QF01/0408-4.0E	Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Mathematics Department

Study plan No.	**2022/2021**		**University Specialization**		**Bachelor of Mathematics**	
Course No.	**0101323**		**Course name**		**Abstract Algebra (1)**	
Credit Hours	**3**		**Prerequisite/ Co-requisite**		**Number Theory**	
Course type	☐ MANDATORY UNIVERSITY REQUIREMENT	☐ UNIVERSITY ELECTIVE REQUIREMENTS	☐ FACULTY MANDATORY REQUIREMENT	☐ Support course family requirements	✓ **Mandatory requirements**	☐ Elective requirements
Teaching style	☐ Full online learning		✓ **Blended learning**		☐ Traditional learning	
Teaching model	☐ 1 Synchronous: 1 asynchronous		✓ **1 face to face : 1 asynchronous**		☐ 2 Traditional	

Faculty member and study divisions' information (to be filled in each semester by the subject instructor)

Name	Academic rank	Office No.	Phone No.	E-mail	
Division number	**Time**	**Place**	**Number of students**	**Teaching style**	**Approved model**
				Lecture	

Brief description

Groups and subgroups, Cyclic groups, Permutation groups, Homomorphisms of groups, Isomorphism's of groups, Direct product of groups, Cosets and Lagrange's theorem, Normal subgroups and factor groups, The first isomorphism theorem.

Learning resources

Course book information (Title, author, date of issue, publisher ... etc)	Gallian, J. A. (2010), Contemporary Abstract Algebra, 7th edition, USA, Brooks/Cole.			
Supportive learning resources (Books, databases, periodicals, software, applications, others)	1) Abstract Algebra. By: I. N. Herstiein 2) Abstract Algebra. By: A. P. Hillman and G. W. Alexanderson 3) Abstract Algebra. By: A. P. Hillman and G. W. Alexanderson 4) Groups, rings and field. By: T. S Blyth and E. F. Robertson			
Supporting websites	• http://en.wikipedia.org/wiki/Abstract Algebra. • Abstract Algebra Notes- Free Harvard Courses. • Abstract Algebra Notes-You Tube. • http://www.ugrad.math.ubc.ca/coursedoc/math100/index.html Online tutorials and quizzes			
The physical environment for teaching	✓ Class room	☐ labs	✓ Virtual educational platform	☐ Others
Necessary equipment and software	**N/A**			
Supporting people with special needs				
For technical support				

Course learning outcomes (S= *Skills, C= Competences K= Knowledge,)*

No.	Course learning outcomes	The associated program learning output code
	Knowledge	
K1	Recognize Groups, Examples of groups and main groups properties	MK2
K2	Test subgroups and cyclic subgroups	MK2
K3	Describe isomorphism and Automorphism	MK5
K4	Utilize cosets and Lagrange's Theorem	MK2
K5	Discuss normal subgroups and quotient groups	MK5
	Skills	
S1	Exercising mathematical logic in practical life.	MS1
S2	Using scientific methodology as a way of thinking and as a tool in facing problems.	MS2
	Competences	
C1	Applying mathematics in various abstract algebra sectors.	MC2
C2	Developing scientific methodology for pursuing abstract algebra graduate studies.	MC3

Mechanisms for direct evaluation of learning outcomes

Type of assessment / learning style	Fully electronic learning	Blended learning	Traditional Learning (Theory Learning)	Traditional Learning (Practical Learning)
Midterm exam	30%	**30%**	40%	30%
Participation / practical applications	0	**0**	10%	30%
Asynchronous interactive activities	30%	**20%**	0	0
Final exam	40%	**50%**	50%	40%

Schedule of simultaneous / face-to-face encounters and their topics

Week	Subject	learning style	Reference
1	Groups: definition and examples.	Lecture	42 – 46
2	Cayley tables of small Symmetric Groups, Groups of Symmetries, and dihedral groups (of small order).	Lecture	46 – 50
3	Uniqueness of the identity in a group and the cancellation low. The order of a group, the order of an element in a group.	Lecture	50 – 56
4	Definition of a subgroup, one-step subgroup test, two step subgroup test and finite subgroup test.	Lecture	59 – 64
5	Properties of subgroups.	Lecture	65 – 71
6	Cyclic groups and the generators of cyclic groups.	Lecture	73 – 85
7	Cycle notation with the properties of permutations, product of disjoint cycles.	Lecture	94 – 103
8	Even and odd permutations. Even permutations form a subgroup of the group of permutations.	learning through problem solving	104 – 116
9	Isomorphisms, def. and examples. Properties of isomorphisms. **Mid Exam**	Lecture	120 – 134

10	Cosets and Lagrange's theorem, properties of cosets. If G is finite group then the order of any subgroup divide the order of the group.	Lecture	137 – 141
11	Any group of prime order is cyclic. External direct product of groups. Classification of groups of order 4.	Lecture	141 – 152
12	Normal subgroups and factor groups. Normal subgroup test.	Lecture	177 - 183
13	Abelian group and normality.	Lecture	183 – 195
14	Group homomorphism, def. examples. Kernel of a homomorphism. The first isomorphism theorem.	Lecture	199 – 206
15	Rings, subrings, integral domain, factor rings and ideals.	learning through projects	236 – 243
16	**Final Exam**		

Schedule of asynchronous interactive activities (in the case of e-learning and blended learning)

Week	Task / activity	Reference	Expected results
1	Assignments 1	Lecture notes and Ref.1	Submitting pdf document on the virtual educational platform
2	Work sheet 1	Internet sources and the reference book	A document that show cooperate to work effectively in some group projects.
3	Assignments 2	Lecture notes and Ref.1	Submitting pdf document on the virtual educational platform
4	Assignments 3	Lecture notes and Ref.1	Submitting pdf document on the virtual educational platform
5	Assignments 4	Ref.2	Submitting pdf document on the virtual educational platform
6	Assignments 5	Ref.2	Submitting pdf document on the virtual educational platform describe Cyclic groups
7	Video 1	Virtual educational platform	Discussion in the class
8	Work sheet 2	Internet sources and the reference book	A document that describe the group of permutations and its applications.
9	Assignments 6	Ref.2	Discussion in the class
10	Assignments 7	Ref.2	Submitting pdf document on the virtual educational platform
11	Assignments 8	Lecture notes and Ref.1	Submitting pdf document on the virtual educational platform
12	Quiz 1	on the subject studied after mid exam	Submitting pdf document on the virtual educational platform
13	Assignments 9	Ref.2	Submitting pdf document on the virtual educational platform
14	Video 2	Virtual educational platform	Discussion in the class
15	Assignments 9	Lecture notes and Ref.1	Submitting pdf document on the virtual educational platform
16	Final Exam		