

Course specifications

Programme(s) on which the course is given	Pre-master of Computer Science
Major or minor element of programs	
Department offering the program	Mathematics
Department offering the course	Mathematics
Academic year / Level	Pre-master
Date of specification approval	September 2008
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A- Basic Information

Title: Problem Solving	Code: M637	
Credit Hours: 2 hr.	Lecture: 2 hr.	
Tutorial: 0 hr.	Practical: 0 hr	Total: 2 hr.

Teaching Staff: Dr/ Hani M. Ibrahim

B- Professional Information

1 – Overall aims of course

1. Understand how a computer represents the problem.
2. Learn different types of knowledge representation.
3. Understand the meaning of search space, search tree, and goal tree.
4. Understand the search methodologies.
5. Understand artificial neural networks.
6. Understand genetic programming.

2 – Intended learning outcomes of course (ILOs)

a- Knowledge and understanding:

The student should be able to;

- a1- Understand how to represent a search tree for different problems.
- a2- - Understand the properties of search algorithms
- a3- Learn the properties and classifications of intelligent agent.
- a4- Understand how artificial neural networks used to solve problems.
- a5- Understand how genetic algorithm used to solve problems.

a5- Have the knowledge about different learning rule for artificial neural network.

b- Intellectual skills

b1- Set a program of exercises according to the type of the course.

b2- Classify the topics of the course into groups according to their application.

c- Professional and practical skills

c1- Weight the outcomes of the course through its use in practical application in different scientific fields.

d- General and transferable skills

d1- Represent a search tree for some problems

d2 – Construct artificial neural networks to solve given problem.

3- Contents

Topic	No. of hours	Lecture	Tutorial/ Practical
knowledge representation semantic nets, frames – search spaces – search trees traveling salesman, tower of Hanoi, describe and match – goal trees	4	2	-
Search methodologies:- generate and test, depth first search – breadth first search – properties of search methods – why humans use depth first search – using heuristic for search (heuristic evaluation function) – monotonicity – identifying optimal paths (A* algorithm – uniform cost search – greedy search)	4	2	-
Intelligent agents :- Properties of agents – agent classifications – agent architectures	4	2	-
Neural network:- what is a neural network – benefits of neural	4	2	-

network – models of a neuron – types of activation function – neural network architectures			
Learning task - supervised and unsupervised learning - neural network learning rules	4	2	-
Back propagation – application of neural network for solving problems	2	1	-
Genetic programming	2	1	-

4- Teaching and learning methods

4.1- Lectures

4.2- Working on hand in assignments

4.3- Attending practical classes

5- Student assessment methods

5.1 Mid term written exam to assess understanding
competencies

5.2 Oral Exam to assess attendance and interesting

5.3. Semester hand in assignments to assess understanding
professionalism.

5.4 Final term written Exam to assess comprehension.

Assessment schedule

Assessment 1	Mid term	Week 7
Assessment 2	semester activities	Week 5 and 8
Assessment 3	Final term oral exam	Week 13
Assessment 4	Final term written exam	Week 14

Weighting of assessments

Mid-Term Examination	20%
Semester Work (homework assignments + oral tests)	20 %
Other types of assessment	00%
Final-term written Examination	60%
Total	100%

Any formative only assessments (none)

6- List of references

6.1- Course notes

Collected and prepared notes that cover the main topics in the
course content

6.2- Essential books

- 1- Simon, H., "Neural Networks; A comprehensive Foundation",
Prentice Hall,
- 2- Zurada, J. M., "Introduction to Artificial Neural Systems", PWS
publishing Company,

7- Facilities required for teaching and learning

Lecture: PC's - packages for ready made scientific programs. - Data
Show.

Course coordinator: Dr/ Hani M. Ibrahim

Head of Department: Prof. Mohammed A. Ramadan

Date: / /