Philadelphia University		Approval date:
Faculty of Science	**PHILADELPHIA UNIVERSITY** THE WAY TO THE FUTURE	Issue:
Department Mathematics		Credit hours 3
Academic year 2023/2024	**Course Syllabus**	Bachelor

Course Information

Course#	Course title	Prerequisite
250442	**Abstract Algebra 2**	**250342**

Course type		Class time	Room
☐ University Requirement　☐ Faculty Requirement ☒ Major　Requirement　☐ Elective　　☐ Compulsory		**Sat-Mon 9:45-11:00**	**21004**
		Sun-Wed 12:40-13:55	**21005**

Instructor Information

Name	Office No.	Phone No.	Office Hours	E-mail
Dr. Hani Kawariq	**2824**	**2264**	**S/T/M/W 11:15-12:15**	**hkawariq@philadelphia.edu.jo**

Course Delivery Method

Course Delivery Method			
☒ **Physical**	☐ **Online**	☐ **Blended**	
Learning Model			
Percentage	**Synchronous**	**Asynchronous**	**Physical**
			100

Course Description

This module is the second half of the undergraduate Abstract Algebra series, covering topics in rings and fields: integral domains, ideals, ring homomorphism, polynomial rings, extension fields, finite fields, algebraic extension, and some applications in classical geometry.

Course Learning Outcomes

Number	Learning Outcomes	Corresponding Program Outcomes
Knowledge		
K1	Understand the concepts of rings, integral domains, and fields.	**Kp1**
K2	Understand the concept of an ideal , Homomorphism, and how to describe the elements of factor rings.	**Kp2**

K3	Understand the concept of an irreducible polynomial and how to use it to construct a finite field.	**Kp2**	
K4	Know the concepts of divisibility, primes, unique factorization domains, principal ideal domains and Euclidian Domains.	**Kp2**	
Skills			
S1	Understand mathematical definitions and demonstrate it in different examples.	**Sp1**	
S2	Understand and able to rewrite proofs of theorems.	**Sp1**	
Competencies			
C1	Express thoughts in good logical writing.	**Cp1**	
C2	Identify ambiguities in mathematical statements and overcome them.	**Cp1**	

Learning Resources

Course textbook	Joseph A. Gallian, Contemporary Abstract Algebra 2021
Supporting References	Lecture Notes "From Groups to Galois" 2022
Supporting websites	https://www.philadelphia.edu.jo/academics/awitno
Teaching Environment	☒**Classroom** ☐ **laboratory** ☐**Learning platform** ☐**Other**

Meetings and subjects timetable

Week	Topic	Learning Methods	Tasks	Learning Material
1	**Review of group theory**	**Lecture**		**Suggested Questions for Practice**
2	**Introduction to Rings**	**Lecture**		**Ch12: 1-63**
3-4	**Integral Domains**	**Lecture**	**Quiz 1**	**Ch13: 1, 2, 4, 6, 8, 13, 17-19, 23, 25, 26, 28, 29, 31, 38, 39, 42, 43, 45, 46, 49, 50,51,62,63,70**
5-6	**Ideals and Factor Rings**	**Lecture**	**Quiz 2**	**Ch14: 4- 16, 20, 22, 26, 28, 30-32, 38, 40, 42, 45a, 48, 53- 56.**
7-8	**Ring Homomorphisms**	**Lecture**		**Ch15:6- 8, 11, 13, 14, 16, 18, 22, 24, 26-28, 32-37, 39, 45-47, 51, 56, 59, 60.**
9-10	**Polynomial Rings**	**Lecture**	**Quiz 3**	**Ch 16: 5, 6, 8, 10, 13, 15,**

				16, 18, 20, 18, 20, 23-28, 31-36, 44-46, 49-51, 60,65.
11-12	**Factorization of Polynomials**	**Lecture**		**Ch17 : 2, 3, 6, 9-17 odd, 21- 23,25, 26, 29-31, 38, 39, 42, 43, 47.**
13-14	**Divisibility in Integral Domains**	**Lecture**	**Quiz 4**	**Ch 18: 1-5, 8, 12, 13-15, 17,18, 20-23, 25, 27, 28, 30, 31, 36.**
15	**Extension Fields**	**Lecture**		**Ch 19 :1-6,9,13,15,17, 18,19,22-26,30,31,36, 40,42,46-52**
16	**Final Exam**			

