

## MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	<b>Foundation of Mathematics (II)</b>	Module Delivery	
Module Type	Core	<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input checked="" type="checkbox"/> Seminar	
Module Code	MATH1204		
ECTS Credits	8		
SWL (hr/sem)	200		
Module Level	1		
Administering Department	MATH	College	Science
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	Ph.D.
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

## Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Aims</b> أهداف المادة الدراسية</p>	<ol style="list-style-type: none"><li>1. To become familiar with different types of relations between two sets.</li><li>2. To understand the complete and well ordered sets.</li><li>3. Perform appropriate proofs of properties within a given number system.</li></ol>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"><li>1. Understand and use relations on a set and arguments.</li><li>2. Construct the equivalence relations and find the equivalence classes.</li><li>3. Understand Partial order and total order relations.</li><li>4. Recognize the bounded sets and complete sets.</li><li>5. Understand the construction of the natural numbers and understand their properties</li><li>6. Understand the construction of the integer numbers, rational numbers and their properties</li><li>7. Use the mathematical induction in proofs within a given number system.</li><li>8. Understand the construction of the complex numbers and perform appropriate calculations within this number system.</li><li>9. Understand the binary operation and groups.</li></ol>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><u>Chapter One –Relations</u> Type of relations, Reflexive, Symmetric, Transitive, Anti-symmetric, Equivalence relations, Equivalent classes, Properties of equivalent classes, Partition.</p> <p><u>Chapter Two –Ordering</u> Partial order and total order, Least and greatest elements , Bounded sets, Upper bound, Lower bound, Least upper bound, Greatest lower bound, Complete sets, Well-ordered set .</p> <p><u>Chapter Three –The set of Natural Numbers <math>\mathbb{N}</math></u> Peano’s Axioms, Arithmetic of the natural number, Addition, Subtraction, Multiplication, Properties, Associative law of addition and multiplication, Distribution law, Cancellation law of addition and multiplication, Ordering on <math>\mathbb{N}</math>, Well ordering of <math>\mathbb{N}</math>.</p>

Chapter Three –The set of Integer Numbers  $\mathbb{Z}$

Construction of the set of integers, The addition and multiplication on integers, Properties, Associative law of addition and multiplication, Commutative law of addition and multiplication, Distribution law, Cancellation law of addition and multiplication, Ordering on  $\mathbb{Z}$ .

Chapter Four –The set of Rational Numbers  $\mathbb{Q}$

Construction of the rational numbers, The addition and multiplication on rational and its properties, Ordering on  $\mathbb{Q}$ , Density of  $\mathbb{Q}$ .

Chapter Five–The set of Real Numbers  $\mathbb{R}$

Completeness property of real numbers, Additional Properties of the Integer Numbers, Divisibility and primes, Greatest common divisor and least common multiple, The fundamental theorem of arithmetic.

Chapter Six– The Set of Complex Numbers  $\mathbb{C}$

Addition and multiplication on complex numbers.

Chapter Seven– Basic Concepts in Group Theory

Binary Operation, Basic definitions, Groups, Commutative group, Subgroup, Order of group.

### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<b>Strategies</b>	The main strategy that will be used in this module is to encourage the students to participation in the module activities. This strategy will be by giving the students quizzes, assignments, projects and midterm exams throughout the semester.
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### Student Workload (SWL)

#### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	78	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	122	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	8.1333333
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	200		

### Module Evaluation

#### تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	3, 9	LO #1, 2, 4 and 5
	<b>Assignments</b>	2	10% (10)	5,11	LO # 1,2, 3, 6 and 7
	<b>Projects</b>	1	10% (10)	Continuous	
	<b>Report</b>	1	10% (10)	14	LO # 4, 5 and 8
<b>Summative assessment</b>	<b>Midterm Exam</b>	2	10% (10)	6,11	LO # 1-7
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

<b>Delivery Plan (Weekly Syllabus)</b> المنهاج الاسبوعي النظري	
	<b>Material Covered</b>
<b>Week 1</b>	Type of relations, Reflexive, Symmetric
<b>Week 2</b>	Transitive, Anti-symmetric,
<b>Week 3</b>	Equivalence relations, Equivalent classes
<b>Week 4</b>	Properties of equivalent classes, Partition
<b>Week 5</b>	Partial order and total order, Least and greatest elements
<b>Week 6</b>	Mid-term Exam+ Bounded sets, Upper bound, Lower bound
<b>Week 7</b>	Least upper bound, Greatest lower bound
<b>Week 8</b>	Complete sets, Well-ordered set
<b>Week 9</b>	The set of Natural Numbers $\mathbb{N}$
<b>Week 10</b>	The set of Natural Integer $\mathbb{Z}$
<b>Week 11</b>	Mid-term Exam+ The set of Rational Numbers $\mathbb{Q}$
<b>Week 12</b>	The set of Real Numbers $\mathbb{R}$
<b>Week 13</b>	The Set of Complex Numbers $\mathbb{C}$
<b>Week 14</b>	Binary Operation, Basic definitions, Groups
<b>Week 15</b>	Commutative group, Subgroup, Order of group
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

<b>Learning and Teaching Resources</b> مصادر التعلم والتدريس		
	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	أسس الرياضيات, هادي جابر مصطفى واخرون, الجزء الثاني ١٩٨٣, جامعة البصرة-العراق.	Yes
<b>Recommended Texts</b>	Schaum's Outline of Set Theory and Related Topics	No
<b>Websites</b>	<a href="https://www.britannica.com/science/foundations-of-mathematics">https://www.britannica.com/science/foundations-of-mathematics</a>	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
	<b>C - Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D - Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings
	<b>E - Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 – 49)</b>	<b>FX – Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F – Fail</b>	راسب	(0-44)	Considerable amount of work required
<p><b>Note:</b> Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.</p>				