جامعة الزيتونة الأردنية
Al−Zaytoonah University of Jordan
كلية العلوم وتكنولوجيا المعلومات
Faculty of Science and Information Technology

" عراقة وجودة"
"Tradition and Quality"

Detailed Course Description - Course Plan Development and Updating Procedures/ Mathematics Department	QF01/0408-3.0E

Faculty	Faculty of Science and Information Technology	Department	Mathematics
Course number	0101424	Course title	Abstract Algebra (2)
Number of credit hours	3	Pre-requisite/co-requisite	Abstract Algebra 1\0101423

Brief course 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.

	Course goals and learning outcomes
Goal 1	To provide students with a good understanding of the theory of modern algebra and to introduce the basic concepts of abstract algebra.
Learning outcomes	1.1 Students will have a working knowledge of important mathematical concepts in abstract algebra such as definition of a rings, integral domains and fields. 1.2 Use various canonical types of rings (including polynomial rings and modular rings). 1.3 Analyze and demonstrate examples of ideals and quotient rings, 1.4 Use the concepts of isomorphism and homomorphism for rings. 1.5 To look in detail at the theory of fields as applied to one of the earliest motivational problems of algebra and solving polynomial equations.
Goal 2	To help students develop the ability to prove theorems and solve problems.
Learning outcomes	2.1 Students will see and understand the connection and transition between previously studied mathematics and more advanced mathematics. 2.2 Be familiar with various method of proof, including direct proof, constructive proof, proof by contradiction, induction. 2.3 Develop skills in creative and critical thinking, problem solving and logical writing. 2.4 Students will gain experience and confidence in proving theorems. 2.5 A blended teaching method will be used requiring the students to prove theorems give the student the experience, knowledge, and confidence to move forward in the study of mathematics.

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Textbook	Contemporary Abstract Algebra. By: Joseph A. Gallian
Supplementary references	1) Abstract Algebra. By: I. N. Herstein 2) Abstract Algebra. By: Abraham P. Hilman Gerald L. Alexan 3) Abstract Algebra. By: A. P. Hillman and G. W. Alexanderson 4) Groups, rings and field. By: T. S Blyth E. F. Robertson.

Course timeline				
Week	**Number of hours**	**Course topics**	**Pages (textbook)**	**Notes**
01	1 1 1	Definition and examples of rings, uniqueness of the unity and inverses.	235 – 246	
02	1 1 1	Subring test, the center of a ring, intersection and union of subrings.	235 – 246	
03	1 1 1	Integral domains, fields, the relation between fields and integral domains, the characteristic of integral domains.	248 – 257	
04	1 1 1	Unit elements idempotent elements nilpotent elements and zero divisors with the ring Z_n.	248 – 257	
05	1 1 1	Ideals. Showing that any ideal is subring while the converse is not always true. Principal ideals in commutative rings.	262 – 266	
06	1 1 1	Finitely generated ideals, ideals in the ring z[x].The factor ring R/I, I is an ideal of R. **FIRST EXAM 20%**	262 – 266	
07	1 1 1	Prime ideals, maximal ideals, proving that any maximal ideal is prime while the converse is not always true.	266 – 271	
08	1 1 1	Proving that $\langle x^2+1 \rangle$ is maximal ideal of R[X], R is the set of real numbers also proving that the factor ring $R[X]/\langle x^2+1 \rangle$ is isomorphic to C ring.	266 – 271	
09	1 1 1	Ring homomorphism, f(x):$Z_4 \rightarrow Z_{10}$ such that f(x)=5x is a ring homomorphism also the properties of the ring homomorphism.	278 – 282	
10	1 1 1	The first isomorphism theorem and as application to this theorem show that: $Z/\langle 4 \rangle$ isomorphic to Z_4.	282 – 290	
11	1 1 1	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.	282 – 290	
12	1 1 1	Polynomial rings. **SECOND EXAM. 20%**	291 – 294	

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13	1 1 1	The division algorithm of F[x], where F is a field, the remainder theorem. The principal ideal domain.	294 – 298	
14	1 1 1	Proving that if F is a field then F[x] is a principal ideal domain.	297 – 301	
15	1 1 1	Factorization of polynomials, reducibility and irreducibility tests. Algebra extension of fields.	303 – 312	
16	1 1 1	**FINAL EXAM. 50%**	-	

Theoretical course evaluation methods and weight	Participation = 10% First exam 20% Second exam 20% Final exam 50%	**Practical (clinical) course evaluation methods**	Semester students' work = 50% (Reports, research, quizzes, etc.) Final exam = 50%

Approved by head of department		**Date of approval**	

Extra information (to be updated every semester by corresponding faculty member)

Name of teacher	Hamza Alzaareer	Office Number	**9130**
Phone number (extension)	423	Email	**h.alzaareer@zuj.edu.jo**
Office hours			