

University of Jordan

King Abdullah II School for Information Technology

Computer Science Department

Course: (1901736) Computational Intelligence

Semester and Year: 1st semester 2013/2014

Pre-requisites

Coordinator: Dr Mohammad Alshraideh

Instructors	Office hours	Office Phone	E-Mail
Dr Mohammad Alshraideh	Monday 3:30 – 6:00	22571 or 21213 HR	mshridah@ju.edu.jo

Course Description

Introduction to basic computational intelligence techniques (Software Testing, neural networks, fuzzy logic, genetic algorithms, etc.) and their applications in granular computing, computational Web intelligence, data mining, biomedical informatics, intelligent agents for wireless mobile applications, etc.

Learning Outcomes

Upon completion of this subject students are expected to:

- Understand the principles of problem solving and be able to apply them successfully.
- Be familiar with techniques for computer-based representation and manipulation of complex information, knowledge, and uncertainty.
- Gain awareness of several advanced AI applications and topics such as intelligent agents, planning and scheduling, machine learning, etc.

Teaching Methods:

The course will be based on the following activities:

- Lectures
- Case Studies
- Lab sessions
- Review questions

Time and Place

This course meets Monday from 3:30 to 6:30 in T101

Teaching Recourses:

Main Textbook

“Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine” by Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, Prentice Hall, 1997.

Supplementary Textbooks

- 1- Computational Intelligence. Principles, Techniques and Applications by Amit Konar Springer 2005.
2. Artificial Intelligence, second Edition, by Elaine Rich, and Kevin Knight, McGraw-Hill, Inc, 1991.
3. Artificial Intelligence structures and strategies for complex problem Solving. Third Edition. George F. Luger and William A. Stubblefield.
4. Artificial Intelligence: A Modern Approach (Second Edition) by Stuart Russell and Peter Norvig; Prentice Hall, 2003. ISBN 0-13-103805-2.

Course Learning Objectives:

1. Topic 1: Computational Intelligence (CI)
 - Know what CI is
 - Know history of CI
 - Know what basic techniques of CI
 - Know applications of CI
2. Software Testing
 - What is testing
 - White Box Testing and black Box Testing
 - Scope of Testing
 - Coverage criteria
3. Topic 2: Fuzzy Logic
 - Know fuzzy sets
 - Know fuzzy reasoning using fuzzy IF-THEN rules
 - Know different fuzzy models
 - Know how to design a fuzzy logic system using a program language (C++, Java, etc.)
4. Topic 3: Neural Networks
 - Know internal structure of an artificial neural network
 - Know the perceptron and its limitation
 - Know the backpropagation learning algorithm and its limitation
 - Know basic knowledge of unsupervised neural networks
 - Know how to make a neural network system using a program language (C++, Java, etc.)
5. Topic 4: Neuro-Fuzzy Systems

- Know an architecture of a neuro-fuzzy system
- Know ANFIS
- Know Soft Neural Network developed by the instructor
- Know how to make a neuro-fuzzy system using a program language (C++, Java, etc.)
- 6. Topic 5: Genetic Algorithms (GA)
 - Know how GA work
 - Know how to make a GA system using a program language (C++, Java, etc.)
- 7. Topic 6: Computational Web Intelligence (CWI)
 - Know CWI
 - Know basic CWI applications
 - Know how wired or wireless intelligent agents work
- 8. Topic 7: Computational Data Mining
 - Know basic concepts of data mining
 - Know how to use soft computing techniques in data mining
- 9. Topic 8: Biomedical Informatics
 - Know how to use CI techniques in Biomedical Informatics

Course Objectives of Programming Project and Conference Paper:

- All students can learn how to use advanced computational intelligence techniques and a programming language to design a small intelligent system for a specific application.
- All students can learn how to write a high-quality conference paper with theoretical investigation and practical simulations.
- All students can learn how to give a clear technical presentation for a research paper.

The Project will be: Discuss of applying evolutionary algorithms or (**Symbolic or static testing**) in one of two sample programs that will be supplied .

