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.	**0101424**		**Course name**		**Abstract Algebra (2)**	
Credit Hours	**3**		**Prerequisite/ Co-requisite**		**Abstract Algebra (1)**	
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

Rings, Subrings, Integral domain, Factor ring and ideals, Ring homomorphisms, Polynomial rings, Factorization of polynomial, Reducibility and irreducibility tests, Divisibility in integral domain, Principal ideal domains and unique factorization domains, Algebra extension of fields.

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				

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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 rings, examples of rings and main rings properties	MK2
K2	Test subrings and ideal	MK2
K3	Describe isomorphism and homomorphism	MK3
K4	Utilize ideals	MK2
K5	Discuss polynomial rings.	MK4
	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	Definition and examples of rings, uniqueness of the unity and inverses.	Lecture	235 – 246
2	Subring test, the center of a ring, intersection and union of subrings.	Lecture	235 – 246
3	Integral domains, fields, the relation between fields and integral domains, the characteristic of integral domains.	Lecture	248 – 257
4	Unit elements idempotent elements nilpotent elements and zero divisors with the ring Z_n.	Lecture	248 – 257
5	Ideals. Showing that any ideal is subring while the converse is not always true. Principal ideals in commutative rings.	Lecture	262 – 266
6	Finitely generated ideals, ideals in the ring z[x].The factor ring R/I, I is an ideal of R.	learning through problem solving	262 – 266
7	Prime ideals, maximal ideals, proving that any maximal ideal is prime while the converse is not always true.	Lecture	266 – 271

8	maximal ideal of R[X], R is the set of real numbers also the factor ring	Lecture	266 – 271
9	Ring homomorphism and the properties of the ring homomorphism. **Mid Exam**	Lecture	278 – 282
10	The first isomorphism theorem and applications to this theorem	Lecture	282 – 290
11	If f:R→S is a ring homomorphism, then kernel of f is an ideal of R. A ring with unity contains Z_n or Z.	Lecture	282 – 290
12	Polynomial rings.	learning through projects	291 – 294
13	The division algorithm of F[x], where F is a field, the remainder theorem. The principal ideal domain.	Lecture	294 – 298
14	Proving that if F is a field then F[x] is a principal ideal domain.	Lecture	297 – 301
15	Factorization of polynomials, reducibility and irreducibility tests. Algebra extension of fields.	Lecture	303 – 312
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	Ref.2	Submitting pdf document on the virtual educational platform
2	Work sheet 1	Internet sources	Pdf document
3	Assignments 2	Text Book	Submitting pdf document on the virtual educational platform
4	Assignments 3	Ref.2	Submitting pdf document on the virtual educational platform
5	Assignments 4	Ref.2	Submitting pdf document on the virtual educational platform
6	Assignments 5	Lecture note	Submitting pdf document on the virtual educational platform
7	Video 1	E-learning	Discussion in the class
8	Work sheet 2	Internet sources	Virtual educational platform Document
9	Assignments 6	Lecture note	Submitting pdf document on the virtual educational platform
10	Assignments 7	Text Book	Submitting pdf document on the virtual educational platform
11	Assignments 8	Text Book	Submitting pdf document on the virtual educational platform
12	Quiz 1	E-learning	Submitting pdf on the virtual educational platform
13	Assignments 9	Lecture note	Submit a pdf or word sheet
14	Video 2	E-learning	Discussion in the class
15	Assignments 9	Lecture note	Submitting pdf document on the virtual educational platform
16	**Final Exam**		