

Math 397 - Calculus III - Summer 2015

Course Description. MAT 397 is the third course in a three-semester sequence in Calculus. This sequence is designed for Mathematics, Science and Engineering majors and for those students in other majors who intend to take advanced courses in mathematics. This course covers the concepts of vectors, vector valued functions, functions of several variables, partial derivatives, multiple integration, and vector calculus.

Text. *Essential Calculus: Early Transcendentals*, by James Stewart, 2nd edition, Cengage publishing. This is the same text that was used for MAT 295 or 296 at Syracuse University last year. We will cover chapters 10-12 and the first half of chapter 13. The subsections that will not be covered are listed on the homework sheet.

Pre-requisites. Completion of MAT 296 (Calculus II) with a grade of C- or better.

Liberal Arts Core. Completing MAT 397 with a grade of C or better satisfies the Quantitative Skills requirement of the Liberal Arts Core in the College of Arts and Sciences. It also may simultaneously be used to partially satisfy the Natural Sciences and Mathematics divisional requirement.

Calculators. A calculator may be useful or needed at times for some homework problems. However, **calculators will not be allowed on quizzes/exams.** This includes calculators on cell phones. All electronic devices other than the calculator should be silenced and put away during class.

Course Format. Class meets M-Th 12:00-2:25 in Bowne Hall 111. There will be a break each day, about halfway through. Nobody can concentrate for that amount of time.

Class Attendance and Participation: You are expected to attend and participate in class. Missing class is the most common reason for poor performance in the course. If you miss a class, you are responsible for obtaining notes for that class from a student who attended. It is also your responsibility to find out about any announcements made in class. It is your responsibility to make sure homework due on a given day is turned in. If you must miss class, make sure somebody else turns your homework in for you.

Office Hours: I will be available every day before class from 10:45-11:45. I am happy to discuss any questions about material, including problems with quiz/test questions – I will not solve them completely, but am glad to give advice.

Homework: Homework assignments are listed on the Homework Sheet for the entire semester. I will assign problems to work on during class, but not to be handed in.

Quizzes: There will be one to two take-home quizzes given every week. The due dates will be announced in class. If you are not in class, you will be able to find the information on Blackboard.

Midterm Exams. There will be two in-class examinations, on May 28 and June 11. There will be **no make-up quizzes or exams.** A missed quiz or examination counts as a zero unless you present a valid excuse from a physician or the Dean's Office. With an acceptable written excuse, your missed exam score will be replaced by your score on that portion of the material on the final.

Final Exam. The final examination is held on the last day of class during the regular class period.

Grades: Each of the 2 examinations counts for 25% of your course grade. The final counts for 30%. The take-home quizzes count for the remaining 20%. The standard department grading scale will be applied.

Students with disabilities. If you believe that you need accommodations for a disability, please contact the Office of Disability Services(ODS), <http://disabilityservices.syr.edu>, located in Room 309 of 804 University Avenue, or call (315) 443-4498 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue students with documented Disabilities Accommodation Authorization Letters, as appropriate. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible.

Religious observances policy. SU religious observances policy recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holidays according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to are religious observance provided they notify their instructors **before the end of the second week of classes**. An online notification process is available through MySlice (Student Services → Enrollment → My Religious Observances) from the first day of class until the end of the second week of class.

Academic Integrity. Syracuse University sets high standards for academic integrity. Those standards are supported and enforced by students, including those who serve as academic integrity hearing panel members and hearing officers. The presumptive sanction for a first offense is course failure, accompanied by the transcript notation Violation of the Academic Integrity Policy. Students should review the Office of Academic Integrity online resource Twenty Questions and Answers About the Syracuse University Academic Integrity Policy and confer with instructors about permitted collaboration and rules for examinations. The Policy also governs the veracity of signatures on attendance sheets and other verification of participation in class activities. Additional guidance for students can be found in the Office of Academic Integrity resource: What does academic integrity mean?

