

BRONX COMMUNITY COLLEGE
Of the City University of New York
DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

SYLLABUS: CSI 35 DISCRETE MATHEMATICS II

3 credits 4 hours

SYLLABUS: CSI 35 Discrete Mathematics II

PREREQUISITE: CSI 30 and MTH 31; and CUNY English Proficiency, or ENG 100 or 110, if required

TEXT: *Discrete Mathematics and its Applications* Eighth Edition, by Kenneth H. Rosen, McGraw Hill, 2019. ISBN 978-1-259-67651-2

Objectives: A successful student in this course will learn to

1. classify basic discrete structures,
2. use graphs and trees as models and tools for studying computational complexity,
3. analyze finite and infinite structures using mathematical reasoning and tools of first order logic,
4. design and analyze algorithms, in particular those based on recursion and iteration,
5. prove formal statements using mathematical induction,
6. use mathematical induction in verification of program correctness.

Suggested in-class examples Suggested Homework

Chapter 5: Induction and Recursion (4 weeks)

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|-----|--|-------------------------------|--------|--|
| 5.1 | Mathematical Induction | Examples 1-6, 8, 10, 13-15 | p. 350 | 1, 3, 4, 5, 7, 8, 9, 10, 18, 49, 56 |
| 5.2 | Strong Induction and Well-Ordering | Examples 1-4 | p. 362 | 1, 3, 4, 12, |
| 5.3 | Recursive definitions and structural induction | Examples 1-10, 12 | p. 378 | 1-9 odd, 18, 23, 25, 36-38, 46, 49, 50 |
| 5.4 | Recursive Algorithms | Examples 1, 2, 3, 5-10 | p. 391 | 1, 2, 3, 7, 21, 44, 45 |
| | Computer projects | | p. 403 | 1, 4, 5, 8, 9, 11, 12, 13, 15 |
| | Computations and explorations | | p. 404 | 1, 2, 3, 4, 7 |

Chapter 9 Relations (3 weeks)

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|-----|--|---------------|--------|--|
| 9.1 | Relations and their properties | Examples 1-22 | p. 608 | 1, 3, 5, 10, 27, 33, 35, 44, 45, 46 |
| 9.2 | n-ary relations and their applications | Examples 1-11 | p. 619 | 1-9 odd, 19 |
| 9.3 | Representing relations | All | p. 626 | 1, 3, 13, 18, 20, 31, 32 |
| 9.5 | Equivalence relations | All | p. 646 | 1, 3, 9, 11-16, 21-24, 43, 46, 47 |
| 9.6 | Partial orderings | Examples 1-20 | p. 662 | 1, 3, 4, 5, 9, 11, 13, 15, 19-21, 32, 36 |
| | Computer projects | | p. 670 | 1, 2, 3, 4 |
| | Computations and explorations | | p. 670 | 1, 2, 3, 6, 7 |

Chapter 10 Graphs (3 weeks)

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|------|---|---------------------------------|--------|---------------------------------|
| 10.1 | Graphs and graph models | All | p. 682 | 1, 3-12 all |
| 10.2 | Graph terminology | Examples 1-13 | p. 669 | 1, 2, 3, 5, 7, 8, 9, 18-26 all |
| 10.3 | Representing Graphs and Graph Isomorphism | Examples 1-11 | p. 710 | 1-15 odd, 39-47 odd, 63 |
| 10.4 | Connectivity | Examples 1, 2, 3, 5, 6,7, 13,14 | p. 724 | 1-6, 20, 21 |
| 10.5 | Euler and Hamilton paths | All | p. 739 | 1-15 odd, 19-23 odd, 31, 33, 35 |
| 10.6 | Shortest path problems | All | p. 751 | 1-13 all |
| 10.8 | Graph Coloring | All | p. 768 | 1-11 all, 13, 15 |
| | Computer projects | | p. 777 | 1, 2, 3, 4, 5, 17 |
| | Computations and explorations | | p. 778 | 1, 2, 3, 4, 8, 9, 10, 11 |

Chapter 11 Trees (4 weeks)

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|------|------------------------|-----|--------|-------------------------------------|
| 11.1 | Introduction to Trees | All | p. 791 | 1-11 odd, 21, 23 |
| 11.2 | Applications of Trees | All | p. 805 | 1, 3, 5, 19, 21, 23, 25, 37, 40, 42 |
| 11.3 | Tree Traversal | All | p. 819 | 1-5, 7-15 all |
| 11.4 | Spanning Trees | All | p. 832 | 1-9 all, 13, 15, 23 |
| 11.5 | Minimum spanning Trees | All | p. 839 | 1-9 all |

Computer projects, computations and explorations for chapter 11: there are many relevant projects listed on page 845; choose those that correspond to the material covered and emphasized in class.

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Bronx Community College respects and welcomes students of all backgrounds and abilities. In the event you encounter any barrier(s) to full participation in this course due to the impact of a disability, please contact the disAbility Services Office as soon as possible this semester. The disAbility Services specialists will meet with you to discuss the barriers you are experiencing and explain the eligibility process for establishing academic accommodations for this course. You can reach the disAbility Services Office in Loew Hall, Room 211, (718) 289-5874, disability.services@bcc.cuny.edu.

If you test positive for COVID while taking an in-person/hybrid course:

- Using your BCC email account, please email all your **in-person and/or hybrid** professors of your status.
 - Please include your emplid # and current phone number in your email.
 - Please also email us at healthservices@bcc.cuny.edu.
 - Your professor will work with you to complete class work while you are in quarantine.
- You will be called by a Health Services staffer. It is critical that you connect in a timely matter with this staff member for contact tracing information.
- You will need to submit a negative COVID test to Health Services (healthservices@bcc.cuny.edu) before you are allowed access to the campus.
- Your negative test result must come from your doctor or a medical provider (e.g. CityMD, Urgent Care, etc.). We will **not** accept a negative home test result.