



Ministry of Higher Education and  
Scientific Research – Iraq  
Al-Mustaqbal University College  
College of Sciences



## MODULE DESCRIPTOR FORM

### نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
<b>Module Title</b>	Discrete Structures		<b>Module Delivery</b>	
<b>Module Type</b>	BASIC		<b>Theory</b> <b>Lecture</b> <b>Lab</b> <b>Tutorial</b> <b>Practical</b> <b>Seminar</b>	
<b>Module Code</b>	UOMU0304022			
<b>ECTS Credits</b>	5			
<b>SWL (hr/sem)</b>	125			
<b>Module Level</b>	1	<b>Semester of Delivery</b>		2
<b>Administering Department</b>	AI	<b>College</b>	College of Sciences	
<b>Module Leader</b>	Dr. raidh hamed		<b>e-mail</b>	raidh.h.salman@uomus.edu.iq
<b>Module Leader's Acad. Title</b>	Dr.	<b>Module Leader's Qualification</b>	PhD.	
<b>Module Tutor</b>	None		<b>e-mail</b>	
<b>Peer Reviewer Name</b>		<b>e-mail</b>		
<b>Review Committee Approval</b>		<b>Version Number</b>		

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
<b>Prerequisite module</b>	None	<b>Semester</b>	
<b>Co-requisites module</b>	None	<b>Semester</b>	

**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. The study of fundamentally discrete mathematical structures, in the sense of not supporting the concept of continuity.</li> <li>2. Studying computer data representation methods that achieve easy storage and retrieval and processing speed.</li> <li>3. Logical formulas are described by the discrete structure, which is used to create directed acyclic graph structures and finite trees. A finite set is produced by the truth values of logical formulas.</li> </ol>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. The ability to develop and conduct appropriate experiments, analyse and interpret data, and use engineering judgment to draw conclusions</li> <li>2. Ability to acquire and apply new knowledge as needed, using appropriate learning strategies.</li> </ol> <p>Topics include: sets, number bases, mathematical induction, relations, functions, graphs, trees,</p>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <ul style="list-style-type: none"> <li>➤ Set theory <ul style="list-style-type: none"> <li>• Sets and subsets</li> <li>• How to specify sets, Operations on sets</li> <li>• Algebra of sets and its proves</li> <li>• Power set, Classes of sets, Cardinality</li> <li>• Sets of numbers, Finite sets and counting principle</li> </ul> </li> <li>➤ Mathematical induction</li> <li>➤ Relations <ul style="list-style-type: none"> <li>• Computer representation of relations and Digraph</li> <li>• Manipulation of relations, Properties of relations</li> <li>• Composition of relations</li> </ul> </li> <li>➤ Functions <ul style="list-style-type: none"> <li>• Type of function (one-to-one &amp; invertible function)</li> <li>• Geometrical characterization of functions</li> <li>• Sequences of sets, Recursively defined functions</li> </ul> </li> <li>➤ Graphs <ul style="list-style-type: none"> <li>• Definition, Graphs. Sub graph, and multigraphs</li> <li>• Degree of graph, Connectivity, Special graph</li> <li>• Walk &amp; length of walk, Trail, path, cycle</li> <li>• The bridges of Konigsberg</li> <li>• Traversable multigraphs, Labeled graphs</li> <li>• Minimal path, Minimum spanning tree</li> <li>• Matrices and graph</li> <li>• Trees, rooted tree, ordered rooted tree</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• polish notation, with examples</li> <li>➤ Finite state machines <ul style="list-style-type: none"> <li>• Finite automata</li> <li>• Optimistic approach to construct FSM</li> <li>• Deterministic Finite state automata</li> </ul> </li> </ul>
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## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	<p>The main strategy that will be adopted in delivering this module is to:</p> <ol style="list-style-type: none"> <li>1. Encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.</li> <li>2. Use Live electronic lectures - video lectures</li> <li>3. Solve practical examples</li> </ol>
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## Student Workload (SWL)

### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	63	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعياً	4
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعياً	4
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	125		

## Module Evaluation

### تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	Quizzes		5% (5)		
	Assignments		5% (5)		
	Projects / Lab.				
	Report				
<b>Summative assessment</b>	Midterm Exam		20% (20)		
	Final Exam		70% (70)		
<b>Total assessment</b>			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Set theory-sets & subsets, how to specify sets, operations on sets,
Week 2	Algebra of sets and its proves, Power set, Classes of sets, Cardinality.
Week 3	Sets of numbers, Finite sets and counting principle
Week 4	Mathematical induction
Week 5	Computer representation of relations and Digraph, Manipulation of relations.
Week 6	Properties of relations, Composition of relations
Week 7	Type of function (one-to-one & invertible function), Geometrical characterization of functions
Week 8	Mid Exam
Week 9	Sequences of sets, Recursively defined functions, Definition, Graphs. Sub graph, and multigraphs
Week 10	Degree of graph, Connectivity, Special graph, Walk & length of walk, Trail, path, cycle
Week 11	The bridges of Konigsberg, Traversable multigraphs, Labeled graphs, Minimal path, Minimum spanning tree
Week 12	Matrices and graph, Trees, rooted tree, ordered rooted tree, polish notation, with examples
Week 13	Finite state machines: Finite automata
Week 14	Optimistic approach to construct FSM, Deterministic Finite state automata
Week 15	Preparatory Week
Week 16	Final Exam

## Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	<ul style="list-style-type: none"> <li>• Theory and problems of Discrete mathematics, by Seymour Lipschutz &amp; Marc Lars Lipson, Schaum's Outline Series, third edition 2007</li> <li>• Mathematical foundation of computer science, Y.N. Singh, 2005.</li> <li>• Discrete Mathematics and Its Applications, Seventh Edition, Kenneth H. Rosen, AT&amp;T Laboratories, 2012</li> </ul>	

<b>Recommended Texts</b>		No
<b>Websites</b>	<ul style="list-style-type: none"> <li>• <b>DISCRETE STRUCTURES, AMIN WITNO, Revision Notes and Problems 2006, <a href="http://www.witno.com">www.witno.com</a></b></li> <li>• <b>Discrete mathematical structures for computer science by Bernard Kolman &amp; Robert C. Busby</b></li> <li>• <b>Discrete mathematics for New technology, Rowan Garnier, &amp; John Taylor (Second Edition 2002).</b></li> </ul> <p><a href="http://www.math.uvic.ca/faculty/gmacgill/guide">http://www.math.uvic.ca/faculty/gmacgill/guide</a></p>	

**APPENDIX:**

<b>GRADING SCHEME</b> مخطط الدرجات				
<b>Group</b>	<b>Grade</b>	<b>التقدير</b>	<b>Marks (%)</b>	<b>Definition</b>
<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>	مقبول بقرار	(45-49)	More work required but credit awarded
	<b>F - Fail</b>	راسب	(0-44)	Considerable amount of work required
<b>Note:</b>				
<p>NB 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>				