Course Specification

(Postgraduate Programs)

Course Title:	Research Methods for Engineers
Course Code:	CE6007
Program:	Master of Science in Computer Engineering
Department:	Computer and Network Engineering
College:	College of Computing
Institution:	Umm Al-Qura University
Version:	2.0
Last Revision Date:	12/4/2025

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: (3)				
2. Course type				
A.	☐University	☐College	☒ Department	☐Track
B.	☒ Required		☐ Elective	
3. Level/year at which this course is offered: (Level 1)				
4. Course General Description:				
This course describes how to plan for success with this hands-on guide to conducting high-quality engineering research. It covers all the phases of a research project from its selection to the product design.				
5. Pre-requirements for this course (if any)**:**				
6. Co-requisites for this course (if any)**:**				
7. Course Main Objective(s):				
The objective is to plan and implement a research project for maximum impact: (1) From the identification of an appropriate research topic through to the successful presentation of results. (2) Improve the research outcomes (3) Discover essential tools and methods for producing high-quality, rigorous research, including statistical analysis, survey design, and optimisation techniques. (4) Research with purpose and direction (5) Research ethics and integrity				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Explain fundamentals of engineering research	K1 and K2	Classroom lectures, discussions, and reading assignments at home	written assignments, projects and oral presentations
1.2	Explain fundamentals of literature search and review	K1 and K2	Classroom lectures, discussions, and reading assignments at home	written assignments, projects and oral presentations
2.0	**Skills**			
2.1	Apply statistical analysis and survey research methods	S4	1.Students are engaged in various design activities through problem-based learning and flipped classes. 2.Practical examples and open-ended tasks are used, by employing open source simulation tools & video tutorials, to develop cognitive skills in the students. 3.Students are advised to solve assignments, write project reports as well as prepare presentations according to a standard format. An online class discussion group is made to share instant information and feedback.	1. Reviewing Students' design approaches and outcomes of their projects that demonstrate their research proposal and/or survey papers 2. Written assignments, projects and oral presentations 3. Reviewing Students' assignments, reports, and presentations from technical and organizational points of view.
2.2	Design a research plan	S4		
2.3	Communicate effectively by presenting students' research proposals and/or short survey papers	S3		

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate commitment to ethical and professional responsibilities in citing work of others and correctly delivering information	V1	Assignments and projects are given to students. Assignments are critically reviewed in the class through an open discussion	Students may be assessed, for interpersonal skills, through their written assignments, oral presentations, and design projects. Verbal cross-questioning can also be made to assess their interpersonal skills & responsibility
3.2	Work in a team to write proposal for research project, and/or short survey paper	V2		

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction to engineering research	3
2.	Literature search and review	3
3.	Reference management softwears such as Zotero	2
4.	Developing a research plan	6
5.	Writing technical articles	4
6.	Writing research papers in LaTeX by using OverLeaf	6
7.	Statistical analysis	6
8.	Survey research methods	6
9.	Research presentation	4
10.	Research ethics and integrity	2
11.	Micro-conference for students to present their projects	3
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments (Examples, writing proposal for research project, and/or short survey paper)		50
2.	Individual Project and its presentation		50

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	Research Methods for Engineers 1st Edition by David V. Thiel, 2014 Writing technical articles by H. Schulzrinne, http://www.cs.columbia.edu/~hgs/etc/writing-style.html The Not So Short Introduction to LaTeX by Tobias Oetiker, Marcin Serwin, Hubert Partl, Irene Hyna, and Elisabeth Schlegl, 2023
Supportive References	
Electronic Materials	The instructor may provide as per requirements
Other Learning Materials	The instructor may provide as per requirements

2. Educational and Research Facilities and Equipment Required:

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (Projector, smart board, software)	Projector
Other equipment (Depending on the nature of the specialty)	The instructor may provide as per requirements

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Program Leaders	Indirect
Effectiveness of students' assessment	Program Leaders	Direct
Quality of learning resources	Students, Faculty	Indirect
The extent to which CLOs have been achieved	Students, Faculty, Program Leaders	Direct and Indirect
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	Computer and Network Engineering Department Council
REFERENCE NO.	The 18th Session Of The Academic Year 1446
DATE	15/4/2025