ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specifications
(CE)

Introduction to Neural Networks – 14034301-3

Course Specifications

Institution	Date of Report
Umm Al-Qura University	17/04/2016
College/Department **College of Computer & Information Systems**	

A. Course Identification and General Information

1. Course title and code:
Introduction to Neural Networks – 14034301-3

2. Credit hours **3**

3. Program(s) in which the course is offered.
(If general elective available in many programs indicate this rather than list programs)
Computer Engineering

4. Name of faculty member responsible for the course
Dr. Khalid Al-Hindi

5. Level/year at which this course is offered **Level 9 or 10 (Elective)**

6. Pre-requisites for this course (if any)
Engineering Maths II

7. Co-requisites for this course (if any)

8. Location if not on main campus
Al-Abidiyah Umm Al Qura University - Makkah Al Mukarramah

9. Mode of Instruction (mark all that apply)

a. Traditional classroom	Yes	What percentage?	100
b. Blended (traditional and online)		What percentage?	
c. E-learning		What percentage?	
d. Correspondence		What percentage?	
f. Other		What percentage?	

Comments:

B Objectives

1. What is the main purpose for this course? Have an understanding of the concepts and techniques of neural networks through the study of the most important neural network models. Have knowledge of sufficient theoretical background to be able to reason about the behaviour of neural networks. To be able to train a neural network using different training techniques. To be able to apply neural networks to particular applications, and to know what steps to take to improve performance.
2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field) N/A

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

1. Topics to be Covered		
List of Topics	No. of Weeks	Contact Hours
Introduction	1,2	6
Neuron model and network architecture, Illustrative example	3,4	6
Perception learning rule, Signal and weight vector spaces	5,6,7	9
Linear transformations for neural networks	8,9	6
Supervised Hebb	10,11	6
Performance surfaces and optimum points	12	3
Performance optimization, Widrow Hoff, Back-propagation	13,14	6
Variations on back-propagation		

2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	48					48
Credit	3					3

3. Additional private study/learning hours expected for students per week.	6

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

Course Learning Outcomes, Assessment Methods, and Teaching Strategy work together and are aligned. They are joined together as one, coherent, unity that collectively articulate a consistent agreement between student learning, assessment, and teaching.

The ***National Qualification Framework*** provides five learning domains. Course learning outcomes are required. Normally a course has should not exceed eight learning outcomes which align with one or more of the five learning domains. Some courses have one or more program learning outcomes integrated into the course learning outcomes to demonstrate program learning outcome alignment. The program learning outcome matrix map identifies which program learning outcomes are incorporated into specific courses.

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. **Fourth**, if any program learning outcomes are included in the course learning outcomes, place the @ symbol next to it.

Every course is not required to include learning outcomes from each domain.

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	This course is intended to provide basic concepts of neural networks to the students. In this course theoretical knowledge and training of neural network is covered. Upon completion of the course students will be able to understand the architecture of artificial neural network and its learning rules. The students will be able to provide training to neural networks and apply them to solve a particular problem such as pattern recognition, signal processing and control systems to improve performance.	Teaching strategies used to develop knowledge of the course include classroom lectures, interactive learning sessions, power point slides, assignments and individual attention.	Assessment methods include final exam, mid-term, quizzes, assignments, project and presentation.
1.2			
1.3			
2.0	**Cognitive Skills**		
2.1	The course will develop the ability to designing and creative thinking in the students.	Different teaching strategies are used to develop cognitive skills including practical examples during the lectures and practiced those examples in project. Assignments include some open ended tasks to apply the knowledge gained in the subject.	The cognitive skills are assessed by using assignments and project. Quizzes are also designed to assess these skills.
2.2			
2.3			
2.4			
3.0	**Interpersonal Skills & Responsibility**		
3.1	In this course project is assigned to students which is a group activity and play important role to improve students' interpersonal skills and personal and social responsibility.	Group assignments and project are given to develop these skills.	Assessment of students' interpersonal skills is performed by taking exam, report and presentation.
3.2			
3.3			
3.4			
4.0	**Communication, Information Technology, Numerical**		
4.1	To develop skills in this domain technical programming and training is given to the students.	Students' are advised to write assignments and project reports as per standard format to develop writhing skills and presentations are arranged to give them chance to develop communication skills.	To assess the students numerical and communication skills tests and conducted and presentations are arranged. Some of the marks are allocated for standard presentation.
4.2			
4.3			
4.4			
5.0	**Psychomotor**		
5.1	The course provides training of neural network as psychomotor skill.	The student use different neural network training	The psychomotor skills developed in this course are

		techniques to develop psychomotor skills.	assessed by assignments, presentations and Project.
5.2			