Department Learning Goals Relevant to this Course

- An understanding of the nature and role of deductive reasoning in mathematics
- Ability to use and understand mathematical notation
- Ability to do hand calculations accurately
- Ability to follow proofs and other mathematical discourse

Course-specific Learning Goals

- Freely translate among geometric descriptions and descriptions in terms of equations, parametric equations, and level sets: for lines and planes, as well as for certain more general curves and surfaces.
- Set up the iterated integrals needed to evaluate multiple integrals over regions in 2 and 3 dimensions.
- Effectively use the vector concept in problem solving
- Determine whether a given applied optimization problem is suitable to be solved using multi-variable calculus. If so, formulate the mathematical problem as one of finding the extreme value of a function of several variables over a subset of two or three dimensional space, including the boundary. Solve the problem in simple example cases.

- Be able to state multi-variable generalizations of the derivative, the chain rule, the fundamental theorem of calculus, the second derivative test, limits, and continuity, and use in problem solving when appropriate.

How to Succeed.

1. It is absolutely essential that you understand how to solve the assigned problems. Quiz and exam questions will be similar to these problems. It is important to be able to use the skills and techniques presented in the course and not simply to be able to solve a specific set of problems.
2. Ask questions in lecture, in recitation and at the clinic about anything that is not completely clear. Don't hesitate to bring questions to your instructors during office hours.
3. Every day, read and study the sections in the textbook covered in the lecture. Learning mathematics takes time! Read carefully and work through all the examples in complete detail. It can be helpful to try to work through an example on your own before reading the solution.
4. Stay caught up. Calculus concepts build on each other cumulatively and you need to stay on top of the material at every stage. If you are having difficulty, don't expect that the problem will take care of itself and disappear later. Contact your course instructor or your recitation instructor immediately and discuss the problem!
5. Form a study group. Many students benefit from a study group to work through challenging problems and to review for exams. You should attempt the problems ahead of time by yourself and then work through any difficulties with your study partners. Explaining your reasoning to another student can help to clarify your own understanding.
6. You should expect to work hard. Don't get discouraged if you find some of the material very difficult. Be persistent and patient! If you follow the above suggestions, your experience in this course will be a rewarding one.

Homework Sheet

Chapter 10 - Vectors and the geometry of space approximately 1 1/2 weeks		
Section	Problems	Notes
10.1	Hwk: 3, 4, 10, 13, 27, 31.	
	Quiz/Test: 1, 2, 7, 15, 21, 23, 33, 35.	
10.2	Hwk: 5, 7, 9, 11, 13, 15, 17, 18, 24, 28, 34	
	Quiz/Test: 2, 3, 4, 10, 12, 18, 21, 22, 33.	
10.3	Hwk: 1, 2, 5, 7, 9, 15, 16, 19, 21, 31, 32, 37, 39	
	Quiz/Test: 6, 10, 11, 14, 17, 29, 33, 34, 43.	
10.4	Hwk: 1, 3, 11, 13, 16, 17, 19, 27, 29, 33, 37, 40	
	Quiz/Test: 2, 5, 7, 9, 15, 20, 31, 34, 38, 39	
10.5(a)	Hwk: 1, 2, 4, 5, 7, 8, 11, 14, 17, 42, 43	Hwk broken into 2 parts. (a)-lines and (b)-planes
	Quiz/Test: 3, 9, 10, 13, 15, 18, 19, 44, 46	
10.5(b)	Hwk: 23, 25, 26, 27, 29, 35, 39, 40, 47, 51	
	Quiz/Test: 21, 31, 33, 37, 41, 45, 49	
10.6	Hwk: 1, 3, 4, 9, 11, 12-16, 23, 25, 27	
	Quiz/Test: 5, 7, 17, 19, 21, 24, 26, 29, 30	

10.7	Hwk: 1, 3, 5, 7, 17, 21, 25, 28, 39-41, 49, 59, 60, 62	Skip using computers to draw space curves
	Quiz/Test: 9, 11, 19, 23, 27, 29, 43, 51, 61, 67.	
10.8	Hwk: 1, 2, 3, 39, 41	Skip curvature.
	Quiz/Test: 4, 40, 42.	
10.9	Hwk: 1, 8, 10, 13(a), 15, 19, 20, 21, 27	Skip tangential and normal components of acceleration and Kepler's laws.
	Quiz/Test: 3, 5, 7, 9, 24, 25	

