Math 452 - Introduction to Real Analysis II, Fall 2018
Course Syllabus

Instructor: Brian Leary
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Office: Learning Resource Center 323K
Office hours: Tues 9:30-10 & 1-2, Wed 9:30-10 & 2-3, Thurs 12-2
Math Tutoring Lab: Mon 2-3, Fri 9-10
Class Room/Time: INN-B 204, MWF 1:00-1:50 pm
Course website: community.wvu.edu/∼bal0018/math452F18.html

Homework assignments will be posted on the course website. Course announcements may also be posted on the website or sent via email. Please be sure to check the website regularly, and to regularly check the email address you have on record. You are responsible for any information posted on the course website.

Textbook: There are no required textbooks for the course. However, a strongly recommended textbook is *Analysis II*, Third Edition, by Terence Tao. In addition to the required homework exercises that I will write up, I will also assign optional exercises out of this textbook. I can also give other recommendations for real analysis books upon request, both more advanced and less advanced than this course.

Catalog Data: MATH 452. Introduction to Real Analysis 2. (3-0) Credits 3. A study of sequences, convergence, limits, continuity, definite integral, derivative, differentials, functional dependence, multiple integrals, sequences and series of functions.
Prerequisite: MATH 451.

Course material: Roughly the first third of the course will cover metric space topology, in which we will rehash some material from Analysis I such as convergence of sequences and continuity of functions, but reframed in the world of more general metric spaces. We will then spend some time discussing sequences of functions, series of numbers, and then series of functions (through both power series and Fourier series). If time permits, in the final couple weeks of the course, we'll go through some miniature introductions to further areas of study in analysis. Time permitting, these areas may include multivariable differential calculus (and the implicit function theorem), general topology, Lebesgue measure theory, complex analysis, function analysis, or ordinary differential equations.

Course Objectives: Upon successful completion of the course, the student will be able to do the following:

1. Give definitions for terms in metric space topology.
2. Write ε-based proofs in problems involving limits or continuity.
3. Give definitions for terms involved in power series and Fourier series.
4. Write ε-based proofs in problems involving series of numbers and sequences and series of functions.
5. Correctly cite and use the major theorems covered in the course.

Topics:

1. Introduction to Metric Spaces and Sequences in Metric Spaces
2. Functions on Metric Spaces and Continuity
3. Sequences of Functions and Uniform Convergence
4. A Brief Review of Series of Numbers
5. Power Series
6. Fourier Series
7. Special Topics (if time permits)

Grading: Your final grade will be based on homework, attendance, one project, two exams during the semester, and the final exam, which will not be cumulative. Your final course score will be computed via the following grading scheme:

- 20% Homework + 5% Attendance + 15% Project + 20% Exam 1 + 20% Exam 2 + 20% Final Exam

Letter Grade Cutoffs: A: 90%, B: 80%, C: 70%, D: 60%, F: below 60%

Homework: Homework assignments will be posted on the course website. There will likely be about 10 total assignments, and your lowest 2 homework scores will be dropped from grade computation. The homework is the most important part of this class. To be more precise, not knowing how to do the homework is the most important part of this class. At this level, mathematics is learned by trying to solve problems and failing over and over again. Therefore, you should be prepared to spend many hours each week in frustration, finding flaws in your arguments, or simply stuck not knowing what to do next! To that end, every student is expected to write out their own solutions for the homework problems. Any verbatim copying of solutions, either from another student or from a textbook or online resource, is prohibited and is considered plagiarism. However, you are permitted and even encouraged to collaborate with each other, as long as each student writes up a final copy of their solutions on their own.

Project: Each student will be given a slightly more difficult problem to solve on their own and present their solution in class. You will have between two and three weeks to work on this from the time it is assigned to the time you will present. The purpose of this project will be to strengthen your problem-solving abilities, your proof-writing abilities, and your presentation abilities. More details will be given in class.

Exams: There will be two exams, details TBA. The final exam scheduled by the university is Friday, December 14 from 1:00-2:50. Make-up exams will only be given to students with excused absences, and such make-up exams must be scheduled within 24 hours of the missed exam.

Attendance: There should be roughly 45 lectures. If you miss 0-6 lectures, you will receive the full 5 attendance points for the semester. If you miss 7-8 lectures, you will receive 4 attendance points. If you miss 9-10 lectures, you will receive 3 attendance points. If you miss 11 lectures, you will receive 2 attendance points. If you miss 12 lectures, you will receive 1 attendance point. If you miss 13 or more lectures, you will get a 0 for your attendance score.

Class policies:

- Graphing calculators will never be allowed during any exams. Scientific calculators will be considered on an exam by exam basis. You may use any calculator to help you do the homework if you wish, but you should keep in mind that you may be required to solve similar problems without a calculator on the quizzes and exams.
- If you believe a problem on a homework assignment or exam has been graded incorrectly, you must notify the instructor of your complaint within 7 days of the date the exam is handed back. If you are unable to retrieve your graded material at the time it is handed back, it is your responsibility to make arrangements with the instructor to retrieve the material at another time.

Getting Help: Please feel free to come to office hours or email me if you have questions about the course material. If you are unable to make it to my regularly scheduled office hours, I am willing to make an appointment to meet at another time if possible. Additionally, you can get help in the Math Tutoring Lab in LRC 323 from 8 AM to 4:30 PM. Free tutoring is also available through Student Support Services, located in Benedum 130, and the Student Success Center, located in the library on the second floor of LRC. Finally, I would also encourage the formation of study groups, to learn from each other and help each other learn.

Academic Integrity: The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code at http://studentlife.wvu.edu/office_of_student_conduct/student_conduct_code. Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me before the assignment is due to discuss the matter. [Available at: http://facultysenate.wvu.edu/r/download/15702]