

**Syllabus for MATH 251: Calculus III, Section 2, Fall 2010**  
**Department of Mathematics, Southern Illinois University, Carbondale**

**INSTRUCTOR:** Prof. Dr. rer. nat. Henri Schurz

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**OFFICE HOURS:** 9:30am-11:30am MWF or by appointment

**PREREQUISITES:** 4 years high school math including trig, and C+ in Calculus I+II (Math 150 + 250) or replacement exam as permission of the department.

It is crucial that you have a good working knowledge of high school math including facility with basic algebraic, manipulations, knowledge of analytic geometry of straight lines, similar triangles, trig functions, and exponential functions.

Do you know how to simplify  $(3^{\frac{1}{2}})^{\frac{10}{7}}$  and  $3^{\frac{3}{8}}3^{\frac{5}{8}}$ ? How about  $\sin^2(\theta) + \cos^2(\theta)$  and  $\tan^2(\theta) - \sec^2(\theta)$ ?

Do you know how to find solutions of  $x^2 - x - 2 = 0$  or, in general, the roots of  $x^2 + px + q$  and  $Ax^2 + Bx + C$ ?

How about the table of standard derivatives and antiderivatives?

**TEXT:** *Essential Calculus with Early Transcendentals* (Chapters 10, 11, 12, 13, up to 13.6. guaranteed)

by James Stewart, Thomson Brooks/Cole Publishing Company, Pacific Grove, 2007, ISBN 0-4950-14281.

**LECTURES:** Mon-Wed-Fri 12:00-12:50pm in **EGRA 422**

**TEACHING ASSISTANT:** Mr. Yu Lin ( [jinyu@math.siu.edu](mailto:jinyu@math.siu.edu) , Neckers 460, 453-6563 )

**HOMEWORK and QUIZZES:** Homework sets and quizzes will be arranged and announced in classes.

**EXAMS:** *Midterms* : (during classes)

**Exam 1: Monday, Sep 27**

**Exam 2: Monday, Oct 25**

**Exam 3: Monday, Nov 29**

*Final Exam: Friday, Dec 17, 12:50-2:50pm, EGRA 422 (to be confirmed)*

**GRADING POLICY:**

The course grade will be computed according to the following weighting system:

*Homework and Quizzes:* 25 %; *Midterm Exams:* 25 % each (50 % total); *Final Exam:* 25 %

Typically, the distribution of the final exam grades is approximately 10 % A, 25 % B, 45 % C, 20 % D and F.

The overall grade is determined by the total collected points TSUM as follows:

$F : TSUM < 45\%$ ,  $D : TSUM \geq 45\%$ ,  $C : TSUM \geq 60\%$ ,  $B : TSUM \geq 75\%$ ,  $A : TSUM \geq 90\%$

**INCOMPLETES:**

The grade I ("incomplete") shall be assigned at the instructor's discretion when, due to extraordinary, documented circumstances (like hospitalization), the student was prevented from completing the entire course. Inform the instructor as soon as possible if something occurs which makes you think you should receive an incomplete.

At the time the incomplete is granted the student should have completed the majority of the course with a passing grade.

An agreement must be reached between student and lecturer on the manner in which the incomplete will be removed.

**CALCULATORS:**

Hand-held calculators (like TI 86 - TI 96) and lap-top computers cannot be used during midterm exams in this course.

Since the matching of numerical data is no longer the final goal for students to do homework or finish exam questions, in this course, reasonably, conceptually understanding of the course work must be emphasized. Students must realize that calculators are useful tools for numerical computations, but not so for logical thinking and conceptual understanding of the course work.

