



ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

**Course Specifications
(CE)**



Course Specifications

Institution:	Umm Al-Qura University	Date of Report: 10/06/1437
College/Department: Computer Engineering Department		

A. Course Identification and General Information

1. Course title and code: Probability and Statistics for Engineers - 14033410-4			
2. Credit hours: 4 + 0			
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. Khaled Almotaari			
5. Level/year at which this course is offered: Level 07			
6. Pre-requisites for this course (if any) Engineering Maths-II			
7. Co-requisites for this course (if any) N/A			
8. Location if not on main campus Umm Al-Qura University, Abidiyyah, Makkah Al-Mukarammah			
9. Mode of Instruction (mark all that apply)			
a. Traditional classroom	☒	What percentage?	100
b. Blended (traditional and online)	☐	What percentage?	
c. e-learning	☐	What percentage?	
d. Correspondence	☐	What percentage?	
f. Other	☐	What percentage?	
Comments: N/A			

B Objectives

1. What is the main purpose for this course? • Use statistical vocabulary. • Construct various frequency distributions of grouped and ungrouped data. • Calculate and interpret descriptive statistics of samples and populations. (Measures of central tendency, measures of dispersion.) • Calculate simple probabilities. • Find the mean and variance of a probability distribution including the binomial distribution. • Understand and calculate expected values. • Calculate the probabilities or scores of normal distributions and the normal approximation of the binomial distribution. • Use the Central Limit Theorem to calculate the probabilities of the mean for any distribution. • Formulate, calculate and interpret hypotheses test for one parameter and to compare two parameters, for both large and Small samples, Z and T for one two samples.
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)

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
Course overview, Introduction (Chapter 1), Sample space events, Probability Axioms and rules, conditional probability, total probability, independence, Bayes' theorem (Chapter 2)	1-3	9
Discrete Random Variables, PMF, CDF, Expected Values, Discrete Distributions (Chapter 3), Continuous Random Variables, PMF, CDF, Expected Values, Continuous Distributions (Chapter 4)	4-6	9
Multiple Discrete Random Variables, Multiple Continuous Random Variables, Covariate and Correlation, Bivariate Normal Distribution, Functions of Random Variables (Chapter 5), Numerical Summaries, Probability Plots (Chapter 6)	7-9	9
Sampling, Central Limit Theorem (Chapter 7), Confidence Intervals (8.1, 8.2),	10-12	9
Hypothesis Testing (9.1), Linear Regression (11.1, 11.2)	13-14	6



2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	42	N/A	42	N/A	N/A	84
Credit	42	14	N/A	N/A	N/A	56

3. Additional private study/learning hours expected for students per week.	08
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4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy
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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	Use statistical vocabulary. Construct various frequency distributions of grouped and ungrouped data. Calculate and interpret descriptive statistics of samples and populations. (Measures of central tendency, measures of dispersion.) Calculate simple probabilities. Find the mean and variance of a probability distribution including the binomial distribution. Understand and calculate expected values. Calculate the probabilities or scores of normal distributions and the normal approximation of the binomial distribution. Use the Central Limit Theorem to calculate the probabilities of the mean for any distribution. Formulate, calculate and interpret hypotheses test for one parameter and to compare two parameters, for both large and Small samples, Z and T for one two samples.	Classroom lectures, power point slides and individual attention is used to develop knowledge of the course.	Exercises & Home works, Quizzes, Midterm, Project, Final Exam. Review outputs from the assignments in the computer lab and also from their assignments and projects.
2.0	Cognitive Skills		
2.1	Ability to solve numerical problems. Ability of deduction and inference.	Assignments and labs/ tutorials.	Mid and final exams. Labs / tutorials.



3.0	Interpersonal Skills & Responsibility		
3.1	Understand and communicate to others the importance and relevance of statistics in the modern world Be an independent learner, able to acquire further knowledge with some guidance or support. Participate in group discussions Manage time and meet deadlines..	Numerical Assignments Labs / tutorials.	Mid and Final Exams Labs exams.
4.0	Communication, Information Technology, Numerical		
4.1	Case studies: the key method of discovering a student's dexterity in analyzing Their recommendations, opinions and suggestions Assignments, exams, reports, presentations and quizzes will test their analytic skills and communication skills Class discussions should indicate a student's prowess in responding	Written Examinations Assignments Quizzes	Assignments, exams, reports, presentations and quizzes will test their analytic skills and communication skills Class discussions should indicate a student's prowess in responding
5.0	Psychomotor		
5.1			

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	Quizzes	4, 10	10
2	Mid Term	8, 12	20
3	Assignments	Throughout semester	05
4	Project	Throughout semester	25
5	Final Exam	16	40

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)
 - For individual student consultations and academic advice teaching staff is expected to be available 8 hours per week.

E. Learning Resources

1. List Required Textbooks

- Douglas C. Montgomery and George C. Runger, “Applied Statistics & Probability for Engineers”, Sixth Edition, John Wiley & Sons, 2014.

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 (e.g. 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.)

- A Lecture room having Multimedia projector for lectures and students presentation.

2. Computing resources (AV, data show, Smart Board, software, etc.) • Computer lab is required. • Students are encouraged to bring in their laptops and use them in solving problems in the class room.
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 • Course Survey and students Feedback for each learning outcome of the course.
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. • Faculty trainings.
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.

- Departmental meetings.

Faculty or Teaching Staff: _____

Signature: _____ Date Report Completed: _____

Received by: _____ Dean/Department Head

Signature: _____ Date: _____