Fall 2008

Math 145 Calculus I

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Text: *Calculus Early Transcendentals, 6E*, by James Stewart, Brooks/Cole Publishing Co., 2008. We will cover Chapters 1–5. Optional but useful supplementary books written especially to accompany Stewart's book are the *Student Solution Manual* and *Study Guide*.

Calculator: You are required to have a graphing calculator, TI-89 suggested. A TI-89 will be used for in-class demonstrations.

Prerequisites: C or better in MAT 144 or passing score on the placement exam. If you do not satisfy this prerequisite, please talk to your advisor or me. Your success in this course depends on having the necessary prerequisites.

Homework: Daily reading and homework assignments from the text will be made. Although these homework assignments will not be collected, you are expected to do **all** homework problems assigned. Homework quizzes will be given (see below) over the problems assigned. You should try your best to complete the homework assignments in a timely manner, i.e., before the next class meeting. Daily homework assignments will be posted on the course web site.

Quizzes: There will be **twelve** timed, open book/open note quizzes from the homework assignments, each worth 10 points. These quizzes will be announced in advance (as well as posted on the course web site) and will consist of selected problems from homework assignments given over the previous few days. The lowest **two** scores will be dropped and the remaining quizzes will count 100 points (the weight of one exam) towards your final grade. **No make-up quizzes will be given.** The key to being successful on the homework quizzes is to do the problems **before** the quiz so that **during** the quiz, you are recopying from your notes. The quiz problems are chosen so that you will **not** have enough time to complete them if this is your first attempt at solving these problems.

Exams: There will be **four** exams, each worth 100 points. You will be notified well in advance of exam dates, and you are expected to take all exams. Generally, there are no make-up exams. In the event of an emergency and with **prior** notification, alternatives can be discussed.

Final Exam: The final exam will be **comprehensive** and will be worth 200 points. There are no make-ups on the final exam, unless there is an emergency. The final exam will be given on Monday, 8 December 2008 at 8:00 p.m.

Grades: A breakdown of the points is as follows:

Quizzes	100
Exams	400
Final	200
Total	700

Grading Scale: Final grades for the course are **based** on the following point totals and their corresponding percentages:

A	630–700	[90, 100]
B	560–629	[80, 90)
C	490–559	[70, 80)
D	420–489	[60, 70)
F	0–419	[0, 59)

Withdrawal: The last day to withdraw and receive a grade of WX is Friday, 10 October 2008.

Special Needs: If you need an accommodation for which you are eligible, please inform me at the beginning of the semester (during the first two weeks of class) so that this can be implemented.

Math Tutoring Center: Tutoring will be available (free of charge) in Stevenson TBA.

Classroom Etiquette: Please be on time to class. It is disrupting to the flow of class when students arrive late. Please do not get up and leave during class time. Please turn off your cell phone. Please do not eat in class.

Email Etiquette: During the semester it is likely that you will contact me by email with a question about something from class. Please address your email with "Dr. Jordon". Also, you must sign your email, i.e., "John Smith," so that I know who the email is from. Please don't ask questions whose answers can be found on the course handouts or web site.

Tips for Success: Attend every class period! **Attendance** and **active participation** in this course are expected and encouraged. **You** are responsible for all material presented and all announcements made on the days you are absent. (The course web site is an excellent source of information if you must miss a class.) Do the homework! MATH IS NOT A SPECTATOR SPORT! Attending class and participating in class discussions will be very helpful in preparing for exams and in doing the homework. To succeed in this course, you will most likely require **16** or more hours per week in class attendance, daily study, and homework. If you find that you are having trouble with a particular section or topic, act quickly to catch up. This is especially important in this course as topics build on each other; that is, it is often the case that you will not be able to understand class unless you know the material that has been previously covered. If you have any problems or questions, please seek extra help from me, the Math Tutoring center, or the UCLA tutoring center. Make use of my office hours, or if that is not possible for some reason, make arrangements to see me at another time. It is also very helpful to have a "study buddy." Get to know someone in class and arrange to study/do homework together. Often times we really learn something when we explain it to others.

