Soochow University

MAT 352 Graph Theory and Applications

Winter 2024

Course Credits: 4
Contact Hours: 56 hours
Instructor: TBA
Email:TBA

COURSE OBJECTIVES

The course treats graph theoretical notions and problems, and the use of algorithms, both in the mathematical theory of graphs and its applications. In this course we will cover the fundamental concepts of Graph Theory: simple graphs, digraphs, Eulerian and Hamiltonian graphs, trees, matchings, networks, paths and cycles, graphs colorings and planar graphs. Graph theory has many applications to a many other subjects and areas of mathematics, we will also talk about it.

Upon Completion of this Course, students will be able to:

1. Understand fundamental definitions and concepts of graph theory;

2. Become familiar with the major viewpoints and goals of graph theory;

3. Apply the algorithms that are treated in the course for solving graph theoretical problems;

4. Understand the application of various type of graphs in real life problem.

PREREQUISITES

MAT 235 Rings and Fields

GRADING

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:

ITEM	POINTS
2 Assignments	20 Points

2 Quizzes	20 Points
Midterm Exam	25 Points
Final Exam	35 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

A ≥ 90 > B ≥ 80 > C ≥ 70 > D ≥ 60 > F.

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

Douglas B. West, *Introduction to Graph Theory*, 2nd Edition, Prentice-Hall.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
Module 1	**Topics:** Topic 1: Paths, Cycles, and Trails Topic 2: Vertex Degrees Topic 3: Counting and Bijections Topic 4: Directed Graphs **Assessments:** Assignment #1
Module 2	**Topics:** Topic 5: Distance in Trees and Graph Topic 6: Enumeration of Trees Topic 7: Spanning Trees in Graphs Topic 8: Optimization and Trees **Assessments:** Quiz #1

Module 3	**Topics:** Topic 9: Matchings and Covers Topic 10: Algorithms and Applications Topic 11: Connectivity Topic 12: Network Flow Problems **Assessments:** Assignment #2 Midterm Exam
Module 4	**Topics:** Topic 13: Coloring of Graphs Topic 14: Drawings in the Plane Topic 15: Euler's Formula Topic 16: Characterization of Planar Graphs **Assessments:** Quiz #2
Module 5	**Topics:** Topic 17: Line Graphs and Edge-coloring Topic 18: Hamiltonian Cycles Topic 19: Tait's Theorem Topic 20: Grinberg's Theorem **Assessments:** Final Exam

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS

1) Late assignments are not acceptable and are subjected to grade deductions.

2) Assignments submitted in the wrong format will be counted as not submitted.

3) Failure to submit or fulfill any required course component results in failure of the class.

4) Make-up for midterm and final exams only with valid excuses, as defined by the University.

5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACEDEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a

learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.