AUS | الجــامعــة الأمــيركــيــة فــي الـشــارقــة
American University of Sharjah

A	**Course Number & Title**	**Abstract Algebra– MTH 320**
B	**Pre/Co-requisite(s)**	Prerequisite: MTH 221
C	**Number of credits**	3
D	**Faculty Name**	Ayman Badawi
E	**Term/ Year**	Spring 2024

F	**Sections**	(see table below)

CRN	Days	Time	Location
00000	TR	11:00 – 12:15	Phys. 109

G	**Instructor Information**

Office	Telephone	Email
NAB 262	---	abadawi@aus.edu

Office Hours:

- MTWR: 13:00 – 14:00
- Or by appointment, email me

H	**Course Description from Catalog**	Covers semi-groups, monoids, groups, permutation groups, cyclic groups, Lagrange's Theorem, subgroups, normal subgroups, quotient groups, (external) direct product of groups, homomorphism, and isomorphism theorems, Cayley's Theorem, and introduction to rings and fields.

I	**Course Learning Outcomes and Assessment Instruments**

Course Learning Outcomes (CLOs) Upon completion of this course, students will be able to:	Assessment Instrument(s)
Basic number theory	
CLO1: Demonstrate knowledge and understanding of the Lagrange Theorem, symmetric groups, cyclic groups, subgroups, and the order of an element in a finite group.	Exams 1, 2, and/or Final
CLO2: Demonstrate knowledge and understanding of normal subgroups, quotient groups, and direct product of groups.	Exams 1, 2, and/or Final
CLO3: Demonstrate knowledge and understanding of group homomorphism and isomorphism.	Exam 3 and/or Final
CLO4: Demonstrate Knowledge and understanding of the method of classification of finite abelian groups.	Exam 3 and/or Final
CLO5: Demonstrate knowledge and understanding of constructing proofs to a group's theory-related problems.	Exams 1, 2, 3, and Final

J	Mapping CLO's to PLO's		

Course Learning Outcomes	Program Learning Outcome: *The BSMTH CLOs are listed at the end of this document*
1. CLO1-- CLO5	PLO1, PLO2, PLO3, PLO4, PLO6, PLO7, PLO9

K	Textbook and other Instructional Material and Resources	Required: Badawi- Class- Notes, materials on I-Learn, essential old exams, notes, and a Textbook on the MTH 320 webpage: https://ayman-badawi.com/MTH%20320.htm
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	**Grading Scale (example)**

88 – 100	4.0	A	71.00 – 74.99	2.3	C+
85.00 – 87.99	3.7	A-	65.00 – 70.99	2.0	C
82.00 – 84.99	3.3	B+	60.00 – 64.99	1.7	C-
78.00 – 81.99	3.0	B	50.00 – 59.99	1.0	D
75.00 – 77.99	2.7	B-	Less Than 50.00	0	F

Grading Distribution

Assessment	Weight	Due Date (Week #)
Exam 1	22%	February 22, In Class
Exam 1	22%	March 28, In Class
Exam 2	22%	May 7, In Class
Final Exam	34%	TBA
Total	100%	

N	Explanation of Assessments	There will be three exams and a comprehensive final exam. • 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 *AUS Undergraduate Catalog.*
P	Student Academic Integrity Code Statement	Students MUST read the Student Academic Integrity Code outlined in the *AUS Undergraduate* Catalog 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)

CHAPTER	NOTES
01: Introduction to groups, semi-groups, and monoids	• Introduction to the Course
02: Groups	Examples include the symmetric group.
03: Finite groups, subgroups	LaGrange theorem and its application.
04: subgroups and cosets	Definition and properties
06: Order of an element in a group	Definition and its connection with LaGrange theorem
08: Cyclic groups	Definition and its properties
09: Cyclic groups	More properties of cyclic groups
11: Permutation group	Definition and examples
13: Permutation group	• Write an element as disjoint cycles and determine the order of an element, and discuss even permutations
14: Normal subgroups and quotient groups	Definition and properties
16: Group homomorphism and isomorphism	Definition and examples
17: Group homomorphism and isomorphism	First isomorphic Theorem and its uses
18: External and internal direct product of groups	Definition, examples, and properties
22: External and internal direct product of groups	• More properties, determine the order of an element of a direct product of groups and determine when a direct product of groups is cyclic
• Classification of finite abelian groups	Just explain the method without proofs
Final Exam	**COMPREHENSIVE**

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 complex research 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.