**COVERAGE FOR MATH 251:** (tentative pace)

<i>Weeks</i>	<i>Sections to be Covered</i>
1 (08/23 - 09/03)	Introduction, Chapter 10
2 (09/06 - 09/17)	Chapter 10-11
3 (09/20 - 10/01)	Midterm I, Chapter 11
4 (10/04 - 10/15)	Chapter 11-12
5 (10/18 - 10/29)	Midterm II, Chapter 12
6 (11/01 - 11/12)	Chapter 12-13
7 (11/15 - 11/26)	Chapter 13, Thanksgiving Break
8 (11/29 - 12/10)	Chapter 13, Midterm III, Review for Final

Some topics as quadric surfaces (10.6), Kepler's laws (10.9), linear differentials (11.4) are omitted (maybe, 13.7.-13.9. too).

**OBJECTIVES:**

To acquaint the student of science, engineering or mathematics with the fundamental concepts of multi-variable calculus,

To learn about basic techniques and applications of vectors: algebra, limits, derivatives, integrals, series

To calculate dot and cross products, equations of lines, tangents in space

To introduce partial derivatives, multiple integrals, and fundamental theorems of vector calculus

**OVERVIEW (Course Description):**

This course is the 3rd part of a three semester course on Calculus, meant to be an elementary introduction to basic aspects of vectors and multi-variable functions. Calculus is a very large field, and we will certainly not be able to cover all of the important techniques in a one or two-semester course. A preliminary list of topics covered includes dot and cross products, angle between vectors, equations of lines and planes, derivatives and integrals of vector-valued functions, particle motions,

velocity, acceleration, speed, first and higher order partial derivatives, chain rule, directional derivatives, tangent plane and, normal line, critical point, local extremes, saddle point, maximize and minimize functions, constrained and unconstrained optimization via Lagrange, double and triple integrals, iterated integrals, areas, volumes, surface areas, moments of mass, centers of mass, cylindrical and spherical coordinates, Jacobian, conservative vector fields, line integrals along smooth curves, independence of path, curl and divergence, Green's, Stokes' and Divergence Theorems (i.e. vector FTCs), flux of vector fields

**YOUR TASK:** Help us to help you! Ask questions (and also in lecture) when something in the course is giving you trouble.

The job of the lecturer is to give the "big picture" and to work on sample problems.

Your job is to go over the homework problems, come to all classes and exams, read through the text, listen carefully, and try to clear up difficulties and misunderstandings. Your active participation is needed!

**MISSED EXAMS and MAKE-UPS:**

Make-ups are only allowed when the student has a well documented reason of missing an exam.

That well documented reason must be indicated and shown to the lecturer before the exam takes place.

There is **NO make-up on missed homeworks or quizzes.**

Late turned in homeworks are usually not accepted (unless there is a reason beyond your control).

**WITHDRAWALS:** Last Day to drop **with refund** is **Sep 5**. Withdrawals from the course with a 'W' on your transcript **without refund** can be made till **Oct 17**. (Last day to register is **August 29**) (All Dates by SALUKINET, TBC)

**FREE TUTORING:** in College of Science Study Area - Sunday 7-9pm & Monday - Thursday 4-9pm

**HOMEWORK & QUIZZ PROBLEMS (MATH 251, Fall 2010):** (All due on Fridays) **TBC** (in class)

Week 1: Sec. 10.1.:2, 8a, 10, 16, 28 — 10.2.: 4, 6, 8, 16, 18 (due on 09/03/10)

Week 2: Sec. 10.3.: 2, 8, 14, 18, 44 — 10.4.: 2, 4, 8, 16, 44 — 10.5.: 2, 4, 18, 48, 50 (due on 09/10/10)

Week 3: Sec. 10.6.: 4, 6, 8, 28, 30 — 10.7.: 2, 4, 14, 48, 60 — 10.8.: 2, 14, 16, 34, 36 (due on 09/17/10)

Week 4: Sec. 10.9.: 2, 8, 12, 18, 22 — 11.1.: 2, 4, 18, 32, 50 — 11.2.: 4, 8, 22, 30, 32 (due on 09/24/10)

