

A	Course Number & Title	Graph Theory – MTH 418										
B	Pre/Co-requisite(s)	Prerequisite: MTH 213										
C	Number of credits	3										
D	Faculty Name	Ayman Badawi										
E	Term/ Year	Spring 2024										
F	Sections	<table border="1"> <thead> <tr> <th>CRN</th> <th>Days</th> <th>Time</th> <th>Location</th> </tr> </thead> <tbody> <tr> <td>MTH 418</td> <td>MW</td> <td>11:00 – 12:15</td> <td>Chem. 227</td> </tr> </tbody> </table>	CRN	Days	Time	Location	MTH 418	MW	11:00 – 12:15	Chem. 227		
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G	Instructor Information	<table border="1"> <thead> <tr> <th>Office</th> <th>Telephone</th> <th>Email</th> </tr> </thead> <tbody> <tr> <td>NAB 262</td> <td>---</td> <td>abadawi@aus.edu</td> </tr> </tbody> </table>	Office	Telephone	Email	NAB 262	---	abadawi@aus.edu				
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NAB 262	---	abadawi@aus.edu										
		Office Hours: <ul style="list-style-type: none"> • MTWR: 13:00 – 14:00 • Or by appointment, email me 										
H	Course Description from Catalog	Covers graphs and sub graphs, connected and disconnected graphs, matrices, trees and girth, planar and nonplanar graphs, graph embedding, connectivity and edge connectivity, Hamiltonian graphs, matching, factorization and coverings, networks and applications to science and engineering.										
I	Course Learning Outcomes and Assessment Instruments	Course Learning Outcomes (CLOs) Upon completion of this course, students will be able to:	Assessment Instrument(s)									
		<p>CLO1: Identify connected graphs, subgraphs, induced subgraphs, spanning subgraphs, Eulerian, Hamiltonian, planar, chordal graphs, and trees.</p> <p>CLO2: Apply basic concepts and theorems to find degrees of vertices, diameter, girth, and Ramsey numbers for some graphs.</p> <p>CLO3: Demonstrate a thorough knowledge of Dijkstra’s algorithm, the structure of complete graphs, bipartite graphs, complete bipartite graphs, regular graphs, line graphs, matching, covering, and partial order graphs.</p> <p>CLO4: Apply basic concepts to find the clique number, domination number, vertex-cover number, independence number, and chromic number of a connected graph.</p>	<p>Exam 1 and/or Final</p> <p>Exams 1, 2, and/or Final</p> <p>Exams 1, 2, 3 and/or Final</p> <p>Exam 3 and/or Final</p>									

