COURSE SPECIFICATION

(DISCRETE MATHEMATICS)

Programme(s) on which the course is given	CS, IS, IT and OR
Major or Minor element of programs	Major
Department offering the program	Computer Science
Department offering the course	Operation Research & Decision Support
Academic year / Level	1st Year / 1st Semester

A- Basic Information

Title	Discrete Mathematics		Code		MA131
Credit Hours	**Lecture**	**3**	**Tutorial**	**3**	**Practical**
	Total				**6**

B- Professional Information

1- Overall aims of course

- Understand the logic, sets, function and relations.
- Understanding and applying of mathematical reasoning.
- Using the Boolean algebra and Logic circuits.
- Perform various operations with relations and functions (congruence, methods of proof, induction, recursion, etc...).
- Explain and use the concepts of graphs and trees.

2- Intended learning outcomes of course (ILOs)

a- Knowledge and understanding
a1 Know and understand the essential mathematics relevant to computer science.

a4 Know and understand the fundamental concepts, principles and theories of computing and computer science covering topics such as algorithms, operating system, programming languages and artificial intelligence.

b- Intellectual skills
b1 Solve a wide range of problems related to the analysis, design and

construction of computer systems

c- Professional and practical skills

d- General and transferable skills

    d6   Employ discrete mathematical skills as appropriate.

3- Contents

Topic	No. of Hours	Lecture	Tutorial /Practical
1 Introduction	3	3	-
2 Logic, Sets and Function • Logic, propositions, and predicates. • Compound Statements. • Truth Tables • The Algebra of Propositions • Sets, Operations on Sets. • Functions. • One-to-One, and Onto Functions • Inverses and Composition of functions • One-to-One Correspondence • Sequences and summations. • Mapping.	18	9	9
3 Mathematical Reasoning • Rules of inference. • Methods of proofs, • Mathematical induction. • Recursive definitions, • recursive Algorithms • Proof by contradiction • Program correctness.	**12**	**6**	**6**
4 Relations • Relations and properties • representing relations • closures of relations, • equivalence of relations • Partial ordering.	**12**	**6**	**6**
5 Graphs • Introduction to graphs • Directed and undirected graphs • graph terminology, • representing graphs, • Connectivity. • Graph Isomorphism • Euler and Hamilton paths, • shortest path problems • Traveling Salesperson problems • CPM(Critical Path Method) • Planar graph.	**18**	**9**	**9**
6 Trees • Introduction to trees.	12	6	6

	84	42	42
• Application of trees. • Tree traversal. • Trees and sorting. • Spanning trees. • Minimum spanning trees.			
7 Boolean Algebra • Boolean functions • representing Boolean functions • Logic gates • Simplification • Half, and full adders.	9	3	6
Total number of Hours for the course	**84**	**42**	**42**

4- Teaching and learning methods

4.1 Information collection

4.2 Research assignment

4.3 Lecture

4.4 Class activities

4.5 Practical training / lab

4.6 Case study

4.7 Exercises and tutorials.

5- Student assessment methods

5-a Methods

5.a.1 Reports, assignments, exercises, and final written exam … *to assess* knowledge and understanding.

5.a.2 Regular oral and written quizzes ……. *to assess* …intellectual skills.

5.a.3 Reports, assignments, and discussions ……. *to assess* …general and transferable skills.

5-b Assessment schedule

Assessment 1	5th week.
Assessment 2	8th week.
Assessment 3	10th week.
Assessment 4	16th week (Oral)
Assessment 5	17th -18th weeks *(final written exam)*

5-c Weighting of assessments

Mid-term examination	10%
Final-term examination	70%
Oral examination.	10%
Practical examination	0%
Semester work	10%
Other types of assessment	-
Total	100%

6- List of references

6-a Course notes

There are lectures notes prepared in the form of a book authorized by the department

6-b Essential books (text books)

None

6-c Recommended books

[1] Dossey, John A. et al, Discrete Mathematics, 3rd edition, Addison-Wesley, Reading, MA.
[2] Johnsonbaugh, Richard, Essential Discrete Mathematics, MacMillan Publishing Co., NY.
[3] Roman, Steven. An Introduction to Discrete Mathematics, 2nd edition, Saunders, NY.
[4] Rosen, Kenneth h. Discrete Mathematics and Its Applications, 2 ed, McGraw/Hill
[5] Barnett, Steven. Discrete Mathematics, Addison Wesley, Reading, MA .
[6].Discrete Mathematics and its Application, Kenneth H. Rosen, McGraw-Hill International Edition,1981. 6.4- Periodicals, Web Sites, … etc

6-d Periodicals, Web sites, … etc

IEEE transactions on Mathematics

7- Facilities required for teaching and learning

- Datashow, screen, and laptop computer.

Course coordinator:

Prof. Waiel Fathy

Head of Department:

Prof. Waiel Fathy

Date: / /