ATTACHMENT 5.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification
(CS)

Discrete Structures I

14011801-3

Course Specifications

Institution Umm Al Qura University	Date 7 / 7 / 1437
College/Department College of Computers and Information Systems	

A. Course Identification and General Information

1. Course title and code: 14011801-3 Discrete Structures I
2. Credit hours 3 (2 lecture, 2 lab,)
3. Program(s) in which the course is offered. Computer Science
4. Name of faculty member responsible for the course Curriculum Committee
5. Level/year at which this course is offered 1st Year / Level 3
6. Pre-requisites for this course (if any) 4800141-4 Introduction to Mathematics II
7. Co-requisites for this course (if any)
8. Location if not on main campus Al-Abidiyah campus (Boys) and Al-Zaher campus (Girls), Makkah Al Mukarramah

9. Mode of Instruction (mark all that apply)

a. traditional classroom	✓	What percentage?	100
b. blended (traditional and online)		What percentage?	
c. e-learning		What percentage?	
d. correspondence		What percentage?	
f. other		What percentage?	

Comments:

B Objectives

1. What is the main purpose for this course?
This course covers the mathematical foundations of computer science and engineering. It introduces elementary concepts in mathematics such as definitions, logic, proofs, functions, relations and counting principles. The course also introduces students to elementary discrete structures such as sets, partial orders, graphs and trees. 1. Be able to construct simple mathematical proofs and possess the ability to verify them 2. Have substantial experience to comprehend formal logical arguments. 3. Be skillful in expressing mathematical properties formally via the formal language of propositional logic and predicate logic. 4. Be able to specify and manipulate basic mathematical objects such as sets, functions, and relations and will be able to verify simple mathematical properties that these objects possess. 5. Acquire ability to describe computer programs (e.g. recursive functions) in a formal mathematical manner. 6. Be able to apply basic counting techniques to solve combinatorial problems
2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)

C. Course Description (Note: General description in the form used in Bulletin or handbook)

Course Description:
To introduce the student to the mathematical tools of logic and induction, and to the basic definitions and theorems concerning relations, functions, and sets. Later courses in the computer science curriculum build on the mathematical foundations covered here. Particular emphasis is placed on inductive definitions and proofs, with application to problems in computer science

1. Topics to be Covered		
List of Topics	No. of Weeks	Contact hours

1. *Logic* a. *Propositional logic* b. *Truth tables* c. *Propositional Equivalence* d. *Implication, equivalence, converse, inverse, contrapositive and negation* e. *Predicates and quantifier* f. *Rules of inference*	1	4
2. *Sets* a. *Venn diagrams* b. *Sets operations* c. *Cartesian product* d. *Power sets* e. *Cardinality of finite sets* f. *Important numeric sets, notation and subset relations among them*	1	4
3. *Basic modular arithmetic* a. *Division and the division algorithm* b. *Congruence, properties and modular arithmetic* c. *Application of congruence*	1	4
4. *Functions* a. *Representation* b. *Surjections, injections and bijections* c. *Inverse* d. *Composition* e. *Important Numeric functions: floor, ceiling, log*	2	4
5. *Proofs* a. *Direct proofs* b. *Proof by contradiction* c. *Proof by contrapositive*	1	4
6. *Sequence and Sums (Basics, more in probability course)* a. *Arithmetic and geometric sequences* b. *Basic summation techniques and their visualization* c. *Linearity of summation* d. *Sums of powers of integers*	3	4
7. *Induction* a. *Mathematical Induction* b. *Weak and strong induction* c. *Recursive definitions of functions and sequences* d. *Recurrence relation*	2	4

8. *Relations* a. *Reflexivity, symmetry, transitivity* b. *Operations, union, intersection, complement, projection, join* c. *Composition and exponentiation* d. *Equivalence relations and equivalence classes*	3	4

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

	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours	30	0	30			
Credit						

3. Additional private study/learning hours expected for students per week. 3-4 hrs

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

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Become aware of the basic principles of logical reasoning.	Lectures, tutorial , exercises	Quizzes, Assignments, Midterm Exam,, Final Exam
1.2	Be able to follow elementary mathematical arguments	Lectures, tutorial, exercises	Quizzes, Assignments, Midterm Exam,, Final Exam

1.3	Understand how to analyze complexity of algorithms	Lectures, tutorial, exercises	Quizzes, Assignments, Midterm Exam,, Final Exam
1.4	Synthesize elementary proofs	Lectures, tutorial, exercises	Quizzes, Assignments, Midterm Exam,, Final Exam
2.0	**Cognitive Skills**		
2.1	Be able to reason mathematically to solve problems.	exercises	Quizzes, Assignments, Midterm Exam,, Final Exam
2.2	Be able to define connections between mathematical concepts and concrete applications.	exercises	Quizzes, Assignments, Midterm Exam,, Final Exam
3.0	**Interpersonal Skills & Responsibility**		
3.1			
3.2			
4.0	**Communication, Information Technology, Numerical**		
4.1	Be able to discuss mathematical ideas coherently with their fellow students.	exercises	Assignments
4.2			
5.0	**Psychomotor**		
5.1	be able express themselves clearly when giving a proof	exercises	Quizzes, Assignments, Midterm Exam,, Final Exam
5.2			

5. Map course LOs with the program LOs. (Place course LO #s in the left column and program LO #s across the top.) (I = Introduction P = Proficient A = Advanced)

Course LOs #	**Program Learning Outcomes (Use Program LO Code #s provided in the Program Specifications)**														
	1.1	**1.2**	**2.1**	**2.2**	**2.3**	**2.4**	**2.5**	**3.1**	**3.2**	**3.3**	**4.1**	**4.2**	**4.3**	**5.1**	**5.2**
1.1	I		I	I	I		I								
1.2	I		I	I	I		I								
1.3	I		I	I	I		I								
1.4	I		I	I	I		I								
2.1			I	I	I		I								
2.2			I	I	I		I								
4.1											I	I			
5.1											I	I			I

5. Map course LOs with the program LOs. (Place course LO #s in the left column and program LO #s across the top.)

6. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Quizzes	Every other week	20
2	Assignments	Twice per term	20
3	Midterm Exam	8	20
4	Final Exam	16	40

D. Student Academic Counseling and Support

1. 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)
Office hours between 2-4 hours per week.

E Learning Resources

1. List Required Textbooks
Discrete Mathematics and Its Applications, 7th Edition, By Kenneth Rosen
2. List Essential References Materials (Journals, Reports, etc.)
Lecture slides
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)
4. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

5. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) Lecture room (max 40 students) Computer lab (max 20 students)
2. Computing resources (AV, data show, Smart Board, software, etc.) Data show, Smart Board Mathematical S/W tools.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching
Students usually fill in survey forms that inquiry to which degree the gained knowledge and practice meet the course specification.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department

Monitoring the variation in the performance of each student throughout the course.
3 Processes for Improvement of Teaching • Considering the variety of backgrounds and abilities of the students by: 1. Including review of basic logical principles when introducing new topics 2. Mingling straight-forward concepts with ones that are more challenging and abstract 3. Encouraging active participation of the students. 4. Providing frequent feedback on the students' work
4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

Name of Instructor: _____

Signature: _____ Date Report Completed: _____

Name of Course Instructor _____

Program Coordinator:_____

Signature: _____ Date Received: _____