

Math 190

Discrete Mathematics

Instructor: Dr. Lesley Wiglesworth

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Office Hours: MWF 11:20 – 12:15, TTh 10:00 – 11:15, T 2:15 – 3:15

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Text: Epp, Susanna S. *Discrete Mathematics with Applications*. Third Edition. Brooks Cole, 2004.
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Lectures: MWF 10:20 – 11:20, Olin 107

Study Sessions: Sunday, Tuesday, Thursday from 9:00 – 10:00 pm in Olin 122 with Jordan Lake

Catalog Description of Course:

An introduction to the study of "discrete" mathematical objects and number systems, in contrast to the study of the continuous real number line. The course explores many topics at the analytical level of calculus: relations, logic, techniques of proof, counting techniques, algorithms, graph theory, number systems, Boolean algebra, and set theory. Prerequisite: MAT 141 or 170 or permission of the instructor.

Grading Policy: Your grade will be based on your performance on tests, homework, participation, quizzes, and a final exam.

• Submitted problem sets	140 points
• Quizzes	120 points
• Exercise Presentations	20 points
• In-class exams	315 points
• Final exam	205 points
• Projects and papers	200 points

Grading Scale: The following letter grades will be assigned based on your final grade in the class. Note: These letter grade assignments are subject to change, but only in the direction beneficial to the students.

• 91 and above	A	• 78 – 80	B-	• 60 – 68	D
• 88 – 91	A-	• 76 – 78	C+	• Below 60	U
• 86 – 88	B+	• 70 – 76	C		
• 80 – 86	B	• 68 – 70	C-		

Missed Class and Grade Policy: Centre has made provisions for excused absences for official college-sponsored activities and for verified medical illness. If you will miss class for these reasons, you must follow the procedures established by the college. I would also appreciate personal contact from you, especially when we must make arrangements for submitting work. Each unexcused absence will result in a deduction of 10 points. After three unexcused absences, each additional absence will result in a two-third letter grade reduction of your final course grade. For further details concerning class attendance and absence policies, see the Centre College 2008 – 2009 Student Handbook.

Expectations: To succeed, a student must attend all class meetings, be on time, and remain actively engaged in each class session. A student must spend time outside class studying the text and answering the suggested problems. Bring the textbook, paper, and a writing utensil to each class meeting. When asking questions, be specific. You should take the time to identify your points of confusion to help us

make the best use of our time together. *Students should keep all graded work until receiving a final grade in the course, in case of possible recording errors.*

Students are also expected to come to class on time, dressed appropriately, and alert. If you must come to class late or leave early, please sit by the door and let me know ahead of time. Students are expected to be courteous to others during class. Therefore, please avoid distracting behavior. Cell phones should either be turned off during class or not brought to class. Turning your phone to vibrate is not good enough—others (and I) can still hear it vibrate. If for some reason, you must have your phone on due to an emergency situation, please let me know ahead of time.

Submitted Problem Sets (140 points, 35 points each): Throughout the semester, you will have four problem sets that will be submitted. Written problem sets are expected to be legible and grammatically correct. Answers and assertions must be fully explained and justified. Your solutions must be clear, concise, and easy to follow. Homework will be graded on thoroughness, correctness, and clarity.

Quizzes (120 points, 15 points each): Quizzes provide an early assessment of a student's comprehension of the course material and help students prepare for tests. There will be nine quizzes given throughout the semester. These quizzes will be given at the beginning of the class period and may cover any of the previous course material. However, they will be biased toward the most recent topics. *Each student's lowest quiz score will be dropped when computing your final averages.* Quizzes will be given on the following dates:

- Wednesday, February 11
- Wednesday, February 18
- Wednesday, February 25
- Wednesday, March 11
- Wednesday, March 18
- Wednesday, April 1
- Wednesday, April 15
- Wednesday, April 22
- Wednesday, April 29

Exercise Presentations (20 points): The tentative schedule lists the sections that will be covered during the classes. You should read the assigned sections *before* coming to class. Suggested exercises are assigned from each section. Some problems will be presented by students at the board. Each student will be required to present at least two suggested exercises at the board during the semester. These presentations will be graded on clarity, posture, and explanation. Each presentation will be worth 10 points. You may present more than two times over the course of the semester. In this case, each presentation will be graded and the highest two grades will count towards your final class grade.

