

Department and Course Number	<b>MTH/CS 458</b>	Course Coordinator	Terry McKee
Course Title	<b>Applied Graph Theory</b>	Total Credits	3

## Catalog Description

Discrete Introduction to methods, results, and algorithms of graph theory. Emphasis on graphs as mathematical models applicable to organizational and industrial situations. **Prerequisites:** MTH 231, and either CS 142 OR 241.

## Text Book

J. Gross and J. Yellen, *Graph Theory and Its Applications*, CRC Press, 2003.

## Course Objectives and Outcomes

The overall objective of this course is for students to be comfortable with the fundamental concepts, structures, and algorithms of graph theory. After completion of the course, the students should be familiar with

1. Basic graph theoretic concepts and results
2. Unifying role of cycle/cut set duality
3. Several applications of graph theory
4. Several typical graph theoretic algorithms
5. Several connections between graph theory and other science/engineering topics

## Prerequisites by Topic

1. Basic familiarity with and understanding of algorithms
2. Mathematical maturity of one year of calculus

## Course Topics

The topics covered include

- Basic concepts and structures of graph theory
- Several applications of graph theory
- Cycles, edge sets, and their vector spaces
- Several fundamental graph theoretic algorithms
- Max flow/min cut analysis of network flow

## Course Contribution to Program Outcomes and Assessment

P = "present", X = emphasized, is an explicit objective/outcome, XX = double the previous.

**Table of Criteria 3:** Students who have successfully completed the course have

a1	an ability to apply knowledge of mathematics	PXX
a2	an ability to apply knowledge of science	0

a3	an ability to apply knowledge of engineering	P
b1	an ability to design and conduct experiments	0
b2	an ability to analyze and interpret data	0
c	an ability to design a system, component, or process to meet desired needs	0
d	an ability to function on multi-disciplinary teams	0
e	an ability to identify, formulate, and solve engineering problems	0
f	an understanding of professional and ethical responsibility	0
g	an ability to communicate effectively	0
h	the broad education necessary to understand the impact of engineering solutions in a global and societal context	0
i	a recognition of the need for, and an ability to engage in life-long learning	0
j	a knowledge of contemporary issues	0
k	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	P

### Estimate ABET CAC Category Content

	Core	Advanced		Core	Advanced
Data Structures		0.5	Concepts of PL		0
Algorithms		1	Comp Organization + Architecture		0
Software Design		0	Other		1.5

### Oral and Written Communications

None.

### Social and Ethical Issues

None.

## **Theoretical Content**

This class introduces applications of graph theory. The particular topics are listed above.

## **Problem Analysis and Solution Design**

Students must be able to recognize the sort of real world situations that lend themselves to graph theoretic analysis and be able to apply the concepts and algorithms.

## **Student Assessment**

Student performance is assessed by homework and exams administered throughout the quarter.