

MTH 307 – SPRING 2019

Instructor : Ayşe Sharland
e-mail : aysharland at uri.edu
Office : 102D Lippitt Hall
Office Hours : Wednesdays 10:00-11:00am and 1:00-3:00pm

Course schedule : Tue-Thu, 12:30pm - 1:45pm in Swan 201
Course website : (visit Sakai)

Course Description

This is an introductory course on the concept of rigor in mathematics. We will move away from the viewpoint of mathematics as a computational subject and begin seeing it as a subject requiring airtight logic and, surprisingly, a fair amount of creativity. Particular topics we will investigate include set theory, methods of proof and applications of these to relations and functions.

Textbook

The Tools of Mathematical Reasoning by Tamara J. Lakins, Pure and Applied Undergraduate Texts vol. 26, AMS, 2016.

Learning Outcomes

By the end of the course, you should

- have a firm understanding of the fundamental concepts in mathematics such as
 - Sets
 - Relations
 - Functions
 - Cardinality
- understand the nature of mathematical proof, including the notion of statements, open sentences and conditional statements.
- be able to prove (simple) mathematical statements, particularly conditional statements, using techniques such as
 - Direct proof
 - Contrapositive proof
 - Proof by contradictionas well as being able to prove existence and uniqueness statements. Also to be able to use mathematical induction.
- Perhaps most importantly of all, come to find mathematics as a subject of great beauty, far from the computational drudgery that is found in earlier courses. You will hopefully come to appreciate that the mathematical world is open ended, full of puzzles and questions, and some of you may even feel inspired to consider further mathematics courses which build on the techniques of this course.

Grading

Final grades will be based on quizzes, three midterm exams, and a comprehensive final exam at a date/time TBA. Total points available is 700 with points distributed as follows:

	Points available
Homework Assignments	100 points – see details below,
Quizzes	100 points – see details below.
Exams	300 points (100 points each) – The exams will be administered during the class time. <ul style="list-style-type: none"> • Thursday, February 21 • Thursday, March 21 • Thursday, April 11 All three of these exams will be held in SWAN 201. The policy regarding make-up exams can be found under the Policies.
Final Exam	200 points – Date/Time TBA.

Homework Assignments

There will be homework assignments every week starting from the first week and to be handed back in class on due dates. We will follow the make up policy for exams/quizzes for homework assignments (see below) as well. You may work on the solutions with your classmates. However, you should put your answers on paper using your own wording as exercising writing mathematics is also an important part of this course.

Quizzes

We will have quizzes in class every Thursday starting from February 5 – except on the exam days. Each will take 10 minutes and be worth 10 points maximum. For preparation, you might find the practice problems (listed in the calendar) and homework assignments useful.

For each quiz you will be given a chance to make up if you do not score a 10. I will return your quizzes graded the following Tuesday together with a blank quiz sheet to work on at home. You will hand in both work sheets the following Thursday class. Your grade for the quiz will be the average of the two grades.

It is optional to submit the make up. If you do not hand in a make up your grade will stay the same. You may attempt the “make up” quiz if you miss the quiz in class without any reasonable excuse – this way you might earn 5 points.

Much of the learning of this course will happen outside the classroom time: by reviewing the lecture notes, completing homework assignments and preparing for quizzes. You are encouraged to start working on assignments and practice problems right away, and seek help from either your instructor or tutors at Academic Enhancement Center whenever you feel like you are stuck. It is very important that you do not let “problems” pile up.

Letter Grade Distribution

Final grades will be determined according to the following scale.

92 – 100	A
87 – 91.99	A-
83 – 86.99	B+
79 – 82.99	B
75 – 78.99	B-
70 – 74.99	C+
65 – 69.99	C
60 – 64.99	C-
55 – 59.99	D+
50 – 54.99	D
0 – 49.99	F

Exam Policies

- No notebooks, textbooks or cheat sheets are allowed in the exam.
- During the exam, you may not leave the room for any reason. Please remember to use the bathroom before the exam.
- No cell phones, MP3 players, or any electronic devices of any kind may be used or even accessible to you at any time during the exam. Any student found with any electronic device for any reason during the exam will be considered to be cheating.

Exam and Quiz Make Up Policy

Makeup exams/quizzes may be scheduled in the event you are unable to attend exams/quizzes under the following conditions. In particular, if you must miss the exam because of a scheduling conflict, you must notify your instructor before, not after, the exam, and emergencies require you to contact your instructor within 24 hours. See University Manual sections 8.51.10 and 8.51.14 for guidelines.

- If your reason for missing the exam as scheduled is (i) a University sanctioned event for which verifiable documentation can be provided (including another scheduled class), (ii) a responsibility to an employer that cannot be rescheduled (with documentation from your employer), or (iii) Religious holidays, then you **MUST INFORM YOUR INSTRUCTOR 48 HOURS IN ADVANCE OF THE EXAM AND PROVIDE DOCUMENTATION IF REQUESTED**. Makeup exams will be scheduled after the actual exam, and preferably before the class period when exams are to be handed back, but no later than one week after the original date.
- If the reason for missing the exam as scheduled is due to (i) illness (with verifiable documentation from a medical provider), or (ii) an emergency (with appropriate documentation), then you **MUST INFORM YOUR INSTRUCTOR WITHIN 24 HOURS OF THE EXAM** and provide documentation upon your return. Failure to notify your instructor within 24 hours will result in a 0 for the exam. No exceptions. Makeup exams may be scheduled no later than a week after the original date, unless the illness or emergency precludes this, in which case the makeup exam will be given on a common date during the last few weeks of the semester.
- If your circumstances do not meet either of the above (no documentation, a non-emergency excuse without sufficient notice, etc.), then you will receive a zero for the missed exam. No exceptions.