Suggested Guidelines for Learning Outcome Verb, Assessment, and Teaching

NQF Learning Domains	Suggested Verbs
Knowledge	list, name, record, define, label, outline, state, describe, recall, memorize, reproduce, recognize, record, tell, write
Cognitive Skills	estimate, explain, summarize, write, compare, contrast, diagram, subdivide, differentiate, criticize, calculate, analyze, compose, develop, create, prepare, reconstruct, reorganize, summarize, explain, predict, justify, rate, evaluate, plan, design, measure, judge, justify, interpret, appraise
Interpersonal Skills & Responsibility	demonstrate, judge, choose, illustrate, modify, show, use, appraise, evaluate, justify, analyze, question, and write
Communication, Information Technology, Numerical	demonstrate, calculate, illustrate, interpret, research, question, operate, appraise, evaluate, assess, and criticize
Psychomotor	demonstrate, show, illustrate, perform, dramatize, employ, manipulate, operate, prepare, produce, draw, diagram, examine, construct, assemble, experiment, and reconstruct

Suggested ***verbs not to use*** when writing measurable and assessable learning outcomes are as follows:

Consider	Maximize	Continue	Review	Ensure	Enlarge	Understand
Maintain	Reflect	Examine	Strengthen	Explore	Encourage	Deepen

Some of these verbs can be used if tied to specific actions or quantification.

Suggested assessment methods and teaching strategies are:

According to research and best practices, multiple and continuous assessment methods are required to verify student learning. Current trends incorporate a wide range of rubric assessment tools; including web-based student performance systems that apply rubrics, benchmarks, KPIs, and analysis. Rubrics are especially helpful for qualitative evaluation. Differentiated assessment strategies include: exams, portfolios, long and short essays, log books, analytical reports, individual and group presentations, posters, journals, case studies, lab manuals, video analysis, group reports, lab reports, debates, speeches, learning logs, peer evaluations, self-evaluations, videos, graphs, dramatic performances, tables, demonstrations, graphic organizers, discussion forums, interviews, learning contracts, antidotal notes, artwork, KWL charts, and concept mapping.

Differentiated teaching strategies should be selected to align with the curriculum taught, the needs of students, and the intended learning outcomes. Teaching methods include: lecture, debate, small group work, whole group and small group discussion, research activities, lab demonstrations, projects, debates, role playing, case studies, guest speakers, memorization, humor, individual presentation, brainstorming, and a wide variety of hands-on student learning activities.

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Bi-weekly quizzes		
2	Mid Term		
3	Assignments		
4	Project		
	Final Exam		
5	Bi-weekly quizzes		
6			
7			
8			

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week) Faculty is available 4 hours per week for student help and consulting.

E. Learning Resources

1. List Required Textbooks • Martin T. Hagan, Howard B. Demuth, and Mark H. Beale, Neural Network Design, Thomson Learning, 1996, ISBN: 978-0971732100
2. List Essential References Materials (Journals, Reports, etc.) N/A
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc) • Simon Haykin, Neural Networks and Learning Machines (3rd Edition), Prentice Hall, 2008, ISBN-13: 978-0131471399
4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.) i. http://ecee.colorado.edu/~ecen4831/lectures/NNdemo.html ii. http://www.ai-junkie.com/ann/evolved/nnt1.html iii. http://www.cormactech.com/neunet/whatis.html iv. http://library.thinkquest.org/C007395/tqweb/example.html v. http://www.ibm.com/developerworks/library/l-neural/
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. • MatLAB with Neural Network Toolbox is required.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) • Lecture room is required with multimedia projector.

2. Computing resources (AV, data show, Smart Board, software, etc.) • Sufficient numbers of computers and MatLAB with Neural Network Toolbox is required.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) N/A

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching • To improve effectiveness of teaching student feedback is obtained in the form of assignments, tests, quizzes, attendance etc.
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor • The evaluation of teaching is performed by the department using student survey.Comparison of the course content with similar courses offered in others colleges
3 Processes for Improvement of Teaching • The process for improvement of teaching is based on result of student survey and result of student outcomes. Individual attention is provided to weak students.
4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution) N/A

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. • The course effectiveness is reviewed for planning and improvement on annual basis.

Faculty or Teaching Staff: _____

Signature: _____ **Date Report Completed: _____**

Received by: _____ **Dean/Department Head**

Signature: _____ **Date: _____**