Class Participation: I expect all of my students to actively participate in every class. Active participation includes coming to class, asking and answering questions, working the suggested problems, and studying the notes and text. Your class participation will be considered when your final course grade is assigned.

Group Projects and Papers (200 points): During the term, you will work on four group projects and one paper. The projects provide you with an opportunity to apply your knowledge of discrete mathematics to some potentially interesting "real world" questions. You will submit hard copies of these to me and electronic copies to turnitin.com, the standard service used by the college for assessing the originality of student papers. Your best four project grades will count towards your final grade.

Tests (105 points each): Students will have 60 minutes for each of the three in-class tests. Tentative dates for the three tests are listed in the schedule.

Final Exam (205 points): The final exam is a 3-hour cumulative test and is scheduled for Thursday, May 14th from 8:30 – 11:30am.

Students with Disabilities: I encourage students with disabilities, including but not limited to disabilities such as chronic diseases, learning disabilities, and psychiatric disabilities, and students dealing with other exceptional circumstances to speak with Centre College's Assistant Dean for Advising, Mary Gulley, to obtain support services. I will happily abide by Dean Gulley's recommendations.

You should be reassured that Centre College is committed to making its programs accessible to all. In the higher education setting, the student is responsible for informing the college of disabilities that require accommodations and the student must initiate the process for obtaining appropriate accommodations immediately – accommodations for disabilities cannot always be granted at the last minute and will not be granted after the fact. For further details concerning the academic aspects of disability services, see the Centre College 2008 - 2009 Student Handbook.

Academic Honesty: The guiding principles are: honesty, trust, fairness, respect, and responsibility. Work on all exams must be your own. Collaboration on homework and suggested problems is encouraged and expected. You should spend time in individual concentration to gain the full benefit of the homework and suggested problems. Copying homework is discouraged. You should not leave a study group with your paper or your homework ready to be turned in; write up your homework by yourself. *On all turned in work, you must cite all resources (including people) that helped you solve the problems.* For further details concerning academic honesty, see the Centre College 2008 - 2009 Student Handbook.

My Weekly Schedule: I am usually in from 9:00 – 4:00 each day of the week. If my door is open, please feel free to stop by with an unscheduled visit. If you would like to be more formal, you may always schedule an appointment.

For Extra Help: Study sessions for MAT 190 are from 9 – 10 PM on Sunday, Tuesday, and Thursday nights in Olin 122. Jordan Lake will be available during this time to discuss ideas and work through exercises.

The instructor reserves the right to make changes in the syllabus when necessary to meet learning objectives, to compensate for missed classes, or for similar reasons. Any changes made will be announced during class.

Tentative Schedule

The following Math 190 paced syllabus is tentative. It is provided to give you an idea of the topics and approximate dates of exams. Changes, if necessary, will be announced in class.

Class	Date	Section(s)	Topic	Suggested Exercises
1	W Feb 4	Introduction	What is discrete mathematics?	
2	F Feb 6	1.1, 1., 1.3	Logical Statements	§1.1: 14, 16, 19, 23, 25, 27, 41, 42, 45 §1.2: 12, 15, 18, 19
3	M Feb 9	1.4, 1.5	Arguments and Digital Logic Circuits	§1.3: 6, 8, 14, 36 §1.4: 1, 3, 4, 7, 16, 20, 22, 24, 26, 28
4	W Feb 11	4.1, 4.2	Sequences and Mathematical Induction	Quiz 1 §4.1: 3, 5, 8, 11, 12, 17, 19, 23, 27, 35, 36, 40, 48, 49, 58 §4.2: 1, 3, 5
5	F Feb 13	4.2,4.3	Mathematical Induction Continued	§4.2: 6, 8, 10, 11, 13, 20, 21, 32 §4.3: 1, 3, 6
6	M Feb 16	4.3, 4.4	Strong Induction and the Well-Ordering Principle	§4.3: 8, 16, 21, 24, 29, 30, 31 §4.4: 1, 3, 5, 7
7	W Feb 18	4.4. 4.5	Correctness of Algorithms	Quiz 2 §4.4: 10, 15, 17, 18, 24 §4.5: 1, 3, 7
8	F Feb 20	6.1	Counting	§6.1: 3, 4, 9, 12, 13, 20, 21
9	M Feb 23	6.2	The Multiplication Rule	§6.2: 3, 4, 8, 9, 11, 14, 16, 17, 18, 19, 21, 26, 29, 31, 32, 36, 37
10	W Feb 25	6.3	The Addition Rule	Quiz 3 §6.3: 4, 5, 7, 8, 10, 14, 17, 21, 25, 26, 28, 30, 33
11	F Feb 27	6.4	Counting Combinations	§6.4: 1, 2, 3, 7, 8, 10, 11, 15, 19, 23, 28
12	M Mar 2	6.5	r-Combinations with Repetition Allowed	§6.5: 1, 3, 5, 8, 9, 10, 11, 14, 17
13	W Mar 4		Test 1	

