Department of Mathematics, University of Houston

MATH 3336 - 03 (17018) - Discrete Mathematics - Spring 2022
Syllabus

Instructor: Dr. Gordon Heier
Contact Information:
  Office: 666 PGH
  Office hour: F 3-4pm, over Zoom w/ ID: 998 9906 1977; Passcode: ghohsp22
  Email: heier@math.uh.edu
  Personal website: www.math.uh.edu/~heier
  Course website: UH Blackboard
  Web: www.math.uh.edu/~heier, www.math.uh.edu/~heier/teaching.html

TA: Yongchang Chen (grades students with last name A-K)
Contact Information: Tutoring hour: F 4:30pm-5:30pm, in our MS Team
  Email: ychen224@central.uh.edu

TA: Md Rezwan Bin Mizan (grades students with last name L-Z)
Contact Information: Tutoring hour: W 11am-12noon, in our MS Teams
  Email: mbinmiza@cougarnet.uh.edu

Lecture: TuTh 1:00PM - 2:30PM, in CBB 108, in F2F mode

First Two Weeks of Classes: We will meet in-person on Tuesday, Jan. 18, at 1pm and Thursday, Jan. 27, at 1pm for regular class sessions. We will **NOT** meet in-person on Thursday, Jan. 20 and Tuesday, Jan. 25. The material for Jan. 20 and Jan. 25 will be made available in one or more asynchronous lecture videos which will be posted on Blackboard. You will be notified by email when a new video has been posted. You will complete HW 1 based on the lecture video(s).

Exams: Midterm exam: Thursday, March 24, 2022, in-class (subject to change)
  Final exam: Thursday, May 12, 2022, 2pm-5pm (subject to change)

Textbook: K. H. Rosen, Discrete Mathematics and Its Applications, 8th Edition,
  ISBN: 978-1-259-67651-2

Lecture notes: My typed lecture notes will be posted to Blackboard in a timely manner to assist you in your studies. Note that our current course is an in-person F2F class, NOT an online or hybrid course. The lecture notes are provided as a courtesy only.

Prerequisites: MATH 2318 Linear Algebra (formerly 2431) or equivalent

Course Description: This course gives an introduction to selected topics from logic, set theory, and combinatorics. See below for a list of sections in the textbook likely to be covered.

Homework will be assigned every Thursday on Blackboard and will be due the following Thursday on Blackboard. Late homework will not be accepted.

Quizzes: Several unannounced in-class pop-quizzes will be given throughout the semester.

Attendance: Attending classes and exams is mandatory for all students. Missing class makes a student liable to missing important information, pop-quizzes etc. Substantial documentation is necessary to receive any kind of excuse or make-up privilege.

Grades: The homework and pop-quizzes will each account for 20 percent of your grade. The mid-term exam will account for 25 percent, and the final exam will account for 35 percent. Your two lowest homework scores and your two lowest pop-quiz scores will be dropped.

Disability: If you think or know that you have a disability that needs special accommodation, please see me at the beginning of the semester so that the proper steps can be taken.

UH CAPS Statement: Counseling and Psychological Services (CAPS) can help students who are having difficulties managing stress, adjusting to college, or feeling sad and hopeless. You can reach CAPS (www.uh.edu/caps) by calling 713-743-5454 during and after business hours for routine appointments or if you or someone you know is in crisis. No appointment is necessary for the "Let's Talk" program, a drop-in consultation service at convenient locations and hours around campus. http://www.uh.edu/caps/outreach/lets_talk.html

UH Email: I may use ANY email address you have on file with UH to communicate important information. Please note that UH recently reorganized their email system and you may have several addresses on file with UH. It is your obligation to make sure you receive all email sent to any email address you have on file with UH.

Honor Code Statement: Students may be asked to sign an honor code statement as part of their submission of any graded work including but not limited to projects, quizzes, and exams: "I understand and agree to abide by the provisions in the University of Houston Undergraduate Academic Honesty Policy. I understand that academic honesty is taken very seriously and, in the cases of violations, penalties may include suspension or expulsion from the University of Houston."

Academic Dishonesty will not be tolerated and dealt with appropriately.

