

Math 2603
Section: 003

Discrete Mathematics
MWF 11:50 AM – 12:40 PM
SCEN 402

Fall 2021
Prof. Matthew Clay

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Office Hours: All office hours will be held via Zoom (link available on Blackboard).

Monday: 1:00 – 2:00, Tuesday: 11:30 – 12:30 and Friday: 2:00 – 3:00

If you are unable to use any of the above times, please make an appointment.

Text: *Discrete Mathematics*, by Sandi Irani, zyBooks. To obtain the text, click on the zyBooks link in the course menu on Blackboard and subscribe. The cost is \$58. Do not go to the zyBooks website and create a new account.

Prerequisites: Math 2554 with a grade of C or better.

Learning Objectives:

- Construct and analyze elementary mathematical arguments involving induction and contradiction
- Understand basic set operations and employ these operations correctly
- Identify key properties of functions and relations
- Classify the time complexity of elementary algorithms
- Apply the appropriate counting strategy to solve elementary combinatorial problems
- Understand the role of graphs and trees in mathematics and in applications

Topics:

- Logic: logical operators, conditional statements, quantifiers, De Morgan's laws for logic
- Methods of proof: direct, contrapositive, contradiction, induction
- Sets: set operations, De Morgan's laws for sets, partitions
- Functions and relations: one-to-one functions, onto functions, bijections, sequences, equivalence relations
- Analysis of algorithms: big O notation, time complexity
- Recursion: linear homogeneous recurrence relations with constant coefficients of order at most two
- Number theory: divisibility relation, prime numbers, congruence, modular arithmetic, greatest common divisor, Euclidean algorithm
- Introduction to combinatorics: permutations, combinations, counting with repetition, inclusion-exclusion principle, binomial theorem, discrete probability
- Graphs: graph representations, isomorphism, Euler circuits, Hamiltonian cycles, planar graphs, Euler's formula
- Trees: rooted trees, spanning trees, depth-first/breadth-first search algorithms (time permitting)

The course will cover the majority of Chapters 1 – 11 of the text.

Academic Honesty Policy: As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals through programs of study and research in an environment that promotes freedom of inquiry and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail. Each University of Arkansas student is required to be familiar with and abide by the University's "Academic Integrity Policy" which may be found at <http://honesty.uark.edu>. Students with questions about how these policies apply to a particular course or assignment should immediately contact their instructor.

Special Accommodation: Students who are registered with the Center for Educational Access must notify the instructor in writing by the end of the first week of class, or within one week of registering with CEA.

Class Delivery: Classes will consist of in-person lectures which entail a discussion of course material and worked examples. Class lectures will not be recorded, but pre-recorded lectures and lectures slides will be available on Blackboard. If you choose not to attend lectures you must send me an email requesting remote delivery.

Online Assignments: There will be daily assignments administered online through the text (called *participation* and *challenge activities* in the text). Each section contains some additional exercises at the end. It is assumed that you have attempted each problem.

Homework assignments are very important to the learning process. Math is not a spectator sport, the only way to get better is to practice.

Quizzes: There will be roughly 12 take-home quizzes throughout the semester, approximately one per week with the exception of weeks with exams. Quizzes will be posted on Gradescope and must be submitted via Gradescope. The lowest quiz score will be dropped.

Exams: There will be four exams during the semester and a final exam. These exams will take place in-person unless other arrangements are made. A make-up for any exam will not be given without a compelling reason and the instructor's *prior consent*. *You must inform the instructor before the exam* if you are to miss it due to illness, University related activity or religious holiday.

Calculators: Calculators are not permitted on any quiz or exam.

Course Grade:

- Online Assignments (Daily) - 20%
- Quizzes (Weekly) - 25%
- Exam 1 (Monday, September 13) - 10%
- Exam 2 (Monday, October 4) - 10%
- Exam 3 (Wednesday, October 27) - 10%
- Exam 4 (Wednesday, November 17) - 10%
- Final (Monday, December 13, 12:45 – 2:45 PM) - 15%

Letter grades: $A : 100 - 90$; $B : 89 - 80$; $C : 79 - 70$; $D : 69 - 60$; $F : 59 - 0$

All scores posted on or before Dead Day will be deemed accurate unless a possible error is brought to the attention of the instructor before the scheduled final exam.

Important Dates

Monday, August 23	Classes Start
Friday, September 3	Last day to drop without W
Monday, September 6	Labor Day
Monday, September 13	In class exam 1 (10% of grade)
Monday, October 4	In class exam 2 (10% of grade)
Wednesday, October 27	In class exam 3 (10% of grade)
Monday, October 25 – Tuesday, October 26	Fall Break
Wednesday, November 17	In class exam 4 (10% of grade)
Friday, November 19	Last day to drop with W
Wednesday, November 24 – Friday, November 26	Thanksgiving Holiday
Thursday, December 9	Last day of classes
Monday, December 13	Final Exam (12:45 – 2:45 PM) (15% of grade)

See <http://registrar.uark.edu> for the complete academic calendar and final exam schedule.

Inclement Weather Policy: Class will be held if the University is officially open. Allowances will be made if you are unable to safely reach the campus, but, bravely, class will go on! Do not call the Math office for inclement weather information. Instead, you should call the following telephone number: 575-7000.

Disclaimer: Information on this syllabus is subject to change. Any change will be announced on Blackboard and during the regular meeting time.