

MTH303e Principles of Graph Theory

Level: 3

Credit Units: 5 Credit Units

Language: ENGLISH

Presentation Pattern: EVERY JAN

E-Learning: BLENDED - Learning is done MAINLY online using interactive study materials in Canvas. Students receive guidance and support from online instructors via discussion forums and emails. This is supplemented with SOME face-to-face sessions. If the course has an exam component, this will be administered on-campus.

Synopsis:

Graph theory is a branch of discrete mathematics that formalizes methods for describing how things are connected. In the study of graphs, it becomes evident the efficient algorithms are necessary for solving problems of any significant magnitude. This course has been designed to emphasize the close tie between the theoretical and algorithmic aspects of graph theory. It covers the following topics: different types of graphs or digraphs, trees, connectivity and network flow, matching, planar graphs, vertex and edge coloring of graphs, as well as basic data structure and complexity analysis for basic algorithms. MTH303 is a blended on-line course, with at least 3 face-face sessions.

Topics:

- Graphs and digraphs.
- Matrix representation.
- Trees and properties of trees.
- Spanning and counting trees.
- Connectivity and flows.
- Multi-terminal flows.
- Matchings.
- Transportation problems.
- Planarity and coloring.
- Independence and dominance.
- Graphs and computing.
- Divide-and-Conquer.

Textbooks:

Deir Agnarsson, Raymond Greenlaw (2007): Graph Theory: Modeling, Applications, and Algorithms. (eTextbook) Pearson Prentice Hall.
ISBN-13: 9789814648462-AA

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Learning Outcome:

- Verify structures as graphs and evaluate graph properties.
- Interpret connected/network problems as a graph.
- Analyze and test spanning trees, connectivity and network flow problems.
- Employ matching and transportation problems.
- Implement vertex, edge and general graph colorings.
- Analyze graph algorithms.
- Construct and formulate a range of mathematical techniques to solve a variety of quantitative problems.
- Formulate solutions to problems individually and/or as part of a team.
- Analyze and solve a number of problem sets within strict deadlines.

Assessment Strategies:

Continuous Assessment Component	Weightage (%)
COMPUTER MARKED ASSIGNMENT	8
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COMPUTER MARKED ASSIGNMENT	8
PRE-CLASS QUIZ	2
PRE-CLASS QUIZ	2
PRE-CLASS QUIZ	2
Sub-Total	30

Examinable Component	Weightage (%)
Written Exam	70
Sub-Total	70

Weightage Total **100**