BGSU
Bowling Green State University

Syllabus of MATH 3220

DISCRETE MATHEMATICS

Department of Mathematics – Bowling Green State University

TEXTBOOK *Discrete Mathematical and Its Applications,* 7th Edition, by Kenneth H. Rosen.

PREREQUISITE Currently taking or previously taken MATH 2320 with the grade of C or higher.

OBJECTIVES This course provides students with an introduction to discrete mathematics with the focus on mathematical reasoning, basic understanding of sets, functions, relations, algorithms, counting methods, graph theory and methods of proof. In particular, the following chapters will be discussed:

CONTENT

Chapter 1 The Foundations: Logic and Proofs

- Propositions
- Compound Statements
- Truth Tables
- Logical Arguments
- Methods of Proofs in Math

Chapter 2 Basic Structures: Sets, Functions, Sequences, and Sums

- Operations - union, intersection, complement, difference
- DeMorgan's Laws
- Subsets, power sets, Venn diagrams
- Equal vs. equivalent sets
- Sets of numbers
- Cartesian products
- History - Cantor, Mandelbrot, Descartes, Venn

Chapter 3 Algorithms

- Search algorithms
- Optimization algorithms
- Voting methods

Chapter 5 Induction and Recursion

- Mathematical Induction
- Recursively Defined Sequences
- Solving Recurrence Relations: Generating Functions

Chapter 6 Counting Methods

- Pigeonhole principle
- Fundamental Theorem of Counting
- Permutations
- Combinations

- Binomial Theorem
- History - Pascal's Triangle, Towers of Hanoi, Euclid's geometric progression

Chapter 9 Relations

- Symmetry, transitivity, reflexivity
- Equivalence classes
- Congruence, partitions, domain, range, co-domain
- One-to-one, onto, inverse
- Modular numbers
- History - Pythagorean relationship, Descartes

Chapter 10 Graphs

- Euler and Hamiltonian networks
- Graph coloring
- Directed and undirected
- Isomorphism
- Traveling Salesperson problems
- PERT(Program Evaluation and Resource Technique) (optional)
- CPM(Critical Path Method) (optional)
- Expression trees (optional)
- History - Euler, Hamilton, Bridges of Konigsberg

EXAMS

There will be two in-class exams and a comprehensive final exam.

- Exam 1 will cover chapters 1 and 2.
- Exam 2 will cover chapters 3, 4, 5, and 6.
- Final exam will cover all chapters.

QUIZZES

Quizzes will be given during the first twenty minutes of selected class periods and will be announced one day in advance.*

HOMEWORK

Homework will be assigned at the end of each section. Some selected homework will be collected the following class period.

LABS

Two Maple lab assignments will be collected throughout the semester.

GRADE

Homework and Problem Discussions	20%
Lab assignments	10%
Quizzes	20%
Two in-class exams	30%
Final Exam	20%
Total	100%

SEE THE ATTACHED COURSE SCHEDULES AND SUGGESTED HOMEWORK ASSIGNMENTS

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MATH 3220 SCHEDULES & HOMEWORK ASSIGNMENTS (Rosen, 7th ed.)

1/12	Section 1.1, pgs. 12 – 15:	# 2, 8, 14, 16, 28, 34, and 36c & e.
1/17	Section 1.3, pgs. 34 – 35:	# 2, 6, 14, 15, 16, 24, and 28
1/24	Assignment 1: Sections 1.1 & 1.3.	
1/19	Section 1.4, pgs. 53 – 54:	# 1, 3, 5, 11b, e & f, 12b, f, & g, 14, 16, 19d & e, and 20c & d.
1/24	Section 1.5, pgs. 64 – 67:	# 2, 26b, e, f, & h, 27b, c, e, & h, and 28c & g.
1/24	Section 1.6, pgs. 78 – 80:	# 2 and 20.
1/26	Assignment 2: Sections 1.4, 1.5, & 1.6.	
1/26	Quiz 1: Chapter 1 – Section 1.1 through 1.6. Thursday, Jan. 26	
1/31	Section 2.1, pgs. 125 – 126:	# 2, 10, 16, 19, 22, and 38.
2/2	Section 2.2, pgs. 136 – 137:	# 4, 6, 8, 12, 20, 26, and 36.
2/7	Section 2.3, pgs. 152 – 154:	# 2, 8, 10, 12, 14a, c, & e, 22, 32, 36, and 64.
2/9	Section 2.4, pgs. 167 – 169:	# 4, 9a, b, & c, 10a, b, & c, 14b, c, d, & g, 30, 32, and 33.
2/14	Section 2.6, pgs. 183 – 185:	#3, 5, 10, 18, 20, 25, and 27.
2/16	Assignment 3: Sections 2.1, 2.2, 2.3, 2.4, and 2.6.	
2/23	EXAM 1: Chapter 1 & Chapter 2 – Section 2.1 through 2.6. Thursday, Feb. 23	
2/28	Section 3.1, pgs. 202 – 203:	# 2, 12, and 16.
2/28	Section 3.3, pgs. 230 – 231:	# 3, 12, 15, and 21.
3/1	Section 5.1, pgs. 329 – 330:	# 4, 5, 6, 7, 10, 14, and 21.
3/13	Section 5.3, pgs. 357 – 358:	# 2, 8, 12, and 25.
3/15	Assignment 4: Sections 4.3, 5.1, and 5.3	
3/20	Quiz 2: Tuesday, Mar. 20	
3/22	Section 6.3, pgs. 413 – 414: Section 6.4, pgs. 421 – 422:	# 5, 6, 10, and 24. #3, 4, 5, 6, 8, 20, and 23.
3/27	Assignment 5: Sections 6.3 and 6.4	
3/29	EXAM 2: Chapters 5 and 6	

4/3	Section 9.1, pgs.: 581 – 582:	# 3, 4, 7a, c, e, & h, 26, 30, 35a, e, and, g, 37b, and e.
4/5	Section 9.3, pgs.: 596 – 597:	# 1, 3, 5, 6, 7, 13, 14, 18, 22, 23.
4/5	Section 9.5, pg.: 616	# 21, 23, and 24.
4/5	Assignment 6: Sections 9.1, 9.3, and 9.5	
4/10	Quiz 3: Thursday, Apr. 19	
4/12	Section 10.1, pgs. 649 – 650	# 2, 3, 5, 8, 11 and 12.
4/12	Section 10. 2, pg. 665	# 1, 3, 4, 5, 6, 7, 15, 20a, b, & c, 21, and 22.
4/17	Section 10.3, pgs. 675 – 676	# 5, 7, 11, 15, and 27.
4/17	Section 10.5, pgs. 703 – 704	# 3, 5, and 9.
4/22	Section 10.6, pg. 716	# 2, 3, 5, and 8
4/24	Assignment 7: Sections 10.1, 10.2, and 10.5	
5/4	FINAL EXAM: Chapters 1, 2, 3, 5, 7, 9, and 10.	