University of Rhode Island, Department of Mathematics
MTH 307, Introduction to Mathematical Rigor, Fall 2019

Professor:	Nancy Eaton
Office Location:	Lippitt Room 202C
Telephone:	401.874.4107
Email:	neaton@uri.edu
Office Hours:	Posted on Starfish
Class Days/Time:	Tuesday and Thursday 11:00 AM – 12:15 PM
Classroom:	Swan Hall 207
Prerequisites:	The prerequisite for this class is MTH 142, Intermediate Calculus with Analytic Geometry

Course Description

This course is an introduction to the symbolism and language of rigorous mathematics. Topics include logic, set theory, real numbers and integers, functions and relations, cardinality, induction, methods of proof. The emphasis is on precise written and oral presentation of mathematical arguments.

Course Goals

This course is a prerequisite for MTH 316, Abstract Algebra, and MTH 435, Real Analysis I. Prior to taking those advanced courses, it is important to have experience writing proofs, using logic, and speaking the language of mathematics, so that you will be able to focus on the content of those courses. The topics we will cover are:

- The language of mathematics – Mathematicians often use symbols in place of words, phrases, and definitions. It can seem like learning a new language. You will expand your vocabulary of symbols used in math.
- Logic – Rules of logic are the backbone of proofs.
- Proof techniques – The methods of direct and indirect proofs, including contrapositive and contradiction, are heavily used in mathematics.
- Quantifiers – Statements to be proven often include terms such as "for every" or "there exits."
- Sets – Sets are basic to all of mathematics. We identify sets that are commonly used in mathematics and explore various ways to describe sets, including set operations and indexed sets.

- Mathematical Induction is another important proof technique.
- Cardinality of sets – Sets are finite or infinite. Infinite sets might be countably infinite (e.g. the integers) or uncountably infinite (e.g. the real numbers).
- Functions – Functions are a special type of mapping from one set to another. Sequences are a special type of function. We take a fresh look at limits.

Specific Student Learning Outcomes (SLOs)

1. Precisely express mathematical statements in writing
2. Write logically correct proofs
3. Determine and explain the correctness of proofs
4. Accurately describe sets in writing
5. Communicate concepts covered in class verbally

Required Text
Douglas Smith, Maurice Eggen, & Richard St. Anadre. 2013.*A Transition To Advanced Mathematics*, 8th Edition. Cengage Learning.

Obtaining the text
If you want the online version of this text, you may want to subscribe to Cengage Unlimited where you have access to the whole library of online textbooks for one price. I also saw some used versions of the hardcover available online for around $26.

Sakai
You are required to use the Sakai course worksite, where I will post homework announcements assignments, handouts, videos, and grades. Check it often and be sure to ask me if you see any discrepancy with your grades.

Assignments and Grading Policy

Homework: Assignments will be given most weeks, 11 in all. See the schedule. Include your name, homework assignment number, and date at the top of the front page. Typed assignments, using latex or MS word, will be expected after the first few weeks of class. **IMPORTANT: Each assignment must be uploaded to the Sakai worksite as ONE document in PDF format.** When homework is returned to you, with less than full credit, you should find out what you did wrong and rewrite it for your notes. SLOs 1-4. (Homework is worth 25% of grade)

Exams: Three 1-hr. exams will be given. See the schedule. You will be expected to solve problems similar to the homework problems and material covered in class. SLOs 1-4. (Exams each worth 15% of grade).

