Cedar Crest College
Calculus I – MAT 141 (3 credits)
Spring, 2009

Instructor: R. Reynolds
Office hours: Monday, Wednesday, Friday: 7:00 - 7:45 am, 10 – noon
              Tuesday, Thursday: 7:00-9:30 am, 11 – noon

              Or by appointment
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COURSE GOALS:

Calculus is the study of how things change and how quickly they change. We will study **functions** as they play a central role in calculus in the development and understanding of actual practical models that involve change. Calculus is not just equations and abstract theory; we will observe that it is a powerful tool used throughout many disciplines including those in mathematics, science, and economics. In studying calculus, students will experience opportunities to expand their abilities to think, reason, and communicate on multiple levels and to make sense of our ever-changing complex world.

*A **cautionary note:** For many students, calculus has been one of the "highest hurdles" in their college studies necessary to move along their chosen career path. Indeed, one calculus companion text is dedicated "To all the students whose lifelong ambitions were dashed on the cliffs of calculus" (How To Ace Calculus, Adams, et. al.). **Don't let this happen to you.** Come to every class. Ask questions. Ask for help. Do your homework. **Study** (not just read) the text before trying to complete homework assignments. Read the book with pencil and paper in hand; try to figure out the reasoning behind the results in the book and fill in any missing steps. Make a list of definitions and important formulas as you read the book and review your notes - actually writing them out will help you to learn them. Ask for help - it is available in many forms.   In addition, particularly if you have studied calculus previously, resist the temptation to skip class and doing the homework problems because "you already know this stuff." Take this opportunity to study and learn calculus at a deeper level of understanding.*

COURSE OUTCOMES:

Students will demonstrate critical thinking, extensive problem solving and quantitative reasoning skills within the following areas of study:

- Functions
- Mathematical modeling
- Definition and computation of the limit of a function
- Learning the language of calculus and using it as a powerful method in solving problems
- Definition and computation of derivatives to describe various rates of change
- Determining the graph of a function combining relevant technology with the appropriate tools of calculus to identify essential features - extrema, points of inflection, concavity, asymptotic behavior, etc.
- Solving application problems that involve limits and derivatives

Students will also increase their abilities to clearly communicate their mathematical reasoning, both orally and in written form.

INSTRUCTION METHODS:

The primary method of instruction will be lectures/discussions supported heavily by homework assignments. Daily homework will be assigned, and students are expected to have completed these assignments before the next class period and be able to participate in class discussions involving these assignments. Students will be expected to contribute in these sessions, and be able to present their solutions to their peers. In addition, some specific homework assignments will be collected and graded. Active individual and small group class participation, sharing, and involvement will be expected, encouraged, and will be a component of a student's final grade. As the material in this course is cumulative in nature (i.e., later topics depend heavily on mastery of earlier topics), students are strongly advised to avoid falling behind in these studies. The student should consult the instructor with any questions/difficulties encountered in her/his studies; a student may be referred to the advising center for additional assistance. *Students with documented disabilities who may need academic accommodations should discuss these needs with the instructor during the first two weeks of class. Students with disabilities who wish to request accommodations should contact the Advising Center.*

ATTENDANCE:

Students are expected to attend the class every time it meets. They are expected to be on time, to pay attention, to consider what they hear, and to respond appropriately – to be **engaged** in learning. Attendance will be taken at each class meeting. Please do not do homework, study for other classes, sleep, etc., while in our class; if the instructor notices such behavior, she will mark the offending student absent. Students are responsible for all material presented including lectures, announcements of tests and quizzes, and

homework assignments. Excessive absence **guarantees** an adverse impact on your course grade. Students are responsible for making sure that all assigned homework is handed in on time even if they must miss class. Makeup exams will be administered only if the student notifies the instructor **before** the exam with a valid medical or personal excuse. Late homework will generally be accepted as long as the instructor has not gone over it in class; however, the maximum grade that late homework can earn is a C. Makeup quizzes will not be administered except under extraordinary circumstances.

CALCULATOR:

As the relationships between functions and their graphs are extremely important in the study of calculus, appropriate technology is a useful tool in constructing these graphical representations. For this reason, a TI-83 or higher graphing calculator is required for this course; it should be brought to each class meeting along with the textbook. (But always keep in mind that the most useful computer is inside your head.)

EVALUATION:

Three hourly tests and a cumulative final exam will be given. Homework will be collected and graded regularly. Class participation and individual effort will also enter into the computation of the student's grade. Each student is expected to do her/his own work; do not invite trouble by working directly with someone else or by using materials not authorized by the instructor. Violations of the Cedar Crest College Honor Code Philosophy will be handled by the instructor, will be reported to the Dean, and will result in a grade of zero on the assignment/exam. Your obligations for this course include attendance at the final exam, on the day and time scheduled by the Registrar's Office. You should not make travel arrangements until the final exam schedule is published; if you must make plans early, you should schedule your travel after the last final exam day. Students are also reminded that theft or damage of library, computing, and other academic resources is not only a violation of the Honor Code of Cedar Crest College but also prohibited by the laws of the Commonwealth of Pennsylvania.

Grades will be based on a relative scale with the following tentative weights:

hour exams	45%	(15% each)
quizzes/ homework	25%	
final exam	20%	
instructor evaluation	+10%	(includes attendance and class participation)
	100%	

REQUIRED TEXT:
Calculus, Sixth Edition, Stewart, James, Brooks/Cole Publishing Co., 2008.

Tentative Course Outline

class	material to be covered in class
1/19	1.1 -definition of a function, ways to represent functions
1/20	1.1 – even, odd functions; piecewise functions
1/21	problems
1/23	1.2 –classes of functions
1/26	1.2 -
1/27	Appendix D - trigonometry review
1/28	problems
1/30	1.3 - transformations of functions
2/2	problems
2/3	1.4 - calculators and graphing
2/4	problems and review
2/6	Test #1 - chapter 1
2/9	2.1 - tangent and velocity problems - introduction to limits
2/10	problems
2/11	2.2 - limits
2/13	problems
2/16	2.3 - limit laws
2/17	2.3
2/18	problems
2/20	2.5 - continuity/Intermediate Value Theorem problems
2/23	problems
2/24	problems and review
2/25	Test #2
2/27	3.1 - introduction to derivatives
3/2	problems
3/3	3.2 - The Derivative - definition and notation, higher derivatives
3/4	3.3 - differentiation formulas
3/6	problems
3/16	3.4 - derivatives of trigonometric functions
3/17	3.5 – chain rule
3/18	problems
3/20	3.6 – implicit differentiation
3/23	3.7 – other rates of change
3/24	problems
3/25	3.8 – related rates
3/27	problems
3/30	3.9 - linear approximations, differentials
3/31	problems
4/1	problems and review
4/3	Test #3
4/6	4.1 - maxima and minima
4/7	problems
4/8	4.2 - Rolle's Theorem, Mean Value Theorem
4/14	4.3 - increasing and decreasing functions, concavity
4/15	concavity
4/17	problems
4/20	4.4 - limits at infinity, horizontal asymptotes, end behavior
4/21	problems
4/22	4.5, 4.6 - curve sketching with calculus and calculators
4/24	4.7 - optimization problems
4/27	4.7 - more application problems
4/28	problems
4/29	4.8 - Newton's method
5/1	4.9 - antiderivatives
5/4	problems
5/5	review