J Mapping CLO's to PLO's	<table border="1"> <tr> <th data-bbox="474 271 815 331">Course Learning Outcomes</th> <th data-bbox="815 271 1453 331">Program Learning Outcome: <i>The BSMTH CLOs are listed at the end of this document</i></th> </tr> <tr> <td data-bbox="474 331 815 465"> 1. CLO1, CLO2 2. CLO3, CLO4 </td> <td data-bbox="815 331 1453 465"> PLO1, PLO2, PLO3, PLO5, PLO6, PLO8, PLO9 PLO1, PLO2, PLO3, PLO5, PLO6, PLO7, PLO8, PLO9 </td> </tr> </table>	Course Learning Outcomes	Program Learning Outcome: <i>The BSMTH CLOs are listed at the end of this document</i>	1. CLO1, CLO2 2. CLO3, CLO4	PLO1, PLO2, PLO3, PLO5, PLO6, PLO8, PLO9 PLO1, PLO2, PLO3, PLO5, PLO6, PLO7, PLO8, PLO9																																												
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K Textbook and other Instructional Material and Resources	Required: Badawi- Class- Notes, materials on I-Learn, essential old quizzes, notes, online textbook, and exams on the MTH 418 webpage: https://www.ayman-badawi.com/MTH%20%20418.html																																																
L Teaching Methods	Lectures, oral presentations, and group discussion. All lecture notes and videos will be available on iLearn.																																																
M Grading Scale, Grading Distribution, and Due Dates	<p>Grading Scale (example)</p> <table border="1"> <tr> <td>93 – 100</td> <td>4.0</td> <td>A</td> <td>73.00 – 77.99</td> <td>2.3</td> <td>C+</td> </tr> <tr> <td>89.00 – 92.99</td> <td>3.7</td> <td>A-</td> <td>68.00 – 72.99</td> <td>2.0</td> <td>C</td> </tr> <tr> <td>86.00 – 88.99</td> <td>3.3</td> <td>B+</td> <td>62.00 – 67.99</td> <td>1.7</td> <td>C-</td> </tr> <tr> <td>81.00 – 85.99</td> <td>3.0</td> <td>B</td> <td>50.00 – 61.99</td> <td>1.0</td> <td>D</td> </tr> <tr> <td>78.00 – 80.99</td> <td>2.7</td> <td>B-</td> <td>Less Than 50.00</td> <td>0</td> <td>F</td> </tr> </table> <p>Grading Distribution</p> <table border="1"> <thead> <tr> <th>Assessment</th> <th>Weight</th> <th>Due Date (Week #)</th> </tr> </thead> <tbody> <tr> <td>Exam 1</td> <td>22%</td> <td>Wednesday, Feb. 21, In Class</td> </tr> <tr> <td>Exam 2</td> <td>22%</td> <td>Wednesday, March 27, In Class</td> </tr> <tr> <td>Exam 3</td> <td>22%</td> <td>Monday, May 6, In Class</td> </tr> <tr> <td>Final Exam</td> <td>34%</td> <td>TBA</td> </tr> <tr> <td>Total</td> <td>100%</td> <td></td> </tr> </tbody> </table>	93 – 100	4.0	A	73.00 – 77.99	2.3	C+	89.00 – 92.99	3.7	A-	68.00 – 72.99	2.0	C	86.00 – 88.99	3.3	B+	62.00 – 67.99	1.7	C-	81.00 – 85.99	3.0	B	50.00 – 61.99	1.0	D	78.00 – 80.99	2.7	B-	Less Than 50.00	0	F	Assessment	Weight	Due Date (Week #)	Exam 1	22%	Wednesday, Feb. 21, In Class	Exam 2	22%	Wednesday, March 27, In Class	Exam 3	22%	Monday, May 6, In Class	Final Exam	34%	TBA	Total	100%	
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N Explanation of Assessments	There will be three exams, and a comprehensive final exam. <ul style="list-style-type: none"> With a valid written excuse and making immediate arrangements with the instructor, a missed exam might be replaced with a make-up exam or the grade of the final exam and/or the average grade of all tests (including final) and/or quizzes 																																																
O Attendance	Students in this course are required to follow the AUS Attendance Policy as outlined in the <i>AUS Undergraduate Catalog</i> .																																																
P Student Academic Integrity Code Statement	Students MUST read the Student Academic Integrity Code outlined in the <i>AUS Undergraduate Catalog</i> and abide by the standards for academic conduct, students' rights and responsibilities and procedures for handling allegations of academic dishonesty.																																																
Q Generative AI Course Policy	It is considered an academic integrity violation to represent the output of a generative artificial intelligence tool as your own work.																																																

Schedule (but not in order; I recommend following class notes)

<i>Week #</i>	CHAPTER	NOTES
1	Graphs and their plane figures	•
2	Subgraphs	•
3	Paths and Connectivity of Graphs + distance, parameter and girth	•
4	Vertex cut	•
5	dominating set and domination number	•
6	clique number (components)	•
		•
7	Bipartite graphs and trees	•
8	Tours and Matching	•
9	Eulerian graphs	•
10	Hamiltonian graphs	
11	Colorings- vertex coloring	•
12	Edge colorings	•
13	Ramsey's Theorem and partial order graphs	•
14	Planar graphs, Line graphs	•
15	Reviews/ comments, discussion	•

BSMTH Program Learning Outcomes

PLO1: Demonstrate knowledge and understanding of diverse areas in mathematics, such as analysis, algebra, discrete mathematics, and applied mathematics.

PLO2: Construct and effectively communicate valid mathematical arguments.

PLO3: Demonstrate a solid grounding in the ideas and techniques of mathematics.

PLO4: Apply mathematical analysis and mathematical skills to problems in other disciplines.

PLO5: Use discrete mathematical concepts in various contexts such as algorithm development, computer programming, and network development and implementation.

PLO6: Demonstrate the ability to identify and carry out thoughtful approaches to problem-solving.

PLO7: Define and execute simple research tasks and assist in more research that is complex tasks as required for professional work.

PLO8: Formulate a problem in mathematical terms from descriptions written in language specific to disciplines associated with engineering, finance, and the natural sciences.

PLO9: Obtain the research skills necessary to adapt to change, remain current in the field, and continue to learn new information, skills, and concepts.