جامعة الزيتونة الأردنية

Al-Zaytoonah University of Jordan

Course Syllabus

According to JORDAN National Qualification Framework (JNQF)

Course Name: Abstract Algebra (2)

Course Number: 0101424

General Course Information:

Course Title	Abstract Algebra (2)
Course Number	0101424
Credit Hours	3 credit hours
Education Type	Blended learning
Prerequisites/Co-requisites	Abstract Algebra (1) (0101323)
Academic Program	Bachelor of Mathematics
Program Code	101
Faculty	Faculty of Science and Information Technology
Department	Mathematics
Level of Course	3
Academic Year /Semester	2023/2024 1st Semester
Awarded Qualification	BS'c
Other Department(s) Involved in Teaching the Course	-
Language of Instruction	English
Date of Production	2021-2022
Date of Revision	16-10-2023

Course Coordinator:

Coordinator's Name	Dr. Hamza Alzaareer
Office No.	130
Office Phone Extension Number	423
Office Hours	11:00 to 16:00 (Sunday) 10:00 to 11:00 (Monday) 12:30 to 15:30 (Tuesday) 10:00 to 11:00 (Wednesday)
E-mail	h.alzaareer@zuj.edu.jo

Other Instructors:

Instructor Name	
Office No.	
Office Phone Extension Number	
Office Hours	
Email	

Course Description *(English/Arabic)*:

English	The course provides students an advanced concepts in: Rings, Subrings, Integral domain, field, Ring homomorphisms, and isomorphism, Polynomial Rings, Factorization of polynomial, Ideals, Finitely generated ideals, congruence and quotient rings.
Arabic	المساق يزود الطالب بالمفاهيم المتقدمة في: الحلقات، الحلقات الجزئية، مجال الساحة، الحقول, تجانس الحلقات والتشاكل، حلقات كثيرات الحدود، قسمة كثيرات الحدود، المثاليات، التوليد المنتهي للمثاليات، المتطابقات وحلقات القسمة.

Textbook: *Author(s), Title, Publisher, Edition, Year, Book website.*

Contemporary Abstract Algebra, Gallian, J., 7th edition, Brooks/Cole. 2010

References: *Author(s), Title, Publisher, Edition, Year, Book website.*

1) N. Herstiein, Abstract Algebra, Wiley, 3rd edition, 1996
2) A. P. Hillman and G. W. Alexanderson, Abstract Algebra, Waveland Press, 5th edition, 1994
3) Groups, rings and field, Groups, rings and field, Springer, 2017.

Course Educational Objectives (CEOs):

CEO1	Understanding fundamental algebraic structures such as rings and fields.
CEO2	Mastering algebraic operations and properties within these structures.
CEO3	Developing rigorous mathematical reasoning and proof skills specific to abstract algebra.

Intended Learning Outcomes (ILO's):

Intended learning outcomes (ILOs)		**Relationship to CEOs**	**Contribution to PLOs**	**Bloom Taxonomy Levels***	**JNQF Descriptors****
K	Knowledge and Understanding				
ILO1-k	Knowledge of how to communicate mathematics clearly.	CEO 1	PLO1	Remembering	K
ILO2-k	Knowledge of the main concepts in abstract algebra.	CEO 1, 2	PLO1	Understanding	K
S	Intellectual skills				
ILO3-s	Making use of mathematical logic in abstract algebr.	CEO 3	PLO6	Applying	S
ILO4-s	Engaging scientific methodology as a way of thinking and as a tool in facing problems.	CEO 3	PLO6	Creating	S
C	Subject specific skills				
ILO5-c	Engaging abstract algebra in various mathematics fields.	CEO 2	PLO12	Applying	C
D	Transferable skills:				
ILO6-d	Gaining scientific methodology for pursuing graduate studies.	CEO 2	PLO12	Creating	C

*Bloom Taxonomy Levels:

Level #	1	2	3	4	5	6
Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

** Descriptor (National Qualification Framework Descriptors): K: Knowledge, S: Skill, C: Competency.

Program Learning Outcome (PLOs):

