



الجامعة الافتراضية السورية
SYRIAN VIRTUAL UNIVERSITY

Algebraic structure Course

Course description

Information

Technology

Engineering



1. Basic Information:

Course Name	Algebraic structure
Course Code	BAS401
Asynchronous contact hours in course	24
Synchronous contact hours in course	1218
Quiz's time	6
Exam Time	2
Asynchronous WorkLoad in course	36
synchronous WorkLoad in course	36
Credit hours of course C	5

2. Prerequisites courses:

Course	code
Non	

3. Course objectives:

This course is an introduction to abstract algebra. The course focuses on algebraic reasoning and basic algebraic structures. Topics include: Logic algebra, sets, function, relations, set of positive integers and some of its basic properties, mathematical induction, counting methods, group, subgroup, isomorphism's theorems, rings, the ring of positive integers, the Euclidian division, Euclidian algorithm and an introduction to the notion of fields.

This course prepare students to apply the basics of Algebraic structures in their domains of specialties.

4. Intended Learning Objectives:

After successfully completing the course, students should be able to:

- Understand the Logic Algebra, sets, functions, binary relations, the basic properties of positive integers.
- Apply the methods of logical proofs, basic properties of positive integers, finite sets, counting methods and to use mathematical induction to prove propositions.
- Understand the composition laws, groups, rings and isomorphism.
- Apply the basic properties of groups and rings in calculation, the Euclidian algorithm and extended Euclidian algorithm to find the greatest common divisor of two integers and solve the Bezout's equality.
- Understand the concept of field and its properties and to use them in vector spaces and linear algebra later on.

5. Results Assessment:

Intended Learning Objectives	Assessment Way					
	Sessions	Practical works	Exams	Presentations	interviews	Reports
Understanding	X	X	X	X		
Logical reasoning	X	X	X	X		
Applying	X	X	X	X		

6. Course content:

Chapter	Subject	Content	Number of theoretical teaching hours	Number of practical teaching hours
CH 1	Logic Algebra and Sets	<ol style="list-style-type: none"> 1. Logic Algebra 2. Sets 3. Functions 4. Family 5. Binary relations 6. Exercises 	3	3
CH 2	Integers \mathbb{N}	<ol style="list-style-type: none"> 1. The basic properties of \mathbb{N} 2. Mathematical induction 3. Finite sets 4. Counting methods 5. Exercises 	2	2
CH 3	Groups	<ol style="list-style-type: none"> 1. Composition laws 2. Groups 3. Bijective Isomorphism 4. Exercises 	3	3
CH 4	Rings and Fields	<ol style="list-style-type: none"> 1. Ring 2. Arithmetic in Rings 3. Entire Rings 4. Invertible elements 5. Ideals 6. Isomorphism 7. Ring of integers 8. Fields 9. Exercises 	4	4

7. Practical Section

- **Tools and Labs:**

Tool Name	Descriptions
Words, PowerPoint, Excel, internet	Available Software

- **Repartition of Practical Work by chapters:**

Chapter	Practical Work Type	Explanations
CH1	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Experiments <input checked="" type="checkbox"/> Homework <input type="checkbox"/> Others	Homework and seminars
CH2	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Experiments <input checked="" type="checkbox"/> Homework <input type="checkbox"/> Others	Homework and seminars
CH3	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Experiments <input checked="" type="checkbox"/> Homework <input type="checkbox"/> Others	Homework and seminars

CH4	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Experiments <input checked="" type="checkbox"/> Homework <input type="checkbox"/> Others	Homework and seminars
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8. References:

1. O. Kouba, “ *Algebra, Part1, Abstract Algebra +*”, HIAST Publications, 2009.
2. F. Abo Saleh, “*Mathematics, Lecture notes*”, HIAST Publications, 2011.
3. A. Abo Hamda, “*Abstract Algebra*”, Damascus University Publications.
4. Kenneth H. Rosen, “*Discrete Mathematics and Its Applications*”, Seventh Edition, McGraw–Hill, 2012.
5. Lang. S, “*Algebra*”, Addison Wesley.