Course Description: Calculus involves the mathematical study of motion and change. Calculus was created about 300 years ago independently by Isaac Newton and Gottfried Leibniz. Although their intention was to solve particular measurement problems in geometry and physics, today the applications of calculus reach far and wide to not only the physical sciences and engineering, but to the social and biological sciences. In fact, rapid large-scale computing has increased the role of calculus in solving many of the outstanding problems in science and technology.

Here are some situations commonly explored using calculus:

- In a heart bypass operation, where should the new artery be stitched?
- Given the length of a car's skid marks, how fast was the car traveling before the brakes were applied?
- What is the best way to fit a line to a set of data?
- How accurately does a particular model estimate the employment rate of a new industry?
- At what point in the life cycle of an epidemic is it the most dangerous?

Course Content: Real world applications as well as the use of technology are interspersed throughout virtually every class as aids to understand the material. Most topics are considered three ways: geometrically, numerically, and algebraically. The course content includes:

- the history and origins of the study of change: the beginnings of calculus as a tool to solve physical and geometric problems, an overview of the diversity of applications of calculus from physics, economics, biology, and other fields;
- an introduction to functions: elementary and piecewise-defined functions, functions defined by tables and graphs, comparative growth, modeling in the real world, periodic-function applications, properties of functions;
- the derivative as a measure of rate of change: numerical and graphical interpretations of derivative, instantaneous rate of change as a limit of average rates of change, local linearity, relationship between derivatives and tangent lines;
- the definite integral: a generalization of continuous summation, its relationship to anti-differentiation (the fundamental theorem of calculus), the solution of a distance problem through study of velocity;
- formulas for computing the derivatives of the elementary functions along with numerical and graphical justifications: related theorems, implicit differentiation, the chain rule;
- applications of the derivative: optimization problems from a variety of real world situations.

Course Goals: At the end of the course, you are expected to be able to:

- Explain the concepts of function, derivative and definite integral, in writing and orally, using graphical, numerical, and algebraic ideas as well as provide formal mathematical definitions of these concepts.
- Determine the derivative of elementary functions (polynomial, trigonometric, rational, exponential, logarithmic) at a point using numerical, graphical, and algebraic techniques.

- Determine the definite integral of elementary functions using numerical, graphical, and algebraic techniques.
- Interpret the derivative and definite integral in a variety of problem settings.
- Algebraically differentiate the elementary functions using the rules for differentiation including the chain rule, product rule, and quotient rule.
- Determine the antiderivative for some elementary functions directly or using substitution.
- Solve optimization problems when provided with a reasonable real world setting and appropriate data.
- Apply calculus to solve problems from a variety of fields.
- Recognize the need for/use of differentiation or integration in real world settings.
- Relate a function to its derivative and antiderivative graphically, numerically, and algebraically.

Communicating Mathematics: Communicating mathematics is an important theme in calculus. The ability to write and explain clearly is crucial to success in the workplace. There will be several opportunities to develop these skills in this course. Please read the *Departmental Guidelines for Writing Mathematics.* The *Guidelines* provide justification for the importance of writing in mathematics. For example, success in your chosen profession will be based as much on how well you communicate as on what you "know". Unlike most of the presentation that you complete in college, where you are communicating with professors, in your job you will often be faced with a much more difficult task–communicating with non-experts. In such situation, it is not enough to say, "Well, you know what I mean." The process of writing will also help you discover what you **don't** know. This is invaluable information. Finally, the *Guidelines* provide both directions and examples for appropriate mathematical writing and will be used to help evaluate your work. Consider the following questions as you write mathematics:

- How well have you followed the directions?
- Have you answered all the questions asked? (Have you answered every part of the question?)
- Is your work coherent and well organized?
- Can another calculus student read your work and learn from it?
- Did you use proper grammar, terminology, and symbols?

Opportunities to communicate orally will occur as you work in groups, explain problems to others, solve group problems, ask questions, respond to questions, and help your peers understand calculus. Opportunities to communicate in writing will occur as you prepare homework and complete exams and quizzes.