Detailed Course Description - Course Plan Development and Updating Procedures/ ..... Department	QF01/0408-3.0E

Faculty	Science & Information Technology	Department	Computer Science
Course number	**112111**	Course title	**Discrete Mathematics**
Number of credit hours	3	Pre-requisite/co-requisite	Introduction to Information Technology

Brief course description
Discrete mathematics is concerned with data structures, logic design, artificial intelligence, and many other materials. This course introduces the following topics**: Numbers and Exponents, Errors (absolute and relative), Propositions, Predicates and Quantifiers, Quantifiers and Logical operators, Logical inference, Methods of proof, Sets, Relations, and Functions.**

	Course goals and learning outcomes
Goal 1	Learning about errors when representing real numbers in computer.
Learning outcomes	1.1 Distinguish between numbers in mathematics and computer. 1.2 Find the absolute and relative errors for real numbers in computer. 1.3
Goal 2	Understanding propositional logic and predicate logic.
Learning outcomes	2.1 Simplify the propositions. 2.2 Convert predicates into propositions using quantification methods. 2.3 Understand the distribution of quantifiers over logical operators.
Goal 3	Recognizing rules of logical inference and methods of proof.
Learning outcomes	3.1 Use logical inference to prove the validity of arguments. 3.2 Understand and use different methods of proof**.** 3.3
Goal 4	Providing knowledge of sets, relations, and functions.
Learning outcomes	4.1 Understand set theory and Cartesian product. 4.2 Represent set operations in computer. 4.3 Understand different types of functions.
Textbook	1.- **James L. Hein**, "Discrete Structures, Logic, and Computability", **Fourth edition, Jones and Bartlett learning**, 2017. 2.-
Supplementary references	1.- Oscar Levine, "**Discrete Mathematics: an open introduction",** 2nd edition, Oscar Levine, 2016. 2.- Liben-Nowell, D. "**Discrete Mathematics for Computer Science Preliminary Edition ",** 1st edition, John Wiley.2015.

	3.- Kenneth H. Rosen, **"Discrete Mathematics and its Applications",** Seventh edition, McGraw-Hill , 2012.

Course timeline				
Week	**Number of hours**	**Course topics**	**Pages (textbook)**	**Notes**
01	**1** **1** **1**	**Numbers and Exponents.** Integer and real numbers in mathematics and in computer. Exponents, properties of exponents, and metric system.	1-5	
02	**1** **1** **1**	**Errors.** Normalized exponential notation of numbers (mantissa and exponent parts). Precision, magnitude, absolute and relative errors.	5-10	
03	**1** **1** **1**	**Propositions.** Truth tables for logical operators. Types of propositions (tautology, contingency and contradiction).	10-35	
04	**1** **1** **1**	Logical identities. Simplifying propositions using logical identities. Translation from English statements to logical expression, and vice versa.		
05	**1** **1** **1**	**Predicates and Quantifiers.** Universe of discourse. The quantifiers (universal, existential, and unique).	36-69	
06	**1** **1** **1**	Nested Quantifiers. Review of previous chapters. **First Exam.**		
07	**1** **1** **1**	**Quantifiers and Logical Operators.** Translation from English statements to Logical notation, and vice versa. The negation of quantifiers.		
08	**1** **1** **1**	Distribution of quantifiers over logical operators. Proofs of distribution. **Logical Inference.**		
09	**1** **1** **1**	Rules of inference. Fallacious arguments. Additional rules of inference.	69-79	
10	**1** **1** **1**	**Methods of Proof.** Techniques of proof for implication (vacuous, trivial, direct, and indirect proofs). Proof by contradiction, proof by counter example.	80-108	
11	**1** **1**	Proof by cases. Additional methods of proof.		

	1	**Sets.**		
12	1 1 1	Subsets, Proper Subsets, power set. Set operations, set identities, generalization. Cartesian products.	115-126	
13	1 1 1	Computer representation of sets. Review of previous chapters. **Second Exam.**	127-137	
14	1 1 1	**Relations.** Definition and their properties. Types of relations.	573-583	
15	1 1 1	**Functions.** Definition of functions. Types of functions (one to one, onto and inverse function).	138-156	
16	1 1 1	**Final Exam.**		

Theoretical course evaluation methods and weight	Participation = 10% First exam 20% Second exam 20% Final exam 50%	**Practical (clinical) course evaluation methods**	Semester students' work = 50% (Reports, research, quizzes, etc.) Final exam = 50%

Approved by head of department		**Date of approval**	

Extra information (to be updated every semester by corresponding faculty member)

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Office hours			