team (tRAT), and sometimes it will be both (individually first,
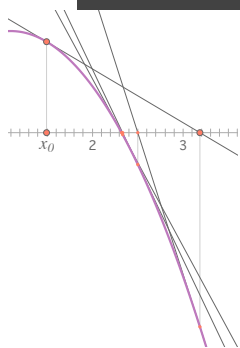
then as a team). When both individual and team RATs are given for a reading, the average of the two scores will be entered for your RAT grade.

At the end of the semester, your two lowest RAT scores will be dropped before computing your average.

Your grade for discussion and participation will be computed as follows.

10%	Average of RAT scores
5%	Peer evaluation score
15%	Total discussion/participation contribution

Peer evaluations will be conducted at two points in the semester: just before midterm, and during the last week of class. Your peer evaluation score will be determined by the feedback of your teammates.

For the midterm evaluation, the peer evaluation score will be used to foster a discussion on how to improve cooperation and discussion within the team. The midterm score will be used for midterm evaluations, but *not* for the final course grade. Your peer evaluation score (5% of your course grade) will be determined by your teammates at the review/evaluation during the last week of class.

Much of the class will be spent working with your teams. In addition to work on the RATs, your team will collaborate on discussion questions and problems in class. While your answers to these questions will not be collected in class, the material from class discussion will form a major component of the course midterm exams.

Culture Points

An important aspect of the calculus sequence is to introduce you to the idea of what a "mathematician" is and does. Frankly, this is not effectively done within the classroom — calculus is but a tiny portion of mathematical thought, and we are only studying the topmost surface of calculus. To provide a broader perspective on the role of calculus in mathematics (and the role of mathematics in the world), I will be asking you to participate in mathematically-oriented activities throughout the semester. Details on this will be provided on a separate handout.

Limit and Derivative Proficiency Tests

In addition to the regular exams, there will be two proficiency exams: a *Limit Proficiency* and a *Derivative Proficiency*. If you score less than 80% on either of these, your score will be entered as a 0% in the grade book. However, you may retake the exam as often as you want within 4 weeks of the original exam — the grade book will reflect the highest score you achieved on the exam (assuming it is 80% or better).

The first Limit Proficiency exam will be on Wednesday, September 26, 2012, and retakes may be done through Wednesday, October 24, 2012. The first Derivative Proficiency exam will be on Friday, October 19, 2012, and retakes may be done through Friday, November 16, 2012.

Retakes for both proficiency exams are to be done outside of the regular class meeting times. You may come to my posted office hours to retake the exam, or set up an appointment to come to my office to take the exam at your convenience.

Exams

There will be four exams in the course and a final exam. The dates for the midterms are Friday, September 28, 2012, Monday, October 22, 2012, Monday, November 12, 2012, and Monday, December 3, 2012. Details on the midterms will be provided as these dates approach. The final exam will be:

Section C (3rd period)	Wednesday, December 12, 2012 at 1:30pm
Section D (5th period)	Tuesday, December 11, 2012 at 1:30pm

The final exam takes place in our regular meeting room.
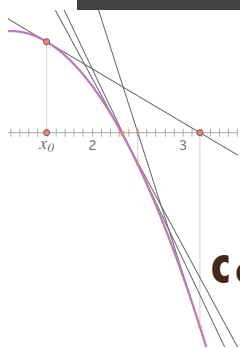
Be sure to mark these dates on your calendar. Remember, **flight or vacation plans are not acceptable reasons to miss an exam date**. As a general rule, make-up exams are not given, and you may not switch times for the calculus exam. If you have a truly exceptional situation, be sure to see as soon as possible to discuss your dilemma.

Course policies and information

Attendance

There are 41 class meetings this semester. Each class is important -- each class covers vital information for the course. Your absence can harm not only you, but also your teammates as your contribution to the group discussions will be missing. However, there are unavoidable circumstances every semester. Thus I will allow up to 3 absences without penalty (although you are still responsible for any work due). For the fourth and each subsequent absence – **regardless the reason for the absence** – you will be assessed a 5% penalty to your final course grade.

Work for this class is your responsibility. If you miss a class, you will receive a 0 on any in-class activity that takes place (note that your two lowest RAT scores will be dropped at the end of the semester). I do not distinguish between "excused" or "unexcused" absences. If you overslept, if your team has a tournament, if you have to attend a funeral, if you were at the health center, if you simply did not want to come to class – any reason has the same effect. A missed class is a missed class.

If you know that you will be missing a class (due to sports or other planned activities), let me know ahead of time. Together, we will decide whether alternate arrangements can be made for exams or other activities.

In all cases, **you** are responsible for any missed work.

Academic Honesty

Students will be expected to adhere to the standard of the Academic Honesty policy as described in the Student Handbook (*http://www.moravian.edu/studentlife/handbook/academic/academic2.html*). Any violations of this will result in severe penalties on the assignment, a report to the Dean, and the very real possibility of failing the course.

Team work: iRATs are individual work – there is to be no collaboration. tRATs are collaborative work – you are expected to work with your team members. All discussion questions and problems presented to your teams are meant to be worked on collaboratively.

Problem sets: You may work with any of your classmates on the problem sets, but you may only use your own notes when completed homework quizzes or presentations in class. Keep in mind that for the exams, you will be on your own. Copying from your friend helps no one.

Other reminders, tips, suggestions

- Get to know your classmates. I actually recommend finding study partners outside of your team to broaden your base of collective knowledge. It is easy to feel overwhelmed, and your best defense is a group of classmates to share in your struggles.
- **Visit my office:** I would love to help address individual issues or answer questions you have about the course or to hear feedback about which aspects of the course are or are not going well. You have a great deal of power to determine the path this class takes — take advantage of it.
  You can also communicate with me via e-mail (hartshorn@math.moravian.edu).
- Take advantage of the tutoring center. Beginning around the second week of class, the math tutoring center is open Monday through Thursday evenings in the Math/CS reading room (PPHAC 238).
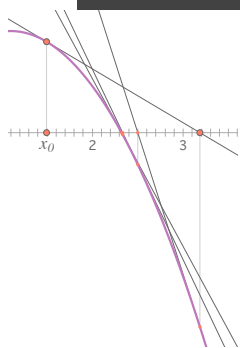
- *Khan Academy* (http://www.khanacademy.org/) provides a review of the mathematics that is expected of all students who are planning to take calculus. You can log in to *Khan Academy* using your Google or Facebook account. If you have trouble with any of the pre-calculus ideas used in this course, I recommend *Khan Academy* to provide some review.
- This syllabus is subject to change through the semester. The most recent version of the syllabus can be found at http://www.math.moravian.edu/hartshorn/math170/.
- Students who wish to request accommodations in this class for a disability should contact Elaine Mara, assistant director of learning services for academic and disability support at 1307 Main Street, or by calling 610-861-1510. Accommodations cannot be provided until authorization is received from the Academic Support Center.
- Final determination of your course grade is subject to my discretion as professor of the course.