

MATH 353: INTRODUCTION TO DISCRETE MATHEMATICS (SPRING 2017)

**Course number:** MAT 353

**Course title:** Introduction to Discrete Mathematics

**Credits:** 3

**Meetings:** TuTh 9:30–10:45 PM, Eberhart 554

**Prerequisites:** Minimum grade of C in MAT 253.

**Instructor Information:** Instructor: Clifford Smyth [cdsmyth@uncg.edu](mailto:cdsmyth@uncg.edu)

Office Hours: Petty 105 TuTh 11:00 AM – 12:15 PM and by appointment

**For whom planned:** Mathematics majors and minors and majors in Computer Science.

**Description of Course:** A rigorous introduction to the subject of Graph Theory: its concepts, theorems, algorithms, and applications. We will cover most of the results of central importance in the first six chapters of *Introduction to Graph Theory, Second Edition* by Douglas West: Fundamental Concepts, Trees and Distance, Matchings and Factors, Connectivity and Paths, Colorings of Graphs, and Planar Graphs.

**Student learning outcomes:** Upon successful completion of this course students shall be able to

**SLO 1: define** the basic terms of graph theory (graphs, multigraphs, digraphs, networks, trees and other basic classes of graphs, degrees, distance, diameter, independent sets, matchings, coverings, flows, cuts, disconnecting sets, connectivity, colorings, planarity, etc.);

**SLO 2: give examples** of graphs satisfying various conditions expressed in the terms covered in SLO 1

**SLO 3: explain** definitions and give precise statements of important theorems of Graph Theory (Hall's theorem, Tutte's theorem, Brooks' Theorem, Euler's Formula, the Four Color Theorem, etc.) carry out algorithms of central importance in Graph Theory (minimum spanning tree, maximum matching, maximum flow, shortest paths, etc.) and;

**SLO 4: construct** and **defend** coherent mathematical proofs of statements in Graph Theory based on definitions and previous theorems.

**Teaching methods and assignments for achieving learning outcomes:** The course material will be presented via traditional lectures. Achievement of learning outcomes will be facilitated via homework assignments, quizzes, and exams.

**Evaluation and grading:** Semester averages are rounded to the nearest point, and letter grades are assigned on a 100 point scale.

A+ : 97–100	B+ : 87–89	C+ : 77–79	D+ : 67–69	
A : 93–96	B : 83–86	C : 73–76	D : 63–66	F : 0 – 59
A– : 90–92	B– : 80–82	C– : 70–72	D– : 60–62	

- Homework assignments (15%): All assignments are weighted equally. Due dates will be announced in class or on Canvas.
- Weekly quizzes (10%): The quizzes will test knowledge of definitions and homework solutions.
- Tests (75%): Three tests count 15% each. The final exam counts 30%. The dates are

- (1) Test 1 Thursday, 2/9
- (2) Test 2 Thursday, 3/9
- (3) Test 3 Thursday, 4/20
- (4) Final exam (Tuesday, 5/9, 12:00PM–3:00 PM)

**Add/drop dates and holidays affecting this class and semester:**

Last day to drop/add without getting a W on your transcript is Monday 1/23.

Last day to withdraw without getting a WF on your transcript is Friday 3/10.

Students who began at UNCG in fall 2014 or later will be limited to withdrawing from a maximum of 16 semester hours throughout their degree. See: <http://studentsfirst.uncg.edu/withdrawal/course/>

See <http://reg.uncg.edu/calendars/spring-2017-academic-calendar/> for the official semester calendar of UNCG.

Spring Break 3/13-17.

**Canvas:** Announcements and downloads will be handled using Canvas. Click the Canvas symbol at the top of <http://www.uncg.edu>. The symbol looks like a little spoked wheel. Use your UNCG user ID and password to get into Canvas.

**Required materials:**

- Textbook: *Introduction to Graph Theory, Second Edition* by Douglas West.

**Academic Integrity Policy:** Each student is required to sign the Academic Integrity Policy on all major work submitted for the course.

