

FACULTY OF SCIENCE Department of Mathematics and Statistics

Mathematics 631.03

Graph Theory

Calendar Description: An introduction to graph theory at an advanced level: connectivity; trees; Euler trails and tours; Hamilton cycles and paths; matchings; edge colourings; vertex colourings; homomorphisms; plane and planar graphs; extremal graph theory and Ramsey theory. Additional topics if time permits.

Prerequisites: basic linear algebra and abstract algebra; some familiarity with combinatorial techniques. A previous course in graph theory is not required.

Possible textbooks:

- J.A. Bondy and U.S.R. Murty, Graph Theory, GTM 244, Springer.
- R. Diesel, Graph Theorey, GMT 173, Springer.
- Graph Theory and Applications, Paul Van Dooren, http://www.hamilton.ie/ollie/Downloads/Graph.pdf
- H. A. Kierstead, Graph Theory Notes, <u>http://math.la.asu.edu/~halk/MAT598.html</u>

(see Course Descriptions under the year applicable: <u>http://www.ucalgary.ca/pubs/calendar/</u>)

Syllabus

<u>Topics:</u>	<u>Number of</u> <u>Hours</u>
Why graph theory? Some history and major results. Basic definitions, notation, terminology.	3
Connectivity and trees	4
Euler tours and trails, Hamiltonian cycles	4
Matchings and edge colourings	4
Vertex colouring and edge colouring	4
Plane and planar graphs	4
Extremal graph theory and Ramsey theory.	4
Additional topics	9
TOTAL:	36

Additional topics may include: flows in networks; the probabilistic method; infinite graphs; algebraic graph theory; graph algorithms. Students will have the opportunity to provide input on the topics to be studied in more detail.

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Last modified on 2013-11-22 yf/rs