Chapter 11 - Partial Derivatives approximately
1 1/2 weeks

Section	Problems	Notes
11.1	Hwk: 5, 8, 11, 13, 15, 25, 29, 33, 41-47	
	Quiz/Test: 1, 3, 7, 17, 22, 24, 31, 49	
11.2	Hwk: 4, 5, 9, 12, 19, 20, 21, 23	
	Quiz/Test: 7, 11, 22, 25	
11.3	Hwk: 3, 5, 6, 8, 9, 14, 23, 25, 32, 39, 43, 45, 55	Skip partial differential equations.
	Quiz/Test: 1, 7, 11, 13, 15, 21, 31, 33, 41, 47, 51, 53, 57	
11.4	Hwk: 3, 6, 11, 19, 27, 30	
	Quiz/Test: 1, 5, 13, 17, 39	
11.5	Hwk: 1, 4, 7, 9, 11, 17, 32, 33	Skip implicit differentiation
	Quiz/Test: 2, 3, 5, 13, 15, 19, 34, 35	
11.6	Hwk: 3, 7, 11, 15, 21, 24, 32, 42	
	Quiz/Test: 1, 5, 9, 13, 17, 23, 25, 31, 33, 35, 43	
11.7	Hwk: 7, 11, 25, 28, 34, 37, 43	
	Quiz/Test: 1, 2, 5, 9, 13, 23, 35,	
11.8	Hwk: 2, 3, 5, 7, 17, 30	Skip two constraints.
	Quiz/Test: 1, 9, 19, 31, 37	

Chapter 12 - Multiple Integrals

approximately 1 week

Section	Problems	Notes
12.1	Hwk: 1, 7, 8, 12, 15, 17, 24, 29, 35	Skip midpoint rule.
	Quiz/Test: 3, 9, 11, 13, 19, 21, 23, 31, 34	
12.2	Hwk: 1, 3, 7, 9, 11, 15, 17, 19, 21, 24, 37, 41, 43.	
	Quiz/Test: 5, 13, 23, 27, 39, 45, 49	
12.3	Hwk: 1, 3, 9, 13, 14, 17, 21, 23, 25.	
	Quiz/Test: 2, 4, 5, 7, 11, 15, 19, 24, 26,	
12.4	Hwk: 5, 7, 10, 11, 12	Skip moments of inertia.
	Quiz/Test: 3, 9, 13, 15	
12.5	Hwk: 5, 6, 7, 11, 13, 15, 17, 25, 29, 31, 37	
	Quiz/Test: 9, 10, 14, 19, 26, 27, 33, 39	
12.6	Hwk: 3, 5, 8, 11, 17, 20, 23, 27, 29	
	Quiz/Test: 1, 2, 4, 6, 7, 9, 13, 15, 19, 21, 30	
12.7	Hwk: 1, 3, 5, 9, 13, 15, 17, 20, 21, 23, 27	

	Quiz/Test: 2, 4, 6, 7, 8, 11, 19, 25, 29, 37	
12.8	Hwk: 1, 6, 7, 9, 15, 17, 23	
	Quiz/Test: 3, 8, 16, 19, 25	
Chapter 13 - Vector Calculus Approximately 1 week		
Section	Problems	Notes
13.1	Hwk: 1, 5, 7, 13, 15, 25	
	Quiz/Test: 11, 12, 14, <u>16-18</u>	
13.2	Hwk: 1, 3, 5, 7, 9, 17, 19, 21	
	Quiz/Test: 6, 11, 13, 15, 18, 22	
13.3	Hwk: 1, 3, 5, 7, 9, 11, 15, 17, 20, 21	Skip conservation of energy
	Quiz/Test: 4, 8, 13, 18, 21, 22, 31	
13.4	Hwk: 5, 7, 9, 13, 17	
	Quiz/Test: 1, 3, 6, 11, 18	

Final Exam: Last class