14	F Mar 6	6.7	The Binomial Theorem	1, 5, 7, 11, 15, 18, 22, 23, 24, 28, 34,
15	M Mar 9	7.1, 7.2	Functions	§7.1: 1, 3, 4, 5, 7, 9, 13, 14, 25 §7.2: 2, 5, 7, 10, 12, 17, 21, 25
16	W Mar 11	7.3	The Pigeonhole Principal	Quiz 4
17	F Mar 13	8.1	Recursively Defined Sequences	1, 5, 9, 13, 26, 27, 31, 36, 42
18	M Mar 16	8.2	Solving Recurrence Relations by Iteration	2, 3, 6, 12, 14, 18, 19, 30, 43, 52
19	W Mar 18	8.3	Second-Order Linear Homogenous Recurrence Relations	Quiz 5 1, 3, 5, 7, 8, 11, 13, 16, 19, 25
20	F Mar 20	8.4	General Recursive Definitions	1, 2, 6, 8, 10, 15, 17, 19
Spring Break: No Class Mar 21 – 29				
21	M Mar 30	9.1, 9.2	Real-Valued Functions	§9.1: 1, 2, 4, 5, 7, 9, 14, 23 §9.2: 4, 6, 9, 10, 12, 16
22	W Apr 1	9.2, 9.3	O-, Ω -, and Θ -Notations	Quiz 6 §9.2: 23, 25, 28, 34 §9.3: 1, 2, 4, 6, 11, 15, 17, 19, 24, 28, 30, 32
23	F Apr 3	9.4, 9.5	Efficiency of Algorithms	§9.5: 2, 5 – 10,
24	M Apr 6	10.1	Relations on Sets	1, 4, 5, 7, 9, 13, 16, 17, 23, 25, 29, 31
25	W Apr 8		Test 2	
26	F Apr 10	10.2	Reflexivity, Symmetry, and Transitivity	1, 6, 12, 15, 23, 30, 31, 34, 37, 41
27	M Apr 13	10.3	Equivalence Relations	1, 3, 5, 10, 15, 16, 18, 21, 22, 23, 25, 27, 32, 33, 34
28	W Apr 15	10.4	Modular Arithmetic with Applications to Cryptography	Quiz 7 3, 6, 8, 13, 16, 19, 20, 22, 26, 28, 31, 36, 42
29	F Apr 17	10.5	Partial Order Relations	2, 4, 5, 10, 13, 17, 18, 21, 24, 26, 32, 35, 39, 40, 44

30	M Apr 20	11.1	Introductions to Graphs	3, 5, 8, 12, 14, 15 – 18, 24, 27, 29, 37, 42
31	W Apr 22	11.2	Paths and Circuits	Quiz 8 2 – 8 even, 9 – 15 odd, 18, 22 – 32 even, 35, 36, 37, 41, 42
32	F Apr 24	11.3	Matrix Representations of Graphs	1 – 5, 8 – 10, 12, 15, 19 – 22
33	M Apr 27	11.4	Isomorphisms of Graphs	1, 5, 8, 9, 12, 13, 16, 17, 21, 23, 25, 30
34	W Apr 29	11.5	Trees	Quiz 9 1, 3, 8 – 14, 22 – 27, 30, 32, 35 – 41 odd
35	F May 1	11.6	Spanning Trees	1 – 25 odd
36	M May 4		Test 3	
37	W May 6		Depth-First Search & Rooted Trees	Supplemented materials
38	F May 8		Network Flows	Supplemented materials
39	M May 11		Graph Coloring	Supplemented materials
Final Exam: Thursday, May 14th, 8:30 – 11:30am				