



## Course Specifications

Institution:	Majmaah University
Academic Department :	Department of Computer Science and Information
Programme :	Computer Science and Information
Course :	Discrete Mathematics for Computer Science 1
Course Coordinator :	Dr. Eng. Moustafa Reda AbdALLAH El-Tantawi
Programme Coordinator :	Prof. Yousry Azzam
Course Specification Approved Date :	22/ 12 / 1435 H

## A. Course Identification and General Information

1 - Course title :	Discrete Math for Computer Science 1	Course Code:	CSI 212
2. Credit hours :	(Lecture: 2 hours, Exercises: 2 hours)	3 credit hours	
3 - Program(s) in which the course is offered:	Computer Science and Information Program (B. Sc.)		
4 - Course Language :	English		
5 - Name of faculty member responsible for the course:	Dr. Eng. Moustafa Reda AbdALLAH Eltantawi		
6- Level/year at which this course is offered :	3 <sup>rd</sup> level		
7 - Pre-requisites for this course (if any) :	None		
8 - Co-requisites for this course (if any) :	None		
9 - Location if not on main campus :	College of Science in Az-Zulfi		
10 - Mode of Instruction (mark all that apply)			
A - Traditional classroom	<input checked="" type="checkbox"/>	What percentage?	80%
B - Blended (traditional and online)	<input checked="" type="checkbox"/>	What percentage?	10%
D - e-learning	<input type="checkbox"/>	What percentage?	..... %
E - Correspondence	<input type="checkbox"/>	What percentage?	..... %
F - Other	<input checked="" type="checkbox"/>	What percentage?	10%

### Comments :

1. Four-fifth of the course is introduced mainly inside well equipped traditional classrooms. So the student will be taught, in a tidy robust way, the main core of the course.
2. One-tenth of the course is conducted with a video conference. This mode will allow the student to skip the fear-threshold of scientific interaction.
3. One-tenth of the course is presented orally in free discussion, within workgroups, at the traditional classrooms or/and library. This will upgrade the students skills in presentations of his ideas and scientific thoughts, and encourage him for continuous looking of new up-to-date information.
4. The 2<sup>nd</sup> and 3<sup>rd</sup> modes of instructions makes the students feel "involved" in the discussions, rather than simply being outside spectators.



## B. Objectives

### B.1 What is the main purpose for this course?

The current course introduces the basic concepts of logic and its tools. The student will study Propositional Logic. He will recognize and be familiar with the logic connectives, their truth tables, and use them to form complicated statements including conditions and equivalence. This will be a robust start to understand the IF-statement in programming languages. He will be able to transform the complicated statements to symbols and vice versa and modeling logic expressions as electronic circuits depending on the series and parallel properties of the AND and OR connectives/gates respectively. Also, he will learn effectively to perform the negation processes especially in presence of quantifiers. In Set Theory the student will study the set operations analytically and using Venn Diagrams. In the Theory of Proofs he will be able to apply direct and indirect proofs, e.g. mathematical induction and contradiction. Moreover, the student will learn the basic concepts of Functions, Sequences, and Relations; The remaining of the course, which is the most important part is concerned with Graph and Trees Theories. The student will be capable of achieving Graph Models, Manipulating Graph Terminology, representing graphs in Lists and Matrices, understanding Euler and Hamilton Paths and efficiently applying them in important applications as Shortest-Path-Problems and Graph Coloring. Handling Trees topics, the student will be able to construct Spanning Trees, find The Minimum Spanning Tree/Network from a given weighted Graph. Finally, the student, in a complete easy and Clarified efficient algorithm, will be able to construct the Huffman Code.

Briefly describe any plans for developing and improving the course that are being implemented :

1. Updating the study material of the course in order to incorporate the new research in the field.
2. Use online resources and animations to help students to enhance knowledge about the topics that are presented in the course.



## C. Course Description

### C.1 Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
1) Propositional Logic: Atomic propositions. Truth values. Logical Connectives and their truth tables: Negation, Conjunction, Disjunction, De Morgan's Laws, Implication, Equivalence. Logical Circuits. Logical Quantifiers and their negation. Priority and Precedence. Tautologies, Contradictions, and contingencies.	4	16
2) Set Theory: Basic Set Concepts. Venn Diagrams and Set Operations. Cardinal Numbers and Surveys. Infinite Sets and Their Cardinalities.	1	4
3) Proofs: Direct Proofs, and Counterexamples. Mathematical Induction.	2	8
4) Functions, Sequences, and Relations: Domain, Codomain, Range. Hash Functions. Sequences and Strings. Binary relations. Domain and Range. Equivalence Relations.	2	8
5) Graph Theory and Introduction to Trees: Basic Concepts and Definitions. Representations of Graph using the Lists and the Matrices. Euler's Path and Circuit. Hamilton's Path and Circuit. Weighted Graph and Travelling Sale's Man Problem. Applications: Coloring Theorem. Trees: Definitions. Spanning Trees. Application: Huffman's Code	6	24

### C.2 Course components (total contact hours and credits per semester):

	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	30	30	.....	.....	.....	60
Credit	30	15	.....	.....	.....	45

### C.3 Additional private study/learning hours expected for students per week.

5 Hours

The private self-study of my student is crucial for this course. It includes: reading carefully the topics in the textbook or reference book, browsing the websites that are concerned with the course, solving the exercises that are assigned in each chapter, discussing the course topics with the instructor in his office hours, watching the video lectures of other instructors who presented related topics worldwide. The total workload of the student in this course is then:  $60 + 5 * 15 = 135$  work hours.