(PLOs)	**JNQF Descriptors****		
	K	**S**	**C**

1.	Knowledge of the main concepts in pure mathematics.	√		
2.	Knowledge of the main concepts in applied mathematics.	√		
3.	Explain concepts, principles and theories in the fields of probability and statistics.	√		
4.	Possession of technological culture related to the fields of mathematics and its applications.	√		
5.	Making use of mathematical logic in practical life.		√	
6.	Engaging scientific methodology as a way of thinking and as a tool in facing problems.		√	
7.	Applying mathematical software packages in problem solving.		√	
8.	Being capable of data analysis.		√	
9.	Capability of teaching according to modern educational techniques.		√	
10.	Develop creative and innovative methods of teaching mathematics.		√	
11.	Showing the ability to work under ethical and professional standards within teams.			√
12.	Gaining critical thinking and scientific research skills.			√

**** Descriptors according to the national qualifications framework (K: knowledge, S: skill, C: Competency)**

Weekly Schedule *(please choose the type of teaching)*

- ☐ **Face to Face (F2F)**
- ☒ **Hybrid** *(One – To - One)*
- ☐ **Online**

Schedule of Simultaneous and their Topics:

Week	First Lecture (F2F)	Second Lecture	ILOs	PLOs	JNQF Descriptors*
1	Definition and examples of rings,	Activity: (Assignments) Properties of rings	2	3	K
2	Integral domains, fields, the relation between fields and integral domains, the characteristic of integral domains.	Activity: (Work sheet) Relation between fields and integral domains, the characteristic of integral domains.	3	5	S
3	Subring test, the center of a ring,	Activity: (Assignments) Intersection and union of subrings.	3, 4	5	S
4	Unit elements idempotent elements nilpotent elements	Activity: (Assignments) zero divisors with the ring Zn.	3, 4	5	S
5	Ideals and Principal ideals in commutative rings.	Activity: (Video) Showing that any ideal is subring while the converse	3	5	S

		is not always true. Principal ideals in commutative rings.			
6	Finitely generated ideals,	Activity: (Assignments) Ideals in the ring z[x].	2	1	K
7	Prime ideals, maximal ideals,	Activity: (Assignments) Proving that any maximal ideal is prime while the converse is not always true.	5	12	C
Midterm Exam (30%)					
9	Ring homomorphism and isomorphism	Activity: (Assignments) The properties of the ring homomorphism.	6	11	C
10	Congruence	Activity: (Assignments) Prove properties of Congruence	3	5	S
11	Polynomial rings.	Activity: (Work sheet) project	4	5	S
12	The division algorithm of F[x], where F is a field, the remainder theorem. The principal ideal domain.	Activity: (Assignments) Proving that if F is a field then F[x] is a principal ideal domain.	3, 4	5	S
13	Rings, subrings	Activity: (Video) Factorization of polynomials	1, 2	1	K
14	Factorization of polynomials, reducibility and irreducibility tests.	Activity: (Assignments) Algebra extension of fields.	1,2	1	K
15	**Review**				
16	**Final Exam**				

* **K: Knowledge, S: Skills, C: Competency**

Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

- Lecture.
- Learning through projects.
- Learning through problem solving.

Course Policies:

A- Attendance policies:
The maximum allowed absences is 15% of the lectures.
B- Absences from exams and handing in assignments on time:
Midterm exam can be retaken based on approval of excuse by the instructor's discretion.
Not handing assignment on time will incur penalties.
C- Academic Health and safety procedures
D- Honesty policy regarding cheating, plagiarism, and misbehaviour:
Cheating, plagiarism, misbehaviour will result in zero grade and further disciplinary actions may be taken.
E- Grading policy:

- All homework is to be posted online through the e-learning system.
- Exams will be marked within 72 hours and the marked exam papers will be handed to the students.
- Online Activities **20%**
- Midterm 30**%**
- Final Exam 50**%**

F- Available university services that support achievement in the course: **E-Learning Platform, Labs, Library.**

Required Equipment:

- Internet Connection
- Access to the ZUJ E-Learning Platform at https://exams.zuj.edu.jo/
- E-learning plan
- Classroom

Assessment Tools Implemented in the Course:

- Final Exam
- Midterm Exam
- Quizzes
- Homework

Responsible Persons and their Signatures:

Course Coordinator	Dr. Hamza Alzaareer	**Completed Date**	**10 / 2023**
		Signature	

Received by (Department Head)		**Received Date**	/ /
		Signature	