Electronic Devices

Cell phones should be kept on silent mode during class. All other electronic devices (ipads, ipods, laptops, etc.) should be turned off during class. They can be a distraction to you and your classmates. Excepted from this are tablets used for note-taking.

Academic Honesty Policy

Cheating is defined in the University Manual section 8.27.10 as the claiming of credit for work not done independently without giving credit for aid received, or any unauthorized communication during examinations. Students are expected to be honest in all academic work. The resolution of any charge of cheating or plagiarism will follow the guideline set forth in the University Manual sections 8.27.10-8.27.21. Course content and outlines, exams, and assignments created by instructors shall be considered the instructors intellectual property. Course materials shall not be distributed, shared in any public domain or third party website, or sold without prior written consent of the instructor. See the University Manual section 8.27.22.

Special Needs

Any student with a documented disability may contact the instructor early in the semester so that reasonable accommodations may be arranged. Students can contact Disability Services for Students: Office of Student Life, 330 Memorial Union, 874-2098. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Incomplete Grade

University of Rhode Island regulations concerning incomplete grades will be followed. See University Manual sections 8.53.20 and 8.53.21 for details.

Religious Holidays

It is the policy of the University of Rhode Island to accord students, on an individual basis, the opportunity to observe their traditional religious holidays. Students who plan to be absent from classes or examinations for religious holy days that traditionally preclude secular activity shall discuss this with the appropriate instructor(s) in advance of the holy day. See University Manual section 8.51.11 for details.

Standards of Behaviour

Students are expected to treat faculty and fellow classmates with dignity and respect. Students are responsible for being familiar with and adhering to the published ?Community Standards of Behavior: University Policies and Regulations? which can be accessed in the University Student Handbook web.uri.edu/studentconduct/university-student-handbook/

Calendar

Below is an approximate timetable for the course including some important dates set by the university.

	Week	Sections/Events	Practice Problems
1	Jan 21-25	Classes begin on January 23, Wednesday 1.1 Language and Logic	(1.1) 1(c,d), 2(b,e),3(b), 4,9(b,d),10(a,b), 14(c),15(f,g)
2	Jan 28-Feb 1	1.2 Proof 2.1 More direct proofs	(1.2) 1, 2, 3, 4 (2.1) 1, 4, 5(c,f,h,i), 7, 12, 15, 17, 20(c)
3	Feb 4-8	2.2 Indirect proofs: by contradiction and contrapositive 2.3 Two important theorems	(2.2) 1, 4, 6, 8, 9, 10,11 (2.3) 1, 2, 3, 4
4	Feb 11-15	Last day to drop <u>without</u> a “W” on transcript – February 14 2.4 Proofs of statements involving mixed quantifiers	(2.4) 1(d,f,j), 3, 4
5	Feb 18-22	Exam 1 – Thursday February 21 3.1 Principle of Mathematical induction	(3.1) 2, 4, 7-10, 12, 18,19
6	Feb25-Mar 1	3.2 Strong induction 4.1 Language of sets	(3.2) 1, 2 4 (4.1) 1, 4, 5, 6, 7, 8
7	Mar 4-8	Last day to drop <u>with</u> a “W” on transcript – March 6 4.2 Operations on sets 4.3 Arbitrary unions and intersections	(4.2) 1(a)(b)(d)(h),2,4,5(c,d), 9,10,12(b),14,16,18,21,22 (4.3) 1,2,4,8,9,11(b),12(b)
	Mar 11-15	Spring Break	
8	Mar 18-22	Exam 2 – Thursday March 21 5.1 Definitions (Functions)	(5.1) 1(a,c,f),2,3,5,6,7,10,11
9	Mar 25-29	5.2 Function composition 5.3 1-1 and onto functions	(5.2) 1, 2 (5.3) 1(a,c,e,g,i,k),2,3(a),9
10	Apr 1-5	5.4 Invertible functions 7.1 (Binary) relations	(5.4) 1(c,e,g,i,k),2(a,e),3,9 (7.1) 1, 2
11	Apr 8-12	Exam 3 – Thursday April 11 7.2 Equivalence relations 7.3 Partitions	(7.2) 2(a,c,e), 3(a,c,e,h), 4(a,c,e), 9 (7.3) 1, 2(a,b)
12	Apr 15-19	8.1 “Same size” sets 8.2 Finite sets	(8.1) 1, 3, 4, 5, 9 (8.2) 3, 5, 10
13	Apr 22-26	8.3 Infinite sets	(8.3) 1,3-6,12,17,19(a,b,c)
14	Apr29-May3	Last day of classes on April 30 Review	
		Final exams May 2-3, 6-10	