Oral presentation opportunities will be provided throughout the semester. These will be based on selected problems from homework assignments. On the days that I hand back homework, I will ask a few students to present their solutions to the class. You will become more and more proficient at explaining your work verbally as the semester progresses. SLO 5. (5% of grade)

Class work will give you opportunities to explain your work to others in an informal setting. Group assignments will be given during class and collected. When you work in groups in class, you will hand in one sheet per group with your names on it. Also one-minute quizzes will be given (and not collected) during class. SLO 5. (5% of your grade)

Final Portfolio: The final will consist of a portfolio and a presentation. I will select some of the homework problems from those that you handed in during the semester and others in the book, for you to rewrite and hand in as a sample of your finest work. The due date will be the day of the final. The selection of problems will be announced 2 weeks before it is due. In order to prepare for this assignment, you should rewrite all of the homework problems that are returned to you with less than full credit, so that when the selection is announced, you will be ready! Each student will present the solution to one problem from the portfolio. Mastery of SLOs 1-5. (20% of your grade: 15% portfolio and 5% presentation)

Challenge problems will be indicated in each homework assignment. These will count for extra credit on your homework. The homework portion of your grade cannot exceed 25%.

Homework – 25%
3 exams – 45% (15% each)
Oral presentations of homework and class work - 10%
Portfolio & final presentation – 20% (15% portfolio, 5% presentation)

Grade scale
A 93-100; A- 90-92;
B+ 87-89; B 83-86; B- 80-82;

C+ 77-79; C 73-76; C- 70-72;
D+ 67-69; D 60-66;
F <60

Policies

Homework: **IMPORTANT: Each assignment must be uploaded to the Sakai worksite as ONE document in PDF format.** I strive to give feedback on your homework by the next class (Tuesday) after it is due (Saturday). I will write directly on the assignment and/or provide a solution guide. Homework is submitted through Sakai. The deadlines are given there. There will be a later date by which I will accept late work (the night before the next class). No homework will be accepted after this late date. BUT if you submit your homework after the due date and before the late date, points will be taken off. In this case, I can't guarantee that I will return it to you in a timely manner. If you have an extended illness that prevents you from doing your weekly homework assignments, please talk to me about it.

Makeup exams: The usual rules apply to makeup exams. You may make up an exam only in exceptional circumstances – you will be required to provide me with a written excuse, signed by you, stating the reason you had to miss the exam. You must contact me before the time of the exam if at all possible. (I don't need to see a diagnosis from a doctor.)

Review sessions: As you can see on the syllabus, a review session is given before each exam during class. During this session, we will review important concepts. You may bring questions to this review session. Write each questions out so that I can put it up on the document camera and share it with the class.

Attendance: Coming to class 100% of the time will ensure success. Although attendance is not counted as part of your grade, I will keep track of attendance. If you attend class and are having trouble with assignments, I can work with you and refer to things covered in class. However, if you are not doing well and you are not attending class, I may have limited ways that I can help you be successful.

Laptops: If you have one, bring your laptop or other electronic device to class, if you have one. Otherwise, please let me know. You will have opportunities to ask questions during class through a google presentation using *Slido.*

DISABILITY ACCOMMODATIONS AND OPPORTUNITIES

Any student with a documented disability is welcome to contact me as early in the semester as possible so that we may arrange reasonable accommodations. As part of this process, please be in touch with Disability Services for Students Office at 330 Memorial Union, 401-874-2098.

ACADEMIC HONESTY

All submitted work must be your own. If you consult other sources (class readings, articles or books from the library, articles available through internet databases, or websites) these MUST be properly documented, or you will be charged with plagiarism and will receive an F. Note that in the case that two papers are alike, both parties will be charged with plagiarism. In some cases, this may result in a failure of the course as well. In addition, the charge of academic dishonesty will go on your record in the Office of Student Life. If you have any doubt about what constitutes plagiarism, visit https://web.uri.edu/catalog/probation-and-dismissal/

STANDARDS OF BEHAVIOR

Students are responsible for being familiar with and adhering to the Standards of Behavior, as spelled out in the Student Handbook: https://web.uri.edu/studentconduct/files/Student-Handbook-FINAL-08.22.2019.pdf

RELIGIOUS HOLIDAYS

It is the policy of URI to accord students, on an individual basis, the opportunity to observe their traditional religious holidays. Students desiring to observe a holiday in leu of attending a class session must provide written notification to each instructor, in advance.