“There are many questions which fools can ask that wise men cannot answer.”

– George Polya, mathematician

<table>
<thead>
<tr>
<th>Time</th>
<th>MWF 1:10 – 2:00</th>
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<tbody>
<tr>
<td>Place</td>
<td>Math 211</td>
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<tr>
<td>Instructor</td>
<td>Dr. Sriraman</td>
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<tr>
<td>Office</td>
<td>Math 301</td>
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<td>Office Hours</td>
<td>MW: 12.00-1.00</td>
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<td>Phone &amp; E-mail</td>
<td>243-6714;</td>
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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.
5. to create and develop students’ critical thinking ability and independent thought.

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 learn properties of abstractly defined functions and relations.
4. 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:

Monday, Sept 3  
Labor Day Holiday

Monday, Sept 17, 5.00 pm  
Last Day to Add/Drop by CyberBear.
Also last day to select AUDIT option. After this date, a drop results in W on transcript and no refund is given.

October 29  
Last Day to Drop by Paper Form. Transcript will show WP or WF.
After Oct. 29, 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 December 7.
Tuesday, November 6       Election Day, No classes, Offices closed
Monday, November 12       Veterans Day, no classes
Wednesday, November 21    Student Travel Day, no classes
Thursday-Friday, November 22-23  Thanksgiving Holiday, no classes
Friday, Dec 7,             Last Day of regular classes

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:
Homework                          140 points
Project/s                          60 points
2 Mid-term exams                   200 points

[Test 1: October; Test 2: November; Dates will be announced a week in advance]

Final exam                        200 points
Total:                             600 points

Grading Scale:
90-100   A;    80-89.9  B;   70-79.9  C;  60-69.9  D;  Below 60  F

Final Exam:  1.10-3.10, Monday, December 10 (No exceptions)

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. I will not
tolerate laziness or half-hearted attempts. 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 homework sets over the course of the semester, and the lowest grade
will be dropped.

Late Homework will not be accepted.
2. Projects
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 small (but extended) projects 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. It is likely that these exams will have a take-home component to be due the Monday after the in-class portion, so plan any weekend trips accordingly. 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.

MORE “FREE” ADVICE
Come to class, work hard, participate in the planned activities, and you will do well in this course. Good luck and welcome to 307.