## C.4 Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course As- sessment Methods
1.0	<b>Knowledge</b>		
1.1	Describe the problem in a formal manner.	Developing basic communicative ability through: - Lecturing, - Team work, - Oral Discussion.	-Quizzes, -Web search, -Graded homework, -Class Participation, -Midterms and Final Exams,
1.2	Recognize different methods to attack a problem.		
2.0	<b>Cognitive Skills</b>		
2.1	Analyze, and reconstruct problem and explain how to solving it.	- Lectures - Exercises demonstrations - Case studies - Individual - Presentations - Brainstorming	-Class Participa- tion -Essay Question -Presentation - Research
3.0	<b>Interpersonal Skills &amp; Responsibility</b>		
3.1	Demonstrate the feasibility of an applied solution/plan	• Small group discussions • Whole group discussions • Brainstorming • Presentations.	• Written Exam • Web search and writing reports. • Lab assignments • Class Activities • Quizzes
3.2	Use the available commercial software systems/packages in application to the suggested solution/plan.		
4.0	<b>Communication, Information Technology, Numerical</b>		
4.1	Team working skills: cooperative working in groups inside the class, or/and efficient participation in take-home-assignments.	• Small group discussions • Whole group discussions • Brainstorming • Presentations	• Written Exam • Web search and writing reports. • Lab assignments • Class Activities • Quizzes
4.2	Oral Skills: free discussions save the students' time and allow them to feel "involved" in the discussion, rather than simply being outside spectators.		
5.0	<b>Psychomotor</b>		
5.1	N/A		



## C.5 Schedule of Assessment Tasks for Students During the Semester:

	Assessment task	Week Due	Proportion of Total Assessment
<b>1</b>	<b>Class Activities:</b>		30%
	Homework assignments, Oral discussions	Weekly	
	Written summary reports through web search	3, 7, 9, 13	
	Class participation in solving problems	Weekly	
	Take-home-exams	5, 11	
	Project groups	5, 10	
	Quizzes	2, 4, 8, 14	
<b>2</b>	First Exam	6	15 %
<b>3</b>	Second Exam	12	15 %
<b>4</b>	Final Exam	16	40 %
Total			100%



## D. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

1. Office hours: Tuesday: 10-13, Wednesday: 10-13.
2. Office call: Thursday 12-14.
3. E-mail: m.eltantawi@mu.edu.sa is permanently available.

## E. Learning Resources

### E.1 List Required Textbooks :

- Richard Johnsonbaugh; "Discrete Mathematics"; 7th Edition; Prentice Hall; 2009.

### E.2 List Essential References Materials :

1. Robert Blitzer; Thinking Mathematically; 4th Edition; Prentice Hall; 2008.
2. Steven G. Krantz; The Elements of Advanced Mathematics; 2nd Edition; Chapman & Hall/CRC; 2002.
3. Steven Roman; An Introduction to Discrete Mathematics; 2nd Edition; HBJ Publishers and its subsidiary, Academic Press; 1989.

### E.3 List Recommended Textbooks and Reference Material :

- Susanna S. Epp, Discrete Mathematics with Applications , 4th Edition, Brooks Cole, 2010

### E.4 List Electronic Materials :

- 1] <http://ocw.mit.edu/courses/mathematics/18-304-undergraduate-seminar-in-discrete-mathematics-spring-2006/>
- 2] <http://www.freebookcentre.net/Mathematics/Discrete-Mathematics-Books.html>

### E.5 Other learning material :

- CD is available for the book: Thinking Mathematically; Robert Blitzer; 4th Edition; Prentice Hall; 2008.
- Video lectures, Presentations, and a complete electronic course are available.

## F. Facilities Required

### F.1 Accommodation

Classroom and Lab, as those that are available at college of science at Az Zulfi.

### F.2 Computing resources

Smart board

### F.3 Other resources:

None



## G. Course Evaluation and Improvement Processes

### G.1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching:

- Analysis of students' results.
- Observation during class work.
- Students' evaluations. & Colleagues' evaluations.
- Evaluation questionnaire filled by the students.
- Interview a sample of students enrolled in the course to take their opinions.

### G.2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor : A department committee is established to be responsible for the development of the strategies of Teaching through:

- Self-assessment. & External evaluation.
- Periodic review of course (the Commission of study plans).

### G.3 Processes for Improvement of Teaching :

- Periodical departmental revision of methods of teaching.
- Monitoring of teaching activates by senior faculty members.
- Training courses

### G.4 Processes for Verifying Standards of Student Achievement

- Reviewing instructor's assessment strategy
- Designing assessments which allow students to demonstrate their achievement of the learning outcomes
- Common assessment tasks
- Assessing group work

### G.5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement :

- Comparison of the course to its counterparts offered in similar departments.
- Periodic revision of course description by faculty member.
- Periodic revision of course description by the study plans and schedules commission.
- Update learning resources related to the course to ensure that the course is kept up with developments in the field.
- Make use of the statistical results of course evaluation made by students to improve and develop the course.
- Giving the opportunity for students to express their opinions about what is taught and receive suggestions and study their effectiveness.

Course Specification Approved

Department Official Meeting No (6) Date 22 / 12 / 1435 H

**Course's Coordinator**

Name : Dr. Moustafa Reda  
AbdALLAH Eltantawi

Signature : .....

Date : 22/12/ 1435 H

**Department Head**

Name : Assoc. Prof. Yousry Azzam

Signature : .....

Date : 22/ 12 / 1435 H

