



### Maths 511 Syllabus

<b>1. College</b>	Science										
<b>2. Department</b>	Mathematics										
<b>3. Program</b>	B.Sc in Mathematics										
<b>4. Course code</b>	Maths 511										
<b>5. Course title</b>	Algebra										
<b>6. Course credits:</b>	Lecture Hours: 3	Lab Hours: 0					Credit Hours: 3				
<b>7. Pre-requisites:</b>	Maths 311, Maths 312										
<b>8. Course web-page:</b>	None										
<b>9. Lectures Timing &amp; Location</b>											
<b>10. Course coordinator</b>	Dr. Ahmed Matar										
<b>11. Academic year</b>	2020-2021										
<b>12. Semester:</b>	√	<b>First</b>		<b>Second</b>			<b>Summer</b>				
<b>13. Textbook(s):</b>	Hungerford, Algebra, Springer 2003										
<b>14. References:</b>	Morandi, Field and Galois Theory, Springer 1996 Dummit and Foote, Abstract Algebra 3 <sup>rd</sup> edition, Wiley										
<b>15. Other resources used (e.g. e-Learning, field visits, periodicals, software, etc.):</b>											
<b>16. Course description (from the catalog):</b>	<p><i>Normal and subnormal series of groups, solvable series, solvable groups, Automorphisms of field extensions, Fixed field, Splitting fields, Normal extensions, Separability, The Fundamental Theorem of Galois Theory, Solvability of Equations by radicals, The General equation of degree n, Roots of unity and Cyclic equations, How to solve a solvable equation.</i></p>										
<b>17. Course Intended Learning Outcomes (CILOs):</b>	Students who successfully complete this course should be able to:										
	<b>Mapping to PILOs</b>										
<b>CILOs</b>	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>
1- Recognize solvable groups.		√	√	√			√				
2- Construct the fraction field of an integral domain		√	√	√			√				
3- Apply irreducibility criteria to determine the irreducibility of polynomials over a field.		√	√	√			√				
4- Distinguish algebraic and transcendental extensions.		√	√	√			√				
5- Apply Tower Theorem to extensions of finite degree.		√	√	√			√				
6- Find the splitting field of a polynomial over a field.		√	√	√			√				
7- Identify normal extensions.		√	√	√			√				

8- Apply the extensions ideas to finite fields.		✓	✓	✓		✓				
9- Relate the notion of Galois correspondence to polynomials equations.		✓	✓	✓		✓				
10- Identify the Galois group of a polynomial.		✓	✓	✓		✓				
11- Discuss the insolubility of polynomial equations by radicals.		✓	✓	✓		✓				
12- Apply the techniques learned to future independent research work.		✓	✓	✓		✓				

<b>18. Course assessment:</b>				
<i>Assessment Type</i>	<i>CILOs coverage</i>	<i>Number</i>	<i>Weight</i>	<i>Date</i>
<i>Online Quizzes</i>				
<i>Tests</i>		<b>2</b>	30%	TBA
<i>Laboratory/Practical</i>				
<i>Assignments/Online Homework</i>		<b>7</b>	30%	TBA
<i>Projects/Case Studies</i>				
<i>Final</i>		<b>1</b>	40%	4/1/2021
<b>Total</b>			<b>100%</b>	

#### **19.Attendance Policy:**

*Extracts from the University Bulletin regarding withdrawal and enforced withdrawal:*

*A student's absence from lectures or classes in excess of 25% of the total assigned session will result in an automatic withdrawal of the student from the course, regardless of the causes for his/her absence.*

- a) A grade of (W) is given to a student who misses 25% or more of the total sessions assigned to the course if he/she presents a valid excuse for his/her absence.*
- b) A grade of (WF) is given to a student who misses 25% or more, but with no valid excuse.*

#### **20.Academic Honesty and Plagiarism:**

*All students are expected to follow the specific rules of academic honesty and plagiarism as per The Regulation of Professional conduct Violations for University of Bahrain Students, decision # 4/2006. Please refer the UoB website-Deanship of Students Affairs-Guidance Office.*

**21.Course Weekly Breakdown:**

<b>Week</b>	<b>Date</b>	<b>Topics covered</b>	<b>CILOs</b>	<b>Teaching Method</b>	<b>Assessment</b>
1	20/9/2020	Solvable Groups, Field of Quotients	1,2	Lecture & Problem solving	HW 1,Test 1 & Final Exam
2	27/9/2020	Field Extensions	2-5	Lecture & Problem solving	HW 1, HW 2, Test 1 & Final Exam
3	4/10/2020	Fundamental Theorem of Galois Theory	2-5,9	Lecture & Problem solving	HW 3, HW4, Test 1 & Final Exam
4	11/10/2020	Fundamental Theorem of Galois Theory	2-5,9	Lecture & Problem solving	HW 4, HW 5, Test 1 & Final Exam
5	18/20/2020	Fundamental Theorem of Galois Theory	2-5,9	Lecture & Problem solving	HW 6, HW 7, Test 1 & Final Exam
6	25/10/2020	Splitting Fields and Normality	2-7,9	Lecture & Problem solving	HW 8, Test 1 & Final Exam
7	1/11/2020	Splitting Fields and Normality	2-7,9	Lecture & Problem solving	HW 9, HW 10, Test 1 & Final Exam
8	8/11/2020	<b>Midsemester break</b>			
9	15/11/2020	Finite Fields	2-9	Lecture & Problem solving	HW 11, Test 2 & Final HW 12, Test 2 & Final
10	22/11/2020	Cyclotomic Extensions	2-10	Lecture & Problem solving	HW 13,HW 14 , Test 2 & Final Exam
11	29/11/2020	Galois Groups of Polynomials	2-10	Lecture & Problem solving	HW 15, HW16, Test 2 & Final Exam
12	6/12/2020	Galois Groups of Polynomials	2-10	Lecture & Problem solving	HW 17, HW 18, Test 2 & Final Exam
13	13/12/2020	Galois Groups of Polynomials	2-10	Lecture & Problem solving	HW 19, HW 20 & Final Exam
14	20/12/2020	Radical Extensions	All	Lecture & Problem solving	HW 21, HW 22 & Final Exam
15	27/12/2020	Radical Extensions	All	Lecture & Problem solving	Final Exam

### Weekly Problems & Important Dates

Week	Date	Topics covered	Examples	Problems	Important Dates
1	20/9/2020	Solvable Groups		See problem sheets	
2	27/9/2020	Field Extensions		See problem sheets	
3	4/10/2020	Fundamental Theorem of Galois Theory		See problem sheets	
4	11/10/2020	Fundamental Theorem of Galois Theory		See problem sheets	
5	18/20/2020	Fundamental Theorem of Galois Theory		See problem sheets	
6	25/10/2020	Splitting Fields and Normality		See problem sheets	<b>29/10 Prophet's birthday</b>
7	1/11/2020	Splitting Fields and Normality		See problem sheets	
8	8/11/2020	<b>Midsemester break</b>			
9	15/11/2020	Finite Fields		See problem sheets	
10	22/11/2020	Cyclotomic Extensions		See problem sheets	
11	29/11/2020	Galois Groups of Polynomials		See problem sheets	
12	6/12/2020	Galois Groups of Polynomials		See problem sheets	
13	13/12/2020	Galois Groups of Polynomials		See problem sheets	<b>16-17/12 National Day</b>
14	20/12/2020	Radical Extensions		See problem sheets	
15	27/12/2020	Radical Extensions		See problem sheets	