MTH 539-540 Class Policy

2009 Fall- 2010 Spring
MTH 539-540
Real Analysis I and II

Professor: Jeremy J. Becnel,
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Phone: 468-1582
Office: 322 NM
Office Hours: 1-3 TTH, 11-1 Mon, 1-3 Mon (in 358);
Class meeting time and place: 8:00-9:15 TR, Room 201

Text and Materials:
Introductory Real Analysis, by Kolmogorov and Fomin

Course Requirements:
One midterm, One final, several homework assignments.

Overview. This is a two part introductory course in Real Analysis. This course introduces the fundamental concepts and topics in Real Analysis. In this course we cover the following topics over the following two semesters: (time spent is in [ ])

Course Calendar:
- Elementary Set Theory: Basic definitions and operations on sets; Function image sets and preimages; Equivalence relations. (Chapter 1: Section 1) [5%]
- Countable and Uncountable Sets: Definitions and theorems of countable and uncountable sets; Powers sets; Uncountability of the real numbers. (Chapter 1: Section 2) [5%]
- Metric Spaces: Definitions, theorems, and examples of metric spaces; Convergence and limits in metric spaces; Open, closed, and dense sets. (Chapter 2: Sections 5 and 6) [7.5%]
- Complete Metric Spaces: Definitions and examples; Completion of a metric space. (Chapter 2: Section 7) [5%]
- Compactness in Metric Spaces: definitions and examples; totally bounded sets, Heine Borel. (Chapter 3: Section 11) [7.5%]
- Vector Spaces: definitions and examples; subspaces; functionals; (Chapter 4: Section 13) [5%]
- Normed Linear Spaces: Definitions and examples; Banach space; Metric induced by a norm; Equivalence of norms. (Chapter 4: Section 15) [5%]
- Inner Product Spaces: Definition and examples; Hilbert space; Orthogonality; Separable Hilbert space; Riesz-Fischer Theorem; Orthogonal complement;
Parallelogram law; Characterization of inner product spaces. (Chapter 4: Section 16) [10%]

- Systems of Sets: Rings of sets, Semirings of sets, Borel algebras. (Chapter 1: Section 4) [5%]
- Measure: Elementary sets; Construction of measures; sigma-algebras; Finite additivity; sigma-additivity; Outer and inner measure; Measurable sets; Lebesgue measure; Non-measurable set; Translation invariance of Lebesgue measure. (Chapter 7: Sections 25, 26, 27) [17.5%]
- Measurable Functions: Simple functions, Convergence almost everywhere. (Chapter 8: Section 28) [7.5%]
- Integration: Lebesgue integral and properties; Monotone Convergence Theorem; Dominated Convergence Theorem; Convergence in measure. (Chapter 8: Sections 29, 30) [15%]
- (Time Permitting) $L^p$ spaces: Inequalities; Banach spaces $L^p$, $1 \leq p \leq \infty$; Metric spaces $L^p$, $0 < p < 1$; Hilbert space $p = 2$. (Chapter 10: Section 37) [5%]
- (Optional) Probability Theory, Random Variables, Distributions
- (Optional) Product Measure, Fubini Theorem
- (Optional) Raydon-Nikodym Theorem

**Departmental Course Syllabus Link:**
http://www2.sfasu.edu/math/courses/syllabi/MTH539Syllabus.pdf
http://www2.sfasu.edu/math/courses/syllabi/MTH540Syllabus.pdf

**Grading Policy:** The final average will be computed using the following weights:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Homework</td>
<td>50%</td>
</tr>
<tr>
<td>Final exam</td>
<td>30%</td>
</tr>
<tr>
<td>Midterm</td>
<td>20%</td>
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**Homework**
For homework assignments you should consider working together. However, I ask that you do not simply give answers to your fellow students, but merely discuss ideas. For example, telling someone that for problem 4 I proved it indirectly and used theorem 3.2 is alright, but just giving someone your written up work is not.

**Exams**
There are **no** make-ups for missed exams, so make every effort to be at class on exam day. If you know ahead of time that you will miss an exam, see me at least one class before the scheduled exam and we will work something out. Department policy requires that you bring and be recognizable from either your **SFASU Student ID** or another valid photo ID before you are permitted to take each exam.

**Final Exam**
The final exam is comprehensive and counts 30% toward the final grade. The time for the final exam is 8-10 a.m. on Thursday, December, 17th 2009.
Attendance Policy:
Attendance is expected but will not be recorded. Any student that misses class is responsible to getting the lesson from that day from another class member.

Academic Integrity (A-9.1):
Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

Definition of Academic Dishonesty
Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit. Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp

Withheld Grades Semester Grades Policy (A-54):
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average. The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.

Students with Disabilities:
To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.