

GRAPH THEORY

MATH 318

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Here is approximately what we will cover in a semester. I have not used this text before, so it is hard to say just how much of it we'll cover. There are a few places where we will skip over material. For example, we'll skip the proof in §5.4 of Kuratowski's theorem. Most texts at this level don't include a proof.

Sections refer to Clark and Holton, ISBN 9810204906.

The class webpage will list what we have covered in the text and what we have skipped. It is unlikely we will cover anything not in this text.

TOPICS

- (1) The definition of a graph. §1.1
- (2) Graphs as models. §1.2
- (3) Definitions: isomorphism, bipartite, etc. §1.3
- (4) Vertex degrees. §1.4
- (5) Subgraphs. §1.5
- (6) Paths and cycle. §1.6
- (7) Adjacency matrix and the incidence matrix. §1.7
- (8) Fusion and an algorithm for connectedness. §1.8
- (9) Definition of a tree. §2.1
- (10) Bridges. §2.2
- (11) Spanning trees. §2.3
- (12) Weighted graphs and minimal spanning trees. §2.4
- (13) Shortest path problems. §2.5
- (14) Cut vertices. Degrees of Connectivity. §2.6
- (15) Euler Tours. §3.1
- (16) The Chinese postman problem. §3.2
- (17) Hamiltonian graphs. §3.3 (we'll probably skip some of this section.)
- (18) The traveling salesman problem. §3.4 (we'll probably skip some here.)
- (19) Matchings. §4.1
- (20) The marriage problem. §4.2 & §4.3 (we'll probably skip some here.)
- (21) Definition of planar graphs. §5.1
- (22) Euler's Formula. §5.2
- (23) Kuratowski's theorem §5.4 (we'll probably skip some here.)
- (24) The dual of a plane graph. §5.6
- (25) Vertex Coloring. §6.1
- (26) Map Coloring. §6.6
- (27) The definition of a digraph. §7.1
- (28) In-degree and out-degree. §7.2
- (29) Tournaments. §7.3
- (30) Traffic flow (orienting graphs). §7.4
- (31) Networks: max flow, min cut. §8.1-3 (we'll probably skip some here.)