Math 170 A, B: Calculus and Analytic Geometry I

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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.
  Student solutions manual (optional)

Calculator: A graphing calculator will be used extensively. Purchase of a TI-83 Plus
or TI-84 plus series is highly recommended. 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.

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.
Calculus I will cover the standard topics in the study of Calculus such as functions,
limits, derivatives of algebraic functions, applications of derivatives, and integration.

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.

Grading and Assessment
Your course grade will be computed based on a raw percentage score, as follows;
 15% Problem sets and class presentations
10% Discussion and group project/ work
 5% Culture Points
 5% Limit proficiency test
 10% Derivative proficiency test
 40% 3 Tests and quizzes
 20% Final Exam
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 judgment of the professor.

Grading Scale:
93-100	A
90-92	A-
88-89	B+
84-87	B
80-83	B-
78-79	C+
74-77	C
70-73	C-
67-69	D+
60-66	D
0-59	F

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 similar problems from the homework set and give you as a quiz. . This is a *closed book* quiz – while you may use your homework notes, you may not use any other resources, including your textbook.
Discussion and group work
As we work through the semester, the typical flow for learning will be:
You will work through one or more sections of the book at home.
What does it mean to work through a mathematical reading?
Much of the class will be spent working with your teams. 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 group.

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 Friday, September 21, 2012, and retakes may be done through Friday October 19, 2012. The first Derivative Proficiency exam will be on Friday, October 26, 2012, and retakes may be done through Monday, November 26, 2012.

Retakes for either proficiency exam may be done at any time outside of class using the *WebWork* homework system. Details on how to use *WebWork* to complete the proficiency exam retakes will be provided when the first limit proficiency exams are returned to you.

Course policies and information

Attendance

There are 40 class meetings this semester. Each class is important -- each class covers vital information for the course. Note that your absence can harm not only you, but also your classmates 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 absence – **regardless the reason for the absence** – you will be assessed a 5% penalty to your final course grade. Each subsequent absence will garner an additional 10% penalty to your final course grade. Attendance is your responsibility. If you miss a class, you will receive a 0 on any in-class activity that takes place. 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 quizzes or exams or other activities.

Get to know your classmates! If you know that you will miss a class, have a classmate bring your homework in for you. As a rule, late work will not be accepted (see "Late Work" below). In all cases, **you** are responsible for any missed work.

Late work

All assignments will be collected in class on the date due. If you do not have your work with you (e.g.: you forgot it in your dorm room), I will accept work in my office any time before 11 am on the date due. After that point, I will deduct 30% from the final grade on the assignment.

Once I return a graded assignment to the class, I will not accept late assignments for any reason.

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 projects: You may freely discuss team projects with other members of your team. However, you may not discuss team projects with anyone else from the course.

Problem sets: You may work with any of your classmates on the problem sets. However, you must write your own solutions to each problem for submission. Keep in mind that for the exams, you will be on your own.

Copying from your friend helps no one.

Other reminders, tips, suggestions

• **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

• **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.

Student Accommodation

• 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.

Homework

Homework will be assigned at each class period. Some of the assignments will be handed-in for a grade, these assignments will be announced. Other assignments will be graded on problems attempted and correct strategy not completion, these assignments will be randomly collected. All homework is considered part of your overall homework grade. Homework is essential to your success in this course. It is a means for you to discover if the concept is clear or muddy. As you work on your homework, indicate (star, flag, highlight) the problems that are causing you difficulty. Make sure you have those questions or concerns addressed in the next class session or in between, so that you are able to move forward and build on those concepts.

Attendance & Lateness

Class attendance and engagement in the learning process are critical factors in determining students' success in their courses. Students are expected to attend all class sessions of courses in which they are enrolled, and are responsible for all material

presented in class sessions of these courses. If the number of absences exceeds twice the number of times our class meets, an enforced withdrawal will result.

It is important to be on time for class. If you know that you are going to be **late** for a particular class or **must leave early**, you need to **communicate** that to me so that you are listed as attending the class. Any assignments that you miss you will be responsible for, including any group assignments.