Intended Grading Scale:

91 – 100	A
85 – 90	B+
78 – 84	B
70 – 77	C+
<70	C

Name-1: _____ Grade: _____

Name-2: _____ Grade: _____

Name-3: _____ Grade: _____

Title: _____

<i>Grading Factor</i>	<i>Percent</i>	Score
Organization of Presentation: Your presentation should contain the following: Cover Slide, Outlines slide, Problem Description, Your methodology or algorithm, Your Results, and Conclusions.	5	
Statement of Purpose: Your presentation must have a definite purpose/focus statement, which is clearly stated in the opening slides.	5	
Purpose Achieved: A subjective evaluation of how well your presentation achieved its stated purpose.	10	
Technical Content: An assessment of the quality of the technical content of the presentation from analytical and experimental results.	20	
Original Contribution: Originality can be provided through a critique, analysis, development of original ideas/examples, etc.	5	
Conclusions: You must present some original conclusions, supported by sufficient detail in your presentation.	5	
Writing Quality: An assessment of your presentation in terms of spelling, grammar, style, formatting, and organization.	10	

Name-1:		
Organization of Ideas: The flow of ideas was logical and the illustrations used were fit and well presented.	15	
Language Quality: An assessment of your presentation in terms of English language, spelling, and grammar.	10	
Answering Questions: How well you answer related questions to your presentation.	15	

Name-2:		
Organization of Ideas: The flow of ideas was logical and the illustrations used were fit and well presented.	15	
Language Quality: An assessment of your presentation in terms of English language, spelling, and grammar.	10	
Answering Questions: How well you answer related questions to your presentation.	15	

Name-3:		
Organization of Ideas: The flow of ideas was logical and the illustrations used were fit and well presented.	15	
Language Quality: An assessment of your presentation in terms of English language, spelling, and grammar.	10	
Answering Questions: How well you answer related questions to your presentation.	15	

Grade: _____

Names: _____

Title: _____

<i>Grading Factor</i>	<i>Percent</i>	Score
Organization of Report: Your report should contain the following: Cover page, Table of Contents page, Introduction, Methodology, Results, Conclusions, and References.	5	
Statement of Purpose: Your report must have a definite purpose/focus statement, which is clearly stated in the opening paragraphs of the Introduction Section.	5	
Purpose Achieved: A subjective evaluation of how well your research project report achieved its stated purpose.	10	
Suitability of Topic: The report must focus on a topic that is appropriate to the subject of	5	
Technical Content: An assessment of the quality of the technical content of the report from analytical and experimental results, comparisons, adequate coverage, clarity of presentations, etc.	30	
Original Contribution: Originality can be provided through a critique, analysis, development of original ideas/examples, etc.	10	
Quality and Number of References: At least 5 references from approved sources, where at least 2 of these references are recent and from journals or conferences or technical reports.	5	
Citation of Non-Original Material: You must credit your references (cite all references in your report).	5	
Conclusions: You must present some original conclusions, supported by sufficient details in your report.	10	
Writing Quality: An assessment of your report in terms of spelling, grammar, style, formatting, and organization.	15	

Problem 1:

[1]	...
[2]	select p_insur_type into dummy from pricing where ...
[3]	...
[4]	select decode(p_insur_type, '1', prc_limit_out_e, '2', prc_limit_out_f)
[5]	into p_max_cov
[6]	from prc_limits
[7]	where prc_group = p_group_id
[8]	and prc_division = p_div;
[9]	p_max_cov := nvl(p_max_cov, 99999);
[10]	Exception
[11]	when no_data_found then
[12]	p_error_no := 1; raise exit_proc;
[13]	when others then
[14]	p_error_no := 11; raise exit_proc;
[15]
[16]	if dummy = 'p' then
[17]	insert into
[18]	insurance_status :=7;
[19]	End if;
[20]	...
[21]	if insurance_status =7 then
[22]	Update outp_invoice
[23]	Set ...
[24]	End if;
[25]	when exit_proc then
[26]	if p_error_no = 1 then
[27]	raise_application_error(-20001, 'Coverage limits do not exist.');
[28]	elsif p_error_no = 2 then
[29]	raise_application_error(-20003, 'Rate pricing does not exist for this materials!!');
[30]	elsif p_error_no = 3 then
[31]	raise_application_error(-20004, 'Material is not defined in the table price!!');
[32]	elsif p_error_no = 5 then
[33]	raise_application_error(-20006, 'Pricing data is incomplete for this patient!!');
[34]	elsif p_error_no = 11 then
[35]	...
[36]	end if;