Mathematical Programming Course Specifications

Faculty: Faculty of computer and informatics

Department: Scientific Computing

Course Specifications

Program(s) on which the course is given	**:**	Bachelor in Computer & Information Sciences
Major or Minor element of programs	**:**	Scientific Computing
Department offering the program	**:**	Scientific Computing
Department offering the course	**:**	Scientific Computing
Academic year / Level	**:**	4^{th} Year /B.Sc.
Date of specification approval	**:**	15/10/2009

A. Basic Information

Title: Mathematical programming **Code:** SCC 435

Lecture: 3 hrs/week **Practical:** 2 hrs/week **Tutorial:** ---

Credit Hours: --- **Total:** 5 hrs/Week

B. Professional Information

1. Overall Aims of Course:

Student will be able to introduce the basics of Networks: shortest paths In addition to introduce The concepts of Maximum flow problems, minimum-cost flow problems, maximum cardinality matching. Student can be related to Scheduling problems: network scheduling, single machine

scheduling, parallel machine scheduling**.** Graduates will be able to use these concepts and apply them on real work.

2. Intended Learning Outcomes of Course (ILOs):

a. Knowledge and Understanding:

a1- State the basic definitions and properties of trees, graphs and networks.
a2- Define and be aware of the central role of graphs and networks in commerce and business modeling.
a3- Have experience in translating decision problems into a network format for solution.
a4- Mention optimization problems which are computationally complex and require heuristic solution methods.
a5- Give an account and be familiar with network problems and algorithms.

b. Intellectual Skills:

b1- Estimate and implement the algorithms presented, and run them on unseen examples.
b2-Critisis recognise and use flow networks.
b3-Analyse appropriate algorithms for network optimisation**.**

c. Professional and Practical Skills:

c1- Be able to use mathematical programming techniques to model and solve practical problems in various scientific disciplines.

d. General and Transferable Skills:

d1- Be able to work in a group.
d2- Be able to write effective programs.

e. Attitude:

e1- A knowledge and respect of ethics and ethical standards in relation to a major area of study.
e2- Illustrate the use of example, analogy, and counter-analogy in ethical argument.
e3- Demonstrate an ethical behavior toward software copyrights.
e4- Relationship Emphasis a successful with other students.
e5- Learn how to make relation with other, and the limit of this relation.

e6- Explain the nature of privacy and how it is protected by the Data Protection.

e7- Know the danger of viruses and how to protect yourself from it.

e8- Know the culture of other peoples.

e9- Discuss the legal background of copyright in national and international law.

3. Contents:

Topic	No. of hours	Lecture	Tutorial/ Practical
Networks: shortest paths (single source paths, all pairs paths), minimum spanning tree – I	5	3	2
Networks: shortest paths (single source paths, all pairs paths), minimum spanning tree – II	5	3	2
Networks: shortest paths (single source paths, all pairs paths), minimum spanning tree – III	5	3	2
Maximum flow problems, minimum-cost flow problems, maximum cardinality matching, and traveling salesman problem. – I	5	3	2
Maximum flow problems, minimum-cost flow problems, maximum cardinality matching, and traveling salesman problem. – II	5	3	2
Maximum flow problems, minimum-cost flow problems, maximum cardinality matching, and traveling salesman problem. – III	5	3	2
Maximum flow problems, minimum-cost flow problems, maximum cardinality matching, and traveling salesman problem. – IV	5	3	2
Graph coloring: independent set approach, approximation sequential algorithm, and backtracking sequential algorithm. – I	5	3	2
Graph coloring: independent set approach,	5	3	2

approximation sequential algorithm, and backtracking sequential algorithm. – II			
Graph coloring: independent set approach, approximation sequential algorithm, and backtracking sequential algorithm. – III	5	3	2
Scheduling problems: network scheduling, single machine scheduling, parallel machine scheduling. – I	5	3	2
Scheduling problems: network scheduling, single machine scheduling, parallel machine scheduling. – I	5	3	2
Scheduling problems: network scheduling, single machine scheduling, parallel machine scheduling. – II	5	3	2
Scheduling problems: network scheduling, single machine scheduling, parallel machine scheduling. - III	5	3	2
Revision	5	3	2