Classroom Etiquette

It is important that everyone respect the rights of all students to learn. While we are in class together, I expect that everyone will be attentive, courteous, and co-operative. No other behavior will be tolerated. Please regard your classmates in a professional manner at all times. To this end, all cell phones, ipods etc. should be turned off when you enter the classroom. Cell phones will not be allowed in the classroom for use as a calculator in any circumstance.

Withdrawal

It is sometimes necessary for a student to withdraw from a class. The deadline for withdrawal is up to 75% of the semester, please check college calendar for exact date. This process requires a written request from the student and will be effective only when received in the Registrar Office by that date.
• **This syllabus is subject to change through the semester.** All changes will be announced in class in advance.

• **Final determination of your course grade is subject to my discretion as professor of the course**.

Note: I will do my best to meet your needs during this course. Please let me know if the pace is too fast, too slow, or if you do not understand a concept. I will try to accommodate you. I hope that you enjoy the course!

Weekly Pacing Schedule

Date	Topic Preparation	Homewok
Mon. 27-Aug	Introduction to course, linear and quadratic functions 1.1, 1.2	**15 to 20 problems from each section. Specific problems will be assigned in each class session.**
Wed. 29-Aug	Basic classes of functions 1.3, 1.4	
Fri. 31-Aug	Inverse, exponential, and logarithmic functions 1.5, 1.6	
Mon. 3-Sep	No Class	
Wed. 5-Sep	Finish precalculus discussion Chapter 1 Quiz	
Fri. 7-Sep	Introduction to limits 2.1, 2.2	
Mon. 10-Sep	Basic limit laws and continuity 2.3, 2.4	
Wed. 12-Sep	Basic limit laws and continuity 2.5	
Fri. 14-Sep	Evaluating limits 2.6, 2.7 Chapter 2 Quiz	
Mon. 17-Sep	Intermediate Value Theorem 2.8	
Wed Sept 19`	The Formal Definition of the Limit 2.9	
Fri Sept 21	The Formal Definition of the Limit 2.9	
Mon Sept 24	Introduction to the derivative 3.1, 3.2	Limit proficiency
Wed Sept 26	Test 1 Chapter 2 2.1 – 2.9	
Fri Sept 28	Product and Quotient Rules 3.3	
Mon Oct 1	Product and Quotient Rules	
Wed Oct 3	Higher-order derivatives/Trig functions	
Fri Oct 5	The Chain Rule Chapter 3 Quiz	
Mon Oct 8	Fall break	
Wed Oct 10	Computing derivatives 3.8	

Fri Oct 12	Computing derivatives 3.9	
Mon Oct 15	Implicit differentiation 3.10	
Wed Oct 17	Related Rates 3.11	
Fri Oct 19	Linear approximation 4.1	Derivative proficiency
Mon Oct 22	Test 2 Chapter 3 3.1-3.11	
Wed Oct 24	Extreme Values 4.2	
Fri Oct 26	Mean value theorem 4.3	
Mon Oct 29	L'Hôpital's rule 4.5	
Wed Oct 31	Curve sketching 4.4 Chapter 4 Quiz	
Fri Nov 2	Curve sketching 4.6	
Mon Nov 5	Optimization 4.7	
Wed Nov 7	Newton's Method 4.8	
Fri Nov 9	Antiderivatives 4.9	
Mon Nov 12	Test 3 Chapter 4 4.1-4.9	
Wed Nov 14	Introduction to the definite integral 5.1	
Fri Nov 16	Introduction to the definite integral 5.2	
Mon Nov 19	The Fundamental Theorem of calculus 5.3 Chapter 5 Quiz	
Wed Nov 21	Thanksgiving break	
Fri Nov 23	Thanksgiving break	
Mon Nov 26	The Fundamental Theorem of calculus 5.4	
Wed Nov 28	The Fundamental Theorem of calculus 5.5	
Fri Nov 30	Substitution method 5.6	
Mon Dec 3	Test 4 chapter 5 5.1-5.6	
Wed Dec 5	Exponential growth/decay 5.8	
Fri Dec 7	Final Exam Review	
Week of Dec 10	FINAL EXAM	

NOTE: This schedule is intended as a guide and could change during the semester.
    Other Homework, Graphing calculator and computer assignments will be
    given on a weekly basis during the semester.