"There are many questions which fools can ask that wise men cannot answer."
- George Polya, mathematician

Time: MWF 1:10 – 2:00
Place: Math 103
Instructor: Dr. Sriraman
Office: Math 301
Office Hours: MW: 11.00-12.00 and by appointment
Phone & E-mail: 243-6714;

Pre-Requisite: Math 172

Catalog description: Designed to prepare students for upper-division proof-based mathematics courses. Topics include proof techniques, logic, sets, relations, functions and axiomatic methods.


Other Material: Straight-edge and compass

Agenda: This course will survey introduce students to the logic, techniques and the necessity of proof with relevant contexts from number theory, geometry, algebra, analysis and combinatorics.

A. Course overarching learning goals:
1. to develop a facility in using the language of mathematics, to learn the language of mathematics and to gain understanding of mathematical rigor.
2. to learn how to read, construct, and write proofs and recognize when the reasoning is correct and when it is incorrect.
3. to create and develop the ability to reason mathematically as demonstrated by the construction of proof strategies, methods and techniques and the clearness with which a proof is written.
4. to learn to work in the realm of abstract mathematics, correctly applying definitions, axioms, and theorems.

B. Course specific learning goals:
1. to learn the basics of mathematical logic
2. to learn how to construct and write direct proofs, contrapositive proofs, proofs by contradiction, and proofs by mathematical induction.
3. to understand how the various numbers systems (natural numbers, integers, rational numbers, real numbers, complex numbers) can be introduced rigorously, and to learn the distinguishing properties of these numbers systems.

Administrative Policies:

Important Dates:
February 5 Last Day to Add via CyberBear
February 15 Last Day to drop and/or change grading option. After this date, a drop results in W on transcript and no refund is given.
February 18 President’s Day- No Classes, Offices Closed
April 1-5 Spring Break
April 8 Last Day to Drop by Paper Forms. After April 8 student is only allowed to make changes by petition with instructor signature and recommendation. The petition also requires the Dean’s signature. This option ends on May 10.
May 10 Last Day of Regular Classes
May 16 3.20- 5.20. Final exam
Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. Academic misconduct is defined as all forms of academic dishonesty and the Student Conduct Code. The Code is available for review online at http://www.umt.edu/AS/APSA/index.cfm/page/1321

In particular, Student Conduct Code Section IV.a.5 identifies the following violations:

Submitting false information: Knowingly submitting false, altered, or invented information, data, quotations, citations, or documentation in connection with an academic exercise

Students with disabilities may request reasonable modifications by contacting me. The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS). “Reasonable” means the University permits no fundamental alterations of academic standards or retroactive modifications. For more information, please consult http://www.umt.edu/disability

**Grading Distribution:**

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>100</td>
</tr>
<tr>
<td>1 Group Project</td>
<td>50</td>
</tr>
<tr>
<td>1 Mid-term exam</td>
<td>100</td>
</tr>
<tr>
<td>1 Take-home Midterm exam</td>
<td>100</td>
</tr>
<tr>
<td>Final exam</td>
<td>200</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>550</strong></td>
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</tbody>
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**Grading Scale:**

- 90-100 A
- 80-89.9 B
- 70-79.9 C
- 60-69.9 D
- Below 60 F

**Endnotes:**

1. **Homework**
   There will be homework assignments given to you over the course of the semester, and it is imperative that you complete these assignments properly. I.e., spend time reading and writing coherent proofs. You may also be asked to occasionally present a proof to the class on an ad-hoc basis. I know this puts pressure on you but it is necessary for me to put this pressure so that you succeed in this course. It is important you understand your mistakes and improve your proof writing as the semester progresses. There will be 8-10 homework sets over the course of the semester, and the lowest grade will be dropped. Late Homework will not be accepted.

2. **Project**
   The only way to become proficient at proofs is to write and present a lot of them. Proof in the mathematics community is a “social” activity. One presents ideas and subjects them to scrutiny. Students will be assigned to groups of 3-4 and will work TOGETHER on a small (but extended) project every Friday beginning a few weeks into the semester. Over the course of the semester, you will be asked to present your ongoing work. This may seem intimidating at first but with time, will become comfortable and proficient.

   Participation (including, but not limited to, attendance) will account for 50% of your project grade. The remaining 50% will be based on the group presentations and project paper. Students will be expected to organize their groups and keep tabs on their group mates’ participation.

3. **Mid-terms and Final**

   If you are diligent about 1 and 2, you will do well in your mid-terms and final. The mid-terms 1 and 2 will be given approximately 1/3 and 2/3, respectively, of the way through the semester. The final will not be cumulative in the traditional sense, but will have a cumulative component to it. It will be longer than the mid-term exams and will feature some questions relating directly to material taught earlier in the course.