The University of Jordan

Accreditation & Quality Assurance Center

Course Syllabus

Course Name
0301941 Theory of Groups and Fields

1	Course title	Theory of Groups and Fields
2	Course number	0301941
3	Credit hours (theory, practical)	3
	Contact hours (theory, practical)	3
4	Prerequisites/corequisites	--
5	Program title	PhD. In Mathematics
6	Program code	
7	Awarding institution	The University of Jordan
8	Faculty	Science
9	Department	Mathematics
10	Level of course	Compulsory specialization requirement
11	Year of study and semester (s)	1st year, 2nd semester
12	Final Qualification	PhD. In Mathematics
13	Other department (s) involved in teaching the course	--
14	Language of Instruction	English
15	Date of production/revision	29/3/2017

16. Course Coordinator:

Dr. Emad Abu Osba
Math 308

17. Other instructors:

Prof. Hasan Al-Ezeh

18. Course Description:

As stated in the approved study plan.

Further study of group theory: group actions, semi direct product, classification of finite groups, solvable, and nilpotent groups, splitting field of a polynomial, the Galois group, fundamental theorem of Galois theory; the general equation of the nth degree, finite ordered fields, real closed field.

19. Course aims and outcomes:

A- **Aims:**

To Classify Groups of small orders and to calculate the splitting field and Galois Group for a given polynomial over a specific field

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to …

B1. To write correct mathematical proofs concerning algebraic structures
B2. To Classify up to isomorphism groups of small orders.
B3. To determine if a given group is nilpotent or solvable and to know its properties.
B4. To find the degree of a field extension.
B5. To find the splitting field of a given polynomial.
B6. To calculate the Galois group for given polynomials over specific fields.
B7. To apply Galois Theory for some applications

20. Topic Outline and Schedule:

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
1. Group Action	1		B1	Homework	Hungerford
2. Sylow Theorems	2		B1	Homework	Hungerford
3. Semi direct Product	3		B1	Homework	Hungerford
4. Classification of groups of Small Order	4		B1,B2	First Exam	Hungerford
5. P-groups, Nilpotent groups, and Solvable groups	5-6		B1,B3	Presentation Second Exam	Hungerford
6. Field Extension	7		B1,B4	Homework	Foot & Dummit
7. Algebraic Field Extension	8		B1,B4	Presentation	Foot & Dummit
8. Splitting Fields	9		B1,B5	Homework	Foot & Dummit
9. Separable Field Extensions	10		B1,B5	Homework	Foot & Dummit
10. Finite Fields	11		B1,B5	Third Exam	Foot & Dummit
11. Galois Theory	12		B1,B6	Homework	Foot & Dummit
12. Solving by Radicals	13		B7	Homework	Foot & Dummit
13. Applications	14		B7	Homework	Foot & Dummit

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following <u>teaching and learning methods</u>:
In order to succeed in this course, each student needs to be an active participant in learning – both in class and out of class.
-   Class time will be spent on lecture as well as discussion of homework problems and some group work.
-   To actively participate in class, you need to prepare by reading the textbook and doing all assigned homework before class (homework will be assigned each class period, to be discussed the following period).
-   You should be prepared to discuss your homework (including presenting your solutions to the class) at each class meeting - your class participation grade will be determined by your participation in this.
You are encouraged to work together with other students and to ask questions and seek help from the professor, both in and out of class.

22. Evaluation Methods and Course Requirements:

Opportunities to demonstrate achievement of the ILOs are provided through the following <u>assessment methods and requirements</u>:

ILO/s	Learning Methods	Evaluation Methods	Related ILO/s to the program
	Lectures	Exam	
		Presentation	
		Homework	

23. Course Policies:

1. The student is not allowed to take the course and its pre-requisite in the same time.
2. Attendance is absolutely essential to succeed in this course. You are expected to attend every class; please notify your instructor if you know you are going to be absent. All exams must be taken at the scheduled time. Exceptions will be made only in extreme circumstances, by prior arrangement with the instructor.
3. If a student is absent for more than 10% of lectures without an excuse of sickness or due to other insurmountable difficulty, then he/she shall be barred from the final examination also he/she will get a failing grade in this course.
4. Medical certificates shall be given to the University Physician to be authorized by him. They should be presented to the Dean of the Faculty within two weeks of the student's ceasing to attend classes.
5. Test papers shall be returned to students after correction. His/her mark is considered final after a lapse of one week following their return.
6. Solutions for the exams questions and marks will be announced at the webpage of the instructor:
   http://eacademic.ju.edu.jo/eabuosba/default.aspx
7. Cheating is prohibited. The University of Jordan regulations on cheating will be applied to any student who cheats in exams or on homeworks.

24. Required equipment:

25. References:

(1) Abstract Algebra by David Dummit and Richard Foote, 3rd edition.

(2) Algebra by Thomas Hungerford, 2nd edition.

26. Additional information:

Name of Course Coordinator: Dr. Emad Abu Osba Signature: ------------------------ Date: 29/3/2017

 Head of curriculum committee/Department: ------------------------ Signature: ---------------------------------

Head of Department: ------------------------ Signature: ---------------------------------

Head of curriculum committee/Faculty: ------------------------ Signature: ---------------------------------

Dean: --- -Signature: ---------------------------------

Copy to:
Head of Department
Assistant Dean for Quality Assurance
Course File