*I have abided by the UNCG Academic Integrity Policy on this assignment.*

Signature \_\_\_\_\_ Date \_\_\_\_\_

More information can be found at

<http://sa.uncg.edu/handbook/academic-integrity-policy/>.

**Academic Violations:** Copying on assignments or cheating on a test or the final will result in charges being brought and an official UNCG disciplinary process. See <http://sa.uncg.edu/dean/academic-integrity/> for the official UNCG academic integrity process. A flowchart of the process is at <http://sa.uncg.edu/dean/wp-content/uploads/AI-2011-2012.pdf>. If the charge is upheld you will receive a zero on that assignment or exam. Especially serious violations may result in an F for the course and a permanent record being added to your academic transcript. A second violation in any class at UNCG will result in a mandatory sanction: academic suspension or expulsion. Expulsion is from the entire University of North Carolina university system.

**Final examination:** The Final Exam covers the entire semester. The exam is 3 hours and will be given on Tuesday, May 9, 2017, 12:00 PM–3:00 PM. See <https://reg.uncg.edu/wp-content/uploads/Final-Exam-Schedule-Spring-2017.pdf> for the Spring 2017 UNCG exam schedule.

**Additional information:**

- (1) UNCG seeks to comply fully with the Americans with Disabilities Act (ADA). Students requesting accommodations based on a disability must be registered with the

Office of Accessibility Resources and Services (OARS) in 215 Elliott University Center, 336-334-5440, <https://ods.uncg.edu/>.

- (2) Assignments Policy: Assignments are due at the beginning of class. Late assignments will be accepted at the following lecture period for half credit.
- (3) Absence Policy: You are responsible for all missed material. Any missed assignment, test, or final exam will result in a score of 0. A make-up test or final exam will be given only if you receive prior approval for a valid excuse by contacting me at least one week in advance.
- (4) Copyright Policy: Selling or purchasing notes from classes for commercial gain is a violation of the UNCG Copyright Policy.

<http://policy.uncg.edu/copyright/>

Any student who sells notes taken in class for commercial gain, or who purchases notes taken by another student for commercial gain, is in violation of this policy and, by extension, is committing a violation of the Student Code of Conduct.

<http://sa.uncg.edu/handbook/student-code-of-conduct/>

- (5) Email Policy: All email correspondence should be made using your UNCG email account. You must check your email regularly for updates and announcements.

**Schedule:** See next page.

**Tentative Schedule:**

Tuesday	Thursday
1/17 Basics (1.1)	1/19 Paths and Cycles (1.2)
1/24 Degrees and Counting (1.3)	1/26 Trees (2.1)
1/31 Spanning trees, optimization (2.2, 2.3)	2/2 Optimization, MST, Huffman coding (2.3)
2/7 Overflow, Extras, and Review	2/9 <b>Test 1 (1.1-3, 2.1-3)</b>
2/14 Vertex Colorings (5.1)	2/16 Vertex Colorings, continued (5.1)
2/21 Structure of $k$ -chrom. graphs (5.2)	2/23 Enumerative aspects (5.3)
2/28 Planar graphs (6.1, 6.2)	3/2 Planar Graphs (6.2, 6.3)
3/7 Overflows, Extras, and Review	3/9 <b>Test 2 5.1-6.3</b>
3/14 No class. (Spring Break)	3/16 No class. (Spring Break)
3/21 Digraphs (1.4)	3/23 Network flows (4.3)
3/28 Cuts and Connectivity (4.1)	3/30 $k$ -connected graphs (4.2)
4/4 Matchings and covers (3.1)	4/6 Matching and covers, cont. (3.1)
4/11 Algorithms (3.2)	4/13 Algorithms and Tutte's theorem (3.2, 3.3)
4/18 Overflows, Extras, and Review	4/20 <b>Test 3 (5.1-9.5, P7-P8)</b>
4/25 Ramsey Theory (8.3)	4/27 Art Galleries and Other Pearls
5/2 No class (Last day of semester, Fri schedule)	
5/9 Final Exam (cumulative, 12:00 PM–3:00 PM)	