

Real Analysis: Fall 2017

- **Instructor:** Professor Chris Kottke
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- **Course Webpage:** <http://ckottke.ncf.edu/analysis/>, or Canvas
- **Course Meetings:** M,W,F 9:00-9:50, HNS 106
- **Office Hours:** M 4:00-5:00, W 1:00-2:00, F 11:00-12:00

Course Description: Analysis is one of the three pillars of modern mathematics, along with algebra and geometry. Broadly speaking, analysis is concerned with the study of functions and their properties, such as continuity, differentiability and integrability. In this course, we will build up the foundational elements of real-variable analysis: the completeness and topology of the real numbers and Euclidean space, sequences and series, continuous functions, and the classical theorems of single variable calculus.

While some of the results will be familiar from your basic calculus courses, our treatment will be entirely rigorous. Moreover, aside from mastering the content, the primary objective of this course is to afford you the experience of doing original mathematics. So, *you the students* will develop *original proofs* of all the results that we will cover.

Instructional Method: The course will be conducted using the “Moore Method”. In this instructional method there is no textbook and the instructor does not lecture. Instead, the instructor guides the students through the material by providing a sequence of theorems and problems that they prove or solve individually, outside of class. The class meetings consist of student presentations and discussions of these solutions. The principles of this version of the Moore Method are:

- Regular attendance and participation is a major part of the assessment, and is expected of all students.
- Collaboration on out-of-class work is not allowed, nor is use of textbooks or other sources to look up proofs. All work is to be *original* and *individual*, so that each student develops the skill of “doing mathematics”.
- Class discussion of proof presentations will be scrutinizing but supportive. The method 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 corpus of real-single-variable analysis. Students of a wide variety of mathematical backgrounds will be able to participate successfully.

Pre-requisites: You should have completed the basic Calculus sequence (I, II, and probably III). Previous experience with mathematical proof writing is not strictly required, but will be helpful, as will be some familiarity with some basic set theory and logic (sets, subsets, functions, rules of logical inference, etc.).

Assessment criteria: All students will eventually present original work during class meetings, and ideally should come prepared to present at any meeting. Additionally, once a week students

will hand in written work on at least one problem or theorem that they did not present. Satisfactory assessment will be depend on regular participation and skill development.

Office Hours: As the instructor, I will be happy to discuss your partial work in office hours; this will be your best resource outside of class. While I won't give you answers, I may be able to help get you "un-stuck". 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.