MAT 234 Introduction to Mathematical Proof

Section 1 TR 9:25-10:40
Sullivan Building 208
Salem State University

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Office Hours: TRF 11:00-12:00, W 2:00-4:00
or by appointment

Required text: The textbook this semester is Mathematical Reasoning: Writing and Proof, 3rd edition, by Ted Sundstrom. This text is part of the Open Textbook Initiative by the American Institute of Mathematics and can be found here:
http://scholarworks.gvsu.edu/books/7/
or by using the link on my webpage.

Overview: This course is an introduction to mathematical proof and the fundamental notions of higher mathematics. Topics may include the basics of propositional logic, set theory, mathematical induction, functions, equivalence relations, and cardinality with an emphasis on writing proofs. Three lecture hours per week. Required of all mathematics majors.

Prerequisite: MAT 220.

Grading: There will be two in class exams, tentatively scheduled for October 3rd and November 7th. Each will count for 15% of the final grade. The final exam will count for 25% of the final grade and will take place on Wednesday, December 18th at 8:00 AM. Problem sets will be worth 25% of the grade and the final 20% of the grade will be the portfolio.

Problem Sets: Problems will be assigned throughout the course for you to work on outside of class. A subset of the assigned problems will be submitted for grading approximately every two weeks. Although not every problem will be graded, be aware that it is your responsibility to understand all of the assigned problems. You will be expected to do the problems to be submitted on your own but will be allowed to submit one revision on these problems. Consequently, no late work will be accepted as there will be two firm due dates for these - one for the initial submission and one for the final submission. The only acceptable reason for turning in late work will be for an excused absence and then the problem set will be due the day you return to class.

Proof Portfolio: Next week, you will be assigned 10 proofs to write. Over the course of the semester you will acquire the skills and knowledge to complete all of them. This is intended to be an independent assignment. Drafts of proofs will be submitted throughout the semester and should not be shared among students. More details and dates will be provided when the assignment is handed out.
Attendance Policy: All students are expected to be familiar with the academic regulations, including those regarding Academic Integrity, for Salem State University as published in the college catalog. In addition, each student is responsible for completing all course requirements and for keeping up with all that goes on in the course (whether or not the student is present). If you are going to miss a class, I expect an email or a call to my office before class begins. If you contact me ahead of time (other than unexpected situations that can be verified) then the absence will be excused. If you do not contact me ahead of time then the absence will be unexcused. If you have an unexcused absence on the day of an exam, you will receive a zero for that grade. All unverified “excused” absences after the second one will be considered unexcused. For each unexcused absence, your final grade will be docked in the following manner:

<table>
<thead>
<tr>
<th>No. of Absences</th>
<th>Total Points Lost</th>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>1 + 2 = 3</td>
</tr>
<tr>
<td>3</td>
<td>1 + 2 + 3 = 6</td>
</tr>
</tbody>
</table>

and so forth

Note: For the exams, arrangements must be made at least 24 hours in advance in order for an absence to be excused.

University Policy Statement: Salem State University is committed to providing equal access to the educational experience for all students in compliance with Section 504 of The Rehabilitation Act and The Americans with Disabilities Act and to providing all reasonable academic accommodations, aids and adjustments. Any student who has a documented disability requiring an accommodation, aid or adjustment should speak with the instructor immediately. Students with Disabilities who have not previously done so should provide documentation to and schedule an appointment with the Office for Students with Disabilities and obtain appropriate services.

In the event of a university declared critical emergency, Salem State University reserves the right to alter this course plan. Students should refer to www.salemstate.edu for further information and updates. The course attendance policy stays in effect until there is a university declared critical emergency. In the event of an emergency, please refer to the alternative educational plans for this course located at http://btravers.weebly.com. Students should review the plans and gather all required materials before an emergency is declared.
Miscellaneous

• I don’t want the class to feel like a lecture. I prefer a class that acts more like a discussion. You will get more out of the class if you participate and if you stop me when there is something that you do not understand.

• Believe it or not, it is actually helpful to read the textbook. If you read the material, it will reinforce the topics covered in class. It is more beneficial, in my experience, to read the section before we cover it so that you know where you have questions ahead of time.

• Please turn off the ringers on all cell phones and pagers before coming to class.

Global Goals

This course is intended to provide you with the knowledge to:

• Make critical decisions about which proof techniques are most appropriate in a given situation

• Critically analyze statements for veracity and produce counterexamples for false claims and formal proofs for true ones

• Communicate ideas about mathematics articulately, both verbally and in writing

• Use mathematical language and symbols precisely and rigorously in written form

Instructional Objectives

By the end of the course, you should be able to:

• prove logical statements involving equivalence, implication and negation \(^{12345}\)

• prove statements using truth tables and symbolic logic \(^{14}\)

• use standard proof techniques, direct contrapositive, cases, induction and contradiction to prove statements \(^{12345}\)

• write proofs concerning basic number theory concepts, including divisibility, primes and congruence \(^{1345}\)

• prove concepts about function, including injectivity and surjectivity \(^{2345}\)

• write proofs, including the use of a typesetting program and standard format conventions \(^{45}\)

\(^{1}\) assessed through Exam 1
\(^{2}\) assessed through Exam 2
\(^{3}\) assessed through Final Exam
\(^{4}\) assessed through Problem Sets
\(^{5}\) assessed through Proofs Portfolio