

**Departmental syllabus for MAT 512
Spring 2015
MWF 10:35-11:30 120 Carnegie**

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Course Description MAT 512 is the second in a two semester sequence on the foundations of analysis that begins with MAT 412. These two courses revisit many of the topics that are first introduced in a basic calculus course – continuity, differentiability, limits, and the Riemann Integral – but the emphasis here is on supplying full mathematical rigor. It is “calculus done right.” Students will also continue to hone skills in writing proofs, and in engaging in mathematical discourse, both written and oral.

MAT 512 is required for both the B.A. and B.S. degrees in mathematics. It is also a popular choice for a minor in mathematics, not only because it counts toward the minor but also because it is a prerequisite for many 500 level mathematics courses.

Catalog Description

MAT 512 Introduction to Real Analysis 3 Y

Real number system, set theory and elementary topological properties of the real line, continuity and differentiability, sequences and series, uniform convergence, Riemann integration, and improper integrals. Prereq: MAT 412 or permission of instructor.

Text William R. Wade, An Introduction to Analysis, 4th edition, Pearson, Upper Saddle River, N.J., 2010. ISBN-13: 978-0-13-229638-0

I plan to cover chapters 5-7, and perhaps a bit of 8, time permitting.

Tests There will be three in-class examinations and a cumulative final examination:

Test 1 Friday, February 13, in class

Test 2 Friday, March 20, in class

Test 3 Friday, April 24, in class

Final Exam Wednesday, May 6, 8:00 am – 10:00 am (Location TBA)

There are no makeup tests. If you have to miss a scheduled test, then the final examination will count correspondingly more. Make sure you do not make plans to leave campus before the final exam!

Homework There will be regular homework assignments that count significantly towards your grade. It is essential that you make every effort to do the homework on your own and without using outside sources. Complete and elegant solutions to every problem in Wade can be found somewhere on the internet, put there by misguided souls who believe they are doing the world a favor. **Do not look at these materials!** To present anyone else's ideas as your own – even those of another student – is a violation of academic integrity. You can expect homework to be collected each Friday.

Calculators Calculators may be used on homework and tests, but will probably not be very useful in an abstract course such as this.

Grading The final grade will be based upon a course score made up of the following components: homework and quizzes 25%, tests 45%, final 30%. The following grading scale will be applied to produce the final letter grade: 92.5 – 100% A, 90-92.5 A-, 87.5-90 B+, 82.5-87.5 B, 80-82.5 B-, 77.5-80 C+, 72.5-77.5 C, 70-72.5 C-, 60-70 D, Below 60 F

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 303 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 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. You are also welcome to contact me privately to discuss your academic needs although I cannot arrange for disability-related accommodations.

Academic Integrity: The Syracuse University Academic Integrity Policy holds students accountable for the integrity of the work they submit. Students should be familiar with the Policy and know that it is their responsibility to learn about instructor and general academic expectations with regard to proper citation of sources in written work. The policy also governs the integrity of work submitted in exams and assignments as well as the veracity of signatures on attendance sheets and other verifications of participation in class activities. Serious sanctions can result from academic dishonesty of any sort. For more information and the complete policy, see <http://academicintegrity.syr.edu>

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. For fall and spring semesters, 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.

Learning outcomes, Help, and Tips

Learning outcomes

For all Math courses:

- Students will be able to use and understand the usage of mathematical notation
- Students will be able to select an appropriate mathematical model for a given real world problem
- Students will be able to do hand calculations accurately and appropriately
- Students will be able to do calculations with the aid of appropriate hardware and/or software

For all Math courses MAT 275, 295 and above:

- Students will understand the nature and role of deductive reasoning in mathematics
- Students will be able to follow proofs and other mathematical discourse
- Students will be able to write simple proofs in the major proof formats (direct, indirect, inductive), and, more generally, to engage in mathematical discourse
- Students will be able to apprehend and enunciate the limitations of conclusions drawn from mathematical models

For all Math majors:

- Students will have a basic knowledge of the contributions and significance of important historical figures in mathematics
- Students will have a basic knowledge of the major modern theories of analysis, abstract algebra, geometry, and applied mathematics
- Students will be able to effectively use mathematical word processing software
- Students will have a basic understanding of career options available to mathematics majors
- Students will be able to locate and use sources and tools that aid mathematical scholarship

Getting help

Your instructor and recitation instructor will be holding regular office hours and will make appointments with students having class conflicts with their scheduled office hours. In addition, the Mathematics Department offers regular math clinics. These will be set up by the second week of the semester and a schedule of the clinics will be posted outside the math office and on the department's website.

How to succeed

Here are a few basic suggestions for how to succeed in this course.

1. It is absolutely essential that you understand how to solve the assigned homework problems and, more importantly, how and why the skills and techniques presented in the course are used in solving the assign problems. Quiz and exam questions will be similar to these problems.
2. Ask questions in lecture, recitation and/or 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. Mathematical 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.

