

21-120 Differential and Integral Calculus
Carnegie Mellon University
Department of Mathematical Sciences

Section E

Instructor: Spencer Unger, Wean Hall 7207, sunger@andrew.cmu.edu

Course Dates: June 29, 2009 to August 7, 2009

Lecture: Monday through Friday, 9 to 10:20 AM, Wean 5302

Office Hours: Tentatively, Tuesday and Thursday 10:30 AM to 12 PM

Text: Stewart, *Essential Calculus: Early Transcendentals*, First Edition, Thompson Brooks/Cole Publishing Co., 2007.

Prerequisites: A solid understanding of the basic concepts of algebra, geometry and trigonometry. Usually this means that you have had two years of high school algebra, one year of high school geometry and half a year of trigonometry. These prerequisites are important. Algebra is the language through which we will access the concepts of calculus. Proficiency in this language is essential. Many of the concepts that we will cover have trigonometric and geometric content. Familiarity with trigonometry and geometry will leave us free to explore these concepts.

Calculators: You may use them to check your homework solutions, but they will *not* be allowed on tests. The focus of the class is on what we can do with our minds and not on what we can make a calculator do for us.

Grades: Your grade will be based on a combination of Homework, Quizzes, Tests and a Final. They will be combined to form your final grade as follows:

Homework: 20%

Each of two tests 25%

The Final: 30%

Midterms and the Final: All exams will take place during the normal class time and in the same room. The two midterms will be on July 10th and July 24th. The Final Exam will be on August 7th. In the exams you will only be allowed pencils, a sharpener and an eraser. All other study materials must be put away. No calculators will be allowed.

Homework: There will be six homework assignments. They will be due on each of the Wednesdays of the course. The first assignment will be given out today, June 29th and is due on July 1st, this Wednesday. Subsequent assignments will be given out in class as soon as the last assignment is turned in. By necessity the assignments will be long. So *do not* wait until the night before to start them. Late assignments will not be accepted.

A note on showing your work. Your written work is the way that you communicate your understanding of the material. For this reason, showing your work is essential. In order to get full credit you must provide *complete*, correct solutions. No credit will be given for answers out of the blue.

Questions: If you have any questions about the syllabus or the course, then feel free to ask me.

Students with disabilities: If you qualify for accommodation because of a documented disability, then please come talk to me so that we can accommodate you. You can contact Disability Resources at 412.268.2013 or at lpowell@andrew.cmu.edu. For more information you can go to <http://www.cmu.edu/hr/eos/disability/index.html>.

Some Advice

- Attend class, do your work regularly and do not fall behind. In a summer course we have a very short time to get through a lot of material. Falling behind is dangerous. All of the material is interconnected and it is very difficult to catch up once behind.
- Calculus is not difficult, but requires work and dedication.
- If you do not understand something in class, then speak up. Chances are that you are not the only one who is confused. I am always willing go over something again.
- Studying with other students is a great way to learn, but there are some pitfalls. It is easy to think that because someone in your study group knows how to do a problem then you know how to do it. When you study in a group be sure that in the end *you* know how to do the problems. Also, copying solutions from your friend is cheating. Not only is it cheating, but it is self destructive with respect to the exams. On the exams you must be able to do the problems by yourself in a reasonable amount of time.
- If you are not doing well, do not hesitate to come and talk to me. Do not wait until the last minute.
- I cannot give you points for how much you worked or even how much you know. Grades will be given based on what is *written* on your work. You must provide complete, correct solutions in order to get full credit. You will have many examples of complete and correct solutions in class and there are more in the book. The same level of detail is expected of you in your written work.

Schedule:

Below is a tentative schedule. The exams and homework assignments are fixed, but the section that we cover on a particular day may change.

Mon June 29 §1.1 Functions and §1.2 Common Functions and their properties

Tue, June 30 §1.3 Definition of a Limit and §1.4 Calculating limits

Wed, July 1 §1.5 Continuity and The Intermediate Value Theorem and §1.6 Limits involving infinity

Thu, July 2 §2.1-2 Derivatives

Fri, July 3 §2.3-4 Basic Differentiation Formulas

Mon July 6 §2.4-5 Derivatives of trigonometric functions and the Chain Rule

Tue, July 7 §2.6 Implicit Differentiation and §2.7 Related Rates

Wed, July 8 §2.8 Linear Approximation and §3.1 Exponential Functions

Thu, July 9 §3.2 Logarithms and Inverse Functions and §3.3 Derivatives of Logarithms

Fri, July 10 Test 1

Mon July 13 §3.4 Exponential Growth and Decay and §3.5 Inverse trigonometric functions

Tue, July 14 §3.7 Indeterminant forms and L'Hopital's Rule

Wed, July 15 §4.1 Maximum and Minimum Values and §4.2 The Mean Value Theorem

Thu, July 16 §4.3 Derivatives and the Shapes of of Graphs

Fri, July 17 §4.4 Curve Sketching

Mon July 20 §4.5 Optimization

Tue, July 21 Optimization and Curve Sketching Problems

Wed, July 22 §5.1 Antiderivatives

Thu, July 23 §5.2-3 Integrals

Fri, July 24 Test 2

Mon July 27 §5.4 The Fundamental Theorem of Calculus

Tue, July 28 §5.5 Integration by Substitution

Wed, July 29 Integrating with inverse trigonometric functions

Thu, July 30 §6.1 Integration by parts

Fri, July 31 Integration Problems

Mon August 3 §3.6 Hyperbolic functions and §7.1 Area between curves

Tue, August 4 §7.2-3 Volumes

Wed, August 5 Review

Thu, August 6 Review

Fri, August 7 Final Exam!