The following language is required by UH:

Face Covering Policy
To reduce the spread of COVID-19, the University strongly encourages everyone (vaccinated or not) to wear face coverings indoors on campus including classrooms for both faculty and students.

Presence in Class
Your presence in class each session means that you:

- Are NOT exhibiting any Coronavirus Symptoms that makes you think that you may have COVID-19
- Have NOT tested positive or been diagnosed for COVID-19
- Have NOT knowingly been exposed to someone with COVID-19 or suspected/presumed COVID-19

If you are experiencing any COVID-19 symptoms that are not clearly related to a pre-existing medical condition, do not come to class. Please see Student Protocols for what to do if you experience symptoms and Potential Exposure to Coronavirus for what to do if you have potentially been exposed to COVID-19. Consult the (select: Undergraduate Excused Absence Policy or Graduate Excused Absence Policy) for information regarding excused absences due to medical reasons.

COVID-19 Information

Students are encouraged to visit the University's COVID-19 website for important information including on-campus testing, vaccines, diagnosis and symptom protocols, campus cleaning and safety practices, report forms, and positive cases on campus. Please check the website throughout the semester for updates.

Vaccinations

Data suggests that vaccination remains the best intervention for reliable protection against COVID-19. Students are asked to familiarize themselves with pertinent vaccine information, consult with their health care provider. The University strongly encourages all students, faculty and staff to be vaccinated.

Reasonable Academic Adjustments/Auxiliary Aids

The University of Houston complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, pertaining to the provision of reasonable academic adjustments/auxiliary aids for disabled students. In accordance with Section 504 and ADA guidelines, UH strives to provide reasonable academic adjustments/auxiliary aids to students who request and require them. If you believe that you have a disability requiring an academic adjustments/auxiliary aid, please contact the Justin Dart Jr. Student Accessibility Center (formerly the Justin Dart, Jr. Center for Students with DisABILITIES).

Excused Absence Policy

Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston Undergraduate Excused Absence Policy and Graduate Excused Absence Policy for reasons including: medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Under these policies, students with excused absences will be provided with an opportunity to make up any quiz, exam or other work that contributes to the course grade or a satisfactory alternative. Please read the full policy for details regarding reasons for excused absences, the approval process, and extended absences. Additional policies address absences related to military service, religious holy days, pregnancy and related conditions, and disability.

Recording of Class

Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the Justin Dart, Jr. Student Accessibility Center. If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any

other platform. Classes may be recorded by the instructor. Students may use instructor's recordings for their own studying and notetaking. Instructor's recordings are not authorized to be shared with *anyone* without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.

Syllabus Changes
Due to the changing nature of the COVID-19 pandemic, please note that the instructor may need to make modifications to the course syllabus and may do so at any time. Notice of such changes will be announced as quickly as possible through Email.

Tentative List of Sections to be Covered:

The Foundations: Logic and Proofs
1.1 Propositional Logic
1.2 Applications of Propositional Logic
1.3 Propositional Equivalences
1.4 Predicates and Quantifiers
1.5 Nested Quantifiers
1.6 Rules of Inference
1.7 Introduction to Proofs
1.8 Proof Methods and Strategy

Basic Structures: Sets, Functions, Sequences, Sums, and Matrices
2.1 Sets
2.2 Set Operations
2.3 Functions
2.4 Sequences and Summations
2.5 Cardinality of Sets
2.6 Matrices

Number Theory and Cryptography
4.1 Divisibility and Modular Arithmetic
4.2 Integer Representations and Algorithms
4.3 Primes and Greatest Common Divisors
4.4 Solving Congruences
4.5 Applications of Congruences
4.6 Cryptography

Induction and Recursion
5.1 Mathematical Induction
5.2 Strong Induction and Well-Ordering
5.3 Recursive Definitions and Structural Induction

Counting
6.1 The Basics of Counting
6.2 The Pigeonhole Principle
6.3 Permutations and Combinations
6.4 Binomial Coefficients and Identities
6.5 Generalized Permutations and Combinations

Advanced Counting Techniques
8.1 Applications of Recurrence Relations
8.2 Solving Linear Recurrence Relations

Relations
9.1 Relations and Their Properties
9.3 Representing Relations
9.5 Equivalence Relations