Course Specification
(Bachelor)

Course Title:	Empirical Methods
Course Code:	SE4717
Program:	BSc in Software Engineering
Department:	Software Engineering
College:	College of Computing
Institution:	Umm Al Qura University
Version:	1.0
Last Revision Date:	22/04/2025

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (3rd year/ 5th or 6th level) or (4th year/8th level)					
4. Course General Description:					
This course will prepare students for advanced research by examining how to plan, conduct and report on empirical investigations. The course will cover techniques applicable to each of the steps of a research project, including formulating research questions, theory building, data analysis (using both qualitative and quantitative methods), building evidence, assessing validity, and publishing. It will particularly focus on research involving software, developing statistical tools to measure software performance and the ways in which people interact with software tools.					
5. Pre-requirements for this course (if any)**:**					
CEN1602 - Statistics and Probability in Computing					
6. Co-requisites for this course (if any)**:**					
N/A					
7. Course Main Objective(s):					
The main objective of this course is to enable students to discuss and practice a scholarly approach, to gain knowledge of how to do research in a software engineering field, and to practice academic writing.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning	0	0
3	Hybrid • Traditional classroom • E-learning	0	0
4	Distance learning	0	0

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
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 the philosophy of science in research	K2	Lecture, Exercise, Group discussion	Quiz, Exams, Assignments
1.2	Explain principles of research design	K2	Lecture, Exercise, Group discussion	Quiz, Exams, Assignments
1.3	Explain the important of data replication and the management of bias	K2	Lecture, Exercise, Group discussion	Quiz, Exams, Assignments
2.0	**Skills**			
2.1	Apply principles of research design for a variety of projects	S1	Lecture, Group discussion	Assignments, Project
2.2	Apply a range of techniques such as: qualitative and quantitative methods, survey methods, case studies, interviews	S1	Lecture, Group discussion	Assignments, Project
2.3	Design and implement research studies that meet the course requirement	S2	Lecture, Group discussion	Assignments, Project
3.0	**Values, autonomy, and responsibility**			
3.1	Applying self-learning and personal development skills in the use of various	V1	Lecture, Group discussion	Assignments, Project

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	technology applications and tools			

C. Course Content

No	List of Topics	Contact Hours
1.	Overview of the research process	6
2.	Research Strategies in Software Engineering	6
3.	Design Research in Software Engineering	6
4.	Data collection methods	6
5.	Processing and Analysis of Data	6
6.	Testing Hypothesis	6
7.	Writing Research Report	9
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Quizzes**	**2-14**	**15**
2.	**Projects**	**2-14**	**15**
3.	**Assignments**	**2-14**	**10**
4.	**Mid Term**	**7**	**20**
5.	**Final Exam**	**16-17**	**40**

*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	• Modrák, V., Semanco, P., & Balog, M. (2015). *Research in engineering and management of advanced manufacturing systems*. Trans Tech Publishers. ISBN 978-3038354110.
Supportive References	• Wilhelm, H., & Simon, G. (2006). *Research methods in software engineering* (1st ed.). GITO Verlag. ISBN 978-3932323703.

Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Traditional Classroom
Technology equipment (projector, smart board, software)	Multimedia Projector
Other equipment (depending on the nature of the specialty)	N/A

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct, Indirect
Effectiveness of Students assessment	Faculty, Peer reviewer	Direct, Indirect
Quality of learning resources	Faculty, Course coordinator	Direct, Indirect
The extent to which CLOs have been achieved	Course coordinator, Program management committee	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**SOFTWARE ENGINEERING DEPARTMENT COUNCIL**
REFERENCE NO.	**THE 17TH MEETING FOR THE ACADEMIC YEAR 1446H**
DATE	**22/04/2025**