Week 5: Sec. 11.3.: 8, 14, 18, 62, 66 — 11.4.: 2, 14, 22, 26, 16 — 11.5.: 2, 6, 18, 34, 38 (due on 10/01/10)

Week 6: Sec. 11.6.: 2, 4, 10, 18, 24 — 11.7.: 4, 10, 18, 26, 40 (due on 10/08/10)

Week 7: Sec. 11.8.: 2, 12, 16, 38, 44 — 12.1.: 2, 8, 18, 24, 28 (due on 10/15/10)

Week 8: Sec. 12.2.: 2, 8, 18, 26, 38 — 12.3.: 4, 6, 10, 24, 28 (due on 10/22/10)

Week 9: Sec. 12.4.: 2, 4, 8, 14, 22 — 12.5.: 2, 4, 12, 22a, 40 (due on 10/29/10)

Week 10: Sec. 12.6.: 2, 4, 10, 22, 28 — 12.7.: 2, 4, 8, 10, 22 (due on 11/05/10)

Week 11: Sec. 12.8.: 2, 6, 10, 12, 20 — 13.1.: 22, 24, 26, 28, 30 (due on 11/12/10)

Week 12: Sec. 13.2.: 2, 4, 10, 20, 34 — 13.3.: 2, 8, 12, 18, 20 (due on 11/19/10)

Week 13: Sec. 13.4.: 2, 4, 8, 14, 18 — 13.5.: 2, 6, 16, 22, 28 (due on 12/03/10)

Week 14: Sec. 13.6.: 4, 16, 32, 34, 40 — 13.7.: 2, 8, 16, 24, 38 (due on 12/10/10)

( Week 15: Sec. 13.8.: 2, 4, 8, 12, 13 — 13.9.: 4, 6, 18, 24, 26 (due on 12/10/10))

**SOME FURTHER ADVICE:** Don't get behind. The course is cumulative and the speed of lectures is much higher than at high school level. What you didn't understand in week three will haunt you for the rest of the course. Your success in the course depends to a large extent on the number of exercises you work out. The more exercises you do better you will learn the material. There are quite a number of homework problems assigned. You might not have time to do them all. If you have time it is a good idea to also try doing some problems which are not assigned. Some problems not assigned might turn up on quizzes, hour exams, or the final exam. Make use of office hours of the lecturer (me!), if you are unable to meet during regular office hours, make arrangements to meet at another time. If things are going badly you might discuss the reasons and improvements with your lecturer in detail. If you have had a strong grasp of calculus in high school the first weeks may seem very easy. But this is deceptive, and there is the distinct danger that overconfidence will lead to disaster.

**The Mathematical Life of the Well Organized and Well Prepared Student:**

Goes to all lectures; listens carefully; makes notices; tries to understand the professor

Does assignment and works through the notes (textbook, etc.) the same day

Makes a note what is not understood, ask questions (there is no stupid question!)

Gets uncertainties resolved after lecture or the next day by the professor or other sources

Carefully reviews for exams; outlines material; works on representative problems

**ON-LINE HELP RELATED TO CALCULUS:** You can make use of the following webpages

<http://www.calculus.net/ci2/?tag=>

<http://www.mathpages.com/home/index.htm>

<http://www.mathforum.com/> or <http://www.quickmath.com/> (with plotting for equations and inequalities)

**EMERGENCY PROCEDURES:** Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. Because some health and safety circumstances are beyond our control, we ask that you become familiar with the SIUC Emergency Response Plan and Building Emergency Response Team (BERT) program. Emergency response information is available on posters in buildings on campus, available on BERT's website at [www.bert.siu.edu](http://www.bert.siu.edu), Department of Safety's website [www.dps.siu.edu](http://www.dps.siu.edu) (disaster drop down) and in Emergency Response Guideline pamphlet. Know how to respond to each type of emergency.

Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency. The Building Emergency Response Team will provide assistance to your instructor in evacuating the building or sheltering within the facility.