Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

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الهيئـــة الوطنيـــة للتقويــم
والاعـتـمــاد الأكــاديـمــي

ATTACHMENT 2 (e)

Course Specifications

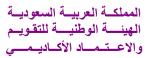**Kingdom of Saudi Arabia**

The National Commission for Academic Accreditation & Assessment

Course Specifications
(CE)

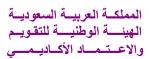# Engineering Design Process and Tools

(14033402-3)

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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: **Engineering Design Process and Tools – 14033402-3**
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. Muhammad Rashid**
5. Level/year at which this course is offered **Year 4**
6. Pre-requisites for this course (if any)   Digital System Design - **14032203-4**
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:

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B Objectives

1. What is the main purpose for this course?   Engineering design process, Project selection and identification, Requirement specifications, Concept generation, System design, System testing, System reliability

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)
     1. Involving students in presentation of advance topics to know current research in the field.
     2. Lecture slides and tutorials, Animations to further clarify the theoretical concepts
     3. Field trips to organizations practicing modern engineering design principles

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 to engineering design process in computer engineering domain	1-3	9
Selection of project and assessing the needs of customer	4-5	6
Methods for developing and documenting the requirements specifications	6-7	6
Design space exploration to select the best one from the competitive alternatives	8	3
Design techniques for functional decomposition	9	3
Methods for describing system behaviour such as flow charts state diagrams	10-11	6
Important issues in testing throughout the development cycle	12-13	6
Theory of reliability at component and system level	14	3

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2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	42					42
Credit	3					3

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

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.
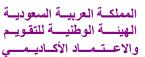
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		NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0		**Knowledge**		
1.1		Independently and within a group dynamic apply Electrical and Computer Engineering system design principles to open-ended complex design problems.	1. Assignments and solutions to the assignments, so that student can know their problems 2. Open-communication with students – show willingness to assist and take questions from students and clarify explanations in the class 3. Students presentations	1. Exercises & Homeworks, Quizzes, Midterm, Project, Final Exam
1.2		Understand design and development methods and systems employed by industry.		
2.0		**Cognitive Skills**		
2.1		Ability to plan and implement.	1. Assignments. 2. Homework	1. Mid and Final Exams 2. Quizzes
2.2		Ability of deduction and inference.		
2.3		Be able to learn engineering design methodologies and perform design testing.		
3.0		**Interpersonal Skills & Responsibility**		
3.1		Understand and communicate to others the importance and relevance of statistics in the modern world	1. Home assignments 2. Group Demonstrations 3. Engineering Design	1. Mid and Final Exams 2. Presentations 3. Team work
3.2		Be an independent learner, able to acquire further knowledge with some guidance or support.		
3.3		Participate in group discussions		
3.4		Manage time and meet deadlines.		
4.0		**Communication, Information Technology, Numerical**		
4.1		Case studies: the key method of discovering a student's dexterity in analyzing	1. Written Examinations 2. Assignments 3. Quizzes	1. Assignments, exams, reports, presentations and quizzes will test their analytic skills and communication skills
4.2		Their recommendations, opinions and suggestions		
4.3		Assignments, exams, reports, presentations and quizzes will test their analytic skills and communication skills		
4.4		Class discussions should indicate a student's prowess in responding		
5.0		**Psychomotor**		
5.1				
5.2				

Suggested Guidelines for Learning Outcome Verb, Assessment, and Teaching

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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

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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	Attendance, Participation and Labs evaluation	Throughout semester	25
2	Quiz	3	5
3	Mid term I	4	10
4	Home work	Throughout semester	10
	Mid Term II	10	10
5	Final Exam	16	40
6	Attendance, Participation and Labs evaluation	Throughout semester	25
7			
8			

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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 10 hours per week for student help and consulting.

E. Learning Resources

1. List Required Textbooks • Ralph M. Ford and Chris S. Coulston, Design for Electrical and Computer Engineers, McGraw-Hill, 2008
2. List Essential References Materials (Journals, Reports, etc.) N/A
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc) N/A
4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.) N/A
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. N/A

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.) • Maximum class size is 25. Each class room is provided with projector and electronic board. • Lecture rooms and Auditorium (Occasionally)

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2. Computing resources (AV, data show, Smart Board, software, etc.)   N/A
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   1. Monthly Meeting discussing current teaching methods.
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor   • Faculty meetings to discuss best practices and issues related to the course   • Comparison of the course content with similar courses offered in others colleges   • Updating course curriculum according to latest research done in the field.
3 Processes for Improvement of Teaching   • Departmental Meetings
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)   • Departmental Meetings

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5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- Departmental Meetings and management meetings

Faculty or Teaching Staff: _____

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

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

Signature: _____   **Date:** _____