



Course Specification

(Bachelor)

Course Title: **Software Engineering Economics**

Course Code: **SE4709**

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:	3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods	4
C. Course Content	5
D. Students Assessment Activities	7
E. Learning Resources and Facilities	7
F. Assessment of Course Quality	8
G. Specification Approval	8



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:

Software Engineering Economics focuses on decision-making in software engineering within a business framework. The success of software projects hinges on effective management and a systematic evaluation of software attributes against economic measures. The main goal is to align software development decisions with business objectives. Key topics include life cycle economics, risk, uncertainty, economic analysis methods, and connecting theory to real-world software economics.

5. Pre-requirements for this course (if any):

SE2204 - IT Project Management

6. Co-requisites for this course (if any):

N/A

7. Course Main Objective(s):

The specific objectives of the course are to:

1. Economic Principles: Understand key economic concepts in software engineering.
2. Cost Analysis: Analyze economic aspects of software lifecycles.
3. Risk Management: Develop skills for informed decision-making in projects.
4. Real-World Applications: Connect theory to practice with case studies.

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 <ul style="list-style-type: none"> • Traditional classroom 	0	0





No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning	0	0

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	.
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 fundamental economic principles, including cost, pricing, and financial concepts, within the context of software engineering.	K1	Lecture, exercise, and group discussion	Quiz, exams, assignments
1.2	Evaluate the lifecycle economics of software products and projects to inform investment and pricing decisions.	K2	Lecture, exercise, and group discussion	Quiz, exams, assignments
2.0	Skills			
2.1	Use risk management and uncertainty analysis techniques to improve software project outcomes. ☒	S1	Lecture, Group Projects	Exams, Assignments, Project



Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.2	Conduct cost-benefit and cost-effectiveness analyses to assess software engineering decisions' economic viability. ☑	S2	Lecture, Group Projects	Exams, Assignments, Project
2.3	Develop comprehensive business cases and financial models for software projects, incorporating economic analysis and optimization techniques.	S3	Lecture, Group Projects	Exams, Assignments, Project
3.0	Values, autonomy, and responsibility			
3.1	Advocate for ethical and sustainable economic practices in software engineering decision-making.	V1	Debates on ethical case studies.	Reflective essays.
3.2	Collaborate in teams to apply economic principles to case studies and real-world software engineering scenarios.	V2	Group project	Group project

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Software Engineering Economics <ul style="list-style-type: none"> Role of economics in software engineering and decision-making Importance of economic metrics like ROI and TCO Case studies on economic successes and failures in software projects 	3
2.	Software Lifecycle Economics <ul style="list-style-type: none"> Economic considerations across planning, development, and maintenance Resource allocation and budgeting in software projects Financial implications of agile vs. traditional development models Economic impact of open-source versus proprietary solutions 	6



3.	Cost and Value Analysis in Software Development <ul style="list-style-type: none"> • Estimating direct and indirect costs in software projects • Concepts like total cost of ownership and value stream mapping • Metrics for productivity, efficiency, and economic decision-making 	6
4.	Risk and Uncertainty in Software Projects <ul style="list-style-type: none"> • Financial risk analysis and scenario planning • Sensitivity analysis and cost overrun management strategies • Economic decision-making under uncertainty and risk 	6
5.	Economic Analysis Methods in Software Engineering <ul style="list-style-type: none"> • Cost-benefit analysis, cost-effectiveness analysis, and break-even analysis • Optimization techniques for cost reduction • Comparison of economic implications of agile and lean methodologies 	6
6.	Software Pricing Strategies and Business Models <ul style="list-style-type: none"> • Analysis of licensing, subscription, and pay-per-use models • Financial considerations for cloud-based and IoT software solutions • Freemium vs. premium pricing models and their economic effects 	6
7.	Sustainability and Economic Impacts <ul style="list-style-type: none"> • Economic decision-making for sustainability in software projects • Energy-efficient algorithms and sustainability metrics • Long-term financial implications of green software engineering practices 	6
8.	Tools and Techniques for Economic Analysis <ul style="list-style-type: none"> • Simulation software and financial modeling tools • Forecasting methods for economic decisions in software projects • Use of machine learning and data analytics in economic analysis 	3
9.	Advanced Topics in Software Economics	3





- Economic impacts of emerging technologies like AI and blockchain
- Microeconomics of cloud computing and globalization
- Cost-benefit perspectives of offshoring and network effects in ecosystems

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

- Mistrik, I., Bahsoon, R., & Kazman, R. (2014). *Economics-driven software architecture*. Morgan Kaufmann. ISBN 978-0124104648.
- Dinwiddie, G. (2019). *Software estimation without guessing: Effective planning in an imperfect world*. Pragmatic Bookshelf. ISBN 978-1680506983.
- Harris, M. (2017). *The business value of software*. CRC Press. ISBN 978-1138706100.

Supportive References

- Schwartz, M. (2016). *The art of business value*. IT Revolution Press. ISBN 978-1942788041.
- Frohnhofer, R. W. (2020). *Software project estimation: Intelligent forecasting, project control, and client relationship management*. Productivity Press. ISBN 978-0367358475.





Electronic Materials

Other Learning Materials

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	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 17 TH MEETING FOR THE ACADEMIC YEAR 1446H
DATE	22/04/2025

