	Course name: MATH 322 Abstract Algebra II			**Department:** Mathematics				Semester 6
	Methods of Education							Credit (ECTS)
	Lecture	Recitation/ (Etud)	Lab	Exams	Homework/ Quiz	Other	Total	6
	42	0	0	30	24	84	180	
Language	English							
Compulsory/Elective	Elective							
Prerequisites	MATH 313 Abstract Algebra I							

Course Contents

Weeks	**Subjects**
1	Fields : definition and examples.
2	Field extensions. Simple extensions, algebraic and transcendental case.
3	Minimum polynomial. Construction of simple algebraic extension from an irreducible polynomial.
4	Classification of simple extensions. Degree of extension. Recollection of vector spaces and dimension.
5	Algebraic elements and algebraic extensions; finite extensions. Algebraic numbers.
6	Geometric constructions with ruler and compasses.
7	The Galois group of an extension. Examples. The Galois correspondence between subgroups and intermediate fields.
8	Splitting field for a polynomial. Existence, uniqueness up to isomorphism. Normal extensions.
9	Relation to splitting fields. Normality of intermediate extension. Normal closure. Separability. Example of inseparable polynomial. Separability of all polynomials in characteristic zero.
10	Separable extensions. Separability of intermediate extensions. Dedekind's Lemma about linear independence of distinct monomorphisms. Degree of the extension corresponding to a group of field automorphisms.
11	Normality and monomorphisms. Transitivity of the Galois group on the zeros of an irreducible polynomial in a normal extension. Properties equivalent to normality.
12	Galois groups of normal separable extensions. Properties of Galois correspondence for normal separable extensions. Normal subgroups and normal intermediate extensions.
13	The Fundamental Theorem of Galois Theory. Application to polynomial equations. The Galois group of a polynomial. Galois group as a group of permutations. Solution by radicals and radical extensions.
14	"Solubility" of the Galois group of a radical extension. Main properties of soluble groups. Example of insoluble quintic. "General" polynomial equations.

Course Objectives

The purpose of this course is to

- give the standard knowledge of field theory.
- apply the technical tools to solve the problems related to field theory.

<table>
<tr>
<td>Learning Outcomes and Competences</td>
<td colspan="3">Upon completion of this course students will be able to
• Acquires mathematical thinking skills (problem solving, generating ways of thinking, forming correspondence, generalizing etc.) and can use them in related fields.
• Can design mathematics related problems, devise solution methods and apply them when appropriate.</td>
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<tr>
<td>Textbook and /or References</td>
<td colspan="3">Main texbooks :
1. I. Stewart, Galois Theory, 2nd edition, Chapman and Hall. edition, Addison-Wesley.
2. Fraleigh Victor, J. Katz, A first course in abstract algebra, Addison Wesley(2003).</td>
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<tr>
<td rowspan="8">Assessment Criteria</td>
<td></td>
<td>If any, mark as (X)</td>
<td>Percentage (%)</td>
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<tr><td>Midterm Exams</td><td>X</td><td>40</td></tr>
<tr><td>Quizzes</td><td></td><td></td></tr>
<tr><td>Homeworks</td><td></td><td></td></tr>
<tr><td>Projects</td><td></td><td></td></tr>
<tr><td>Laboratory work</td><td></td><td></td></tr>
<tr><td>Other</td><td></td><td></td></tr>
<tr><td>Final Exam</td><td>X</td><td>60</td></tr>
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