

Real Analysis II: Spring 2018

- **Instructor:** Professor Chris Kottke
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- **Course Webpage:** <http://ckottke.ncf.edu/analysis/>, or Canvas
- **Course Meetings:** M,Th 2:00-3:20, HNS 106
- **Office Hours:** M,T,Th 3:30-4:30

Course Description: This course is a continuation of Real Analysis I. Having introduced last semester the notions of sequences, convergence and continuity in general metric spaces, and the basic calculus of single variable functions, the focus this semester will be on *function spaces*—sets of functions equipped with various metrics. We will investigate the consequences of different types of convergence for sequences and series of functions, the interchange of limits with other operations such as integrals and derivatives, and topological properties (such as compactness and density) of subsets of function spaces. We will also develop some of the calculus of functions of several variables including the general inverse and implicit function theorems and the existence and uniqueness theorem for systems of ODE, and, time permitting, some of the rigorous theory of Fourier series.

Objectives: As with last semester, the two major objectives of this course are (1) to master the course content, and (2) to continue to develop your skills at formulating and presenting original proofs.

Instructional Method: The course will continue to be conducted using the Moore Method, with some modifications made in light of student feedback from last semester. While you as the students will again provide the proofs and solutions to the theorems problems, the instructor will give a lecture for some or all of the course meeting once a week to provide context and spur discussion. In contrast to last semester, collaboration *will* be permitted for most of the term. Apart from these modifications, the main principles remain the same:

- Regular attendance and participation is a major part of the assessment, and is expected of all students.
- The use of textbooks or other sources to look up proofs is not permitted. All work is to be *original* and either individual or collaborative with other classmates; each student in a collaboration is expected to be able to present the group's original results.
- Class discussion of proof presentations will be scrutinizing but supportive. The point is *not* about competition between students, but rather about the collective effort to understand the rigorous arguments supporting the material.
- Not every student is expected to prove or solve every theorem or problem, but each one will prove/solve some of them, and as a collective, the class will make its way through the rigorous development of the course material. Students of a wide variety of mathematical backgrounds will be able to participate successfully.

Pre-requisites: Real Analysis I, or permission of the instructor.

Assessment criteria: All students will present original work during class meetings, and should come prepared for discussion and/or presentation at any meeting. These presentations and class participation will be the most significant portion of the evaluation. In addition, there will be weekly homework problems, an oral midterm exam, and a take-home final exam.

Office Hours: As the instructor, I will be happy to discuss any partial work in office hours; this will be your best resource outside of class since textbooks and other sources are prohibited. I will also be happy to reproduce or discuss any proof already given in class, or to discuss your progress in the class.

College Policies: Students in need of academic accommodations for a disability may consult with the office of Students Disability Services (SDS) to arrange appropriate accommodations. Students are required to give reasonable notice prior to requesting an accommodation. Students may request an appointment with SDS in-person (HCL3), via phone at 941-487-4496 OR via email at disabilityservices@ncf.edu.

No student shall be compelled to attend class or sit for an examination at a day or time when he or she would normally be engaged in a religious observance or on a day or time prohibited by his or her religious belief. Students are expected to notify their instructors if they intend to be absent for a class or announced examination, in accordance with this policy, prior to the scheduled meeting.