* includes: Lecture, flipped Class, project- based learning, problem solving based learning, collaborative learning

Course Contributing to Learner Skill Development

Using Technology
Communication skills
Improve the communication skills of the student by giving oral quizzes and discuss the assignments at the class
Application of concepts learnt

Assessment Methods and Grade Distribution

Assessment Methods	Grade Weight	Assessment Time (Week No.)	Link to Course Outcomes
Mid Term Exam	30%	Week 6-8	**K1,K2,S1,S2**
Various Assessments *	30%	Continous	**All of them**
Final Exam	40%	Week 16	**All of them**
Total	100%		

* includes: quiz, in class and out of class assignment, presentations, reports, videotaped assignment, group or individual projects.

Alignment of Course Outcomes with Learning and Assessment Methods

Number	Learning Outcomes	Learning Method*	Assessment Method**
Knowledge			

K1	Understand the concepts of rings, integral domains, and fields.	Lecture	**Exam**
K2	Understand the concept of an ideal and how to describe the elements of its factor rings.	Lecture	**Exam,Quiz**
K3	Understand the concept of an irreducible polynomial and how to use it to construct a finite field.	Lecture	**Exam,Quiz**
K4	Know the concepts of divisibility, primes, unique factorization domains, principal ideal domains and Euclidian Domains.	Lecture	**Exam, Quiz**
Skills			
S1	Understand mathematical definitions and demonstrate it in different examples.	Lecture	**Quiz**
S2	Understand and able to rewrite proofs of theorems.	Lecture	**Exam**
Competencies			
C1	Express thoughts in good logical writing.	Problem Solving	**Assignment**
C2	Identify ambiguities in mathematical statements and overcome them.	Discussion	**Assignment**

* includes: Lecture, flipped Class, project- based learning, problem solving based learning, collaborative learning

** includes: quiz, in class and out of class assignment, presentations, reports, videotaped assignment, group or individual projects.

Course Polices

Policy	Policy Requirements
Passing Grade	The minimum passing grade for the course is (50%) and the minimum final mark recorded on transcript is (35%).
Missing Exams	• Missing an exam without a valid excuse will result in a zero grade to be assigned to the exam or assessment. • A Student who misses an exam or scheduled assessment, for a legitimate reason, must submit an official written excuse within a week from the exam or assessment due date. • A student who has an excuse for missing a final exam should submit the excuse to the dean within three days of the missed exam date.
Attendance	The student is not allowed to be absent more than (15%) of the total hours prescribed for the course, which equates to six lectures days (M, W) and seven lectures (S,T,R). If the student misses more than (15%) of the total hours prescribed for the course without a satisfactory excuse accepted by the dean of the faculty, s/he will be prohibited from taking the final exam and the grade in that course is considered (zero), but if the absence is due to illness or a compulsive excuse accepted by the dean of the college, then withdrawal grade will be recorded.
Academic Honesty	Philadelphia University pays special attention to the issue of academic integrity, and the penalties stipulated in the university's instructions are applied to those who are proven to have committed an act that violates academic integrity, such as: cheating, plagiarism (academic theft), collusion, and violating intellectual property rights.

Program Learning Outcomes to be assessed in this Course

Number	Learning Outcome	Course Title	Assessment Method	Target Performance level
Kp1	Understand the concepts of rings, integral domains, and fields.			
Kp2	Understand the concept of an ideal and how to describe the elements of its factor rings, an irreducible polynomial and how to use it to construct a finite field, divisibility, primes, unique factorization domains, principal ideal domains and Euclidian Domains.			
Sp1	**Use ring theory to solve several problems in field extension**			

Description of Program Learning Outcome Assessment Method

Number	Detailed Description of Assessment
Kp1	Short quizzes mainly (1) with 10 points each
Kp2	Short quizzes mainly (3) with 10 points each
Sp1	**Assignment**

Assessment Rubric of the Program Learning Outcome