هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title: Models and Methods
Course Code: SE1768
Program: Software Engineering
Department: Software Engineering
College: Faculty of Computer Science and Information Technology
Institution: Al-Baha University
Version: V1.0
Last Revision Date: 24-April-2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 Credit Hours (3, 0, 0) (Lecture, Lab, Tutorial) (3 Contact Hours)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (8th Level/3rd Year)					
4. Course General Description:					
This course provides a broad introduction to formal methods in software engineering. The concept of formalization is discussed and studied. This is to ensure the quality attribute of reliability of software systems. In order to ensure the reliability, formal and precise specifications need to be articulated. So, the expected run-time behavior of a system can be checked and verified. In addition, in this course students will be able to explore a variety formal methods and languages. Furthermore, model checking and verification will be addressed and studied.					
5. Pre-requirements for this course (if any): **None**					
6. Pre-requirements for this course (if any): **None**					
7. Course Main Objective(s):					
The main aim of this course is to teach the students the concepts formal methods in software engineering. In addition, students should be able to specify behavior of a software system in 4 various formal language. Furthermore, students should be able to interpret formal specifications.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	33	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		
5	Other (Lab)		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	33
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		33

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the concepts of software system formalization	K1	- Lectures	***Direct Assessment Tool*** Midterm Exam Final exam ***Indirect Assessment Tool*** Course Exit Survey
1.2	Recognize the concepts of software formal specifications and verification	K2	- Lectures - Lab Work	***Direct Assessment Tool*** Midterm exam Final exam ***Indirect Assessment Tool*** Course Exit Survey
1.3	Recognize formal methods and models notations	K3	- Lectures -Lab Work	***Direct Assessment Tool*** Midterm exam Final exam ***Indirect Assessment Tool***

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
				Course Exit Survey
2.0	**Skills**			
2.1	Model software specifications in various formal method	S1	- Lectures - Lab work - Project	***Direct Assessment Tool*** Project (rubric) Final exam ***Indirect Assessment Tool*** Course Exit Survey
2.2	Interpret formal specifications	S2	- Lectures - Lab work - Project	***Direct Assessment Tool*** Project (rubric) Final exam ***Indirect Assessment Tool*** Course Exit Survey
2.3	Apply specific techniques for the analysis and verification	S3	- Lectures - Lab work - Project	***Direct Assessment Tool*** Project (rubric) Final exam ***Indirect Assessment Tool*** Course Exit Survey
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate effective teamwork.	V1	-Small Groups	***Direct Assessment Tool*** Project Presentation (rubric) ***Indirect Assessment Tool*** Course Exit Survey

C. Course Content

No	List of Topics (Lectures)	Contact Hours
1.	**Introduction to Software Formalization**	**4**
2.	**Introduction to formal methods**	**4**
3.	**Propositional logic**	**6**
4.	**Predicate logic**	**4**
5.	**Model Checking**	**3**
6.	**Z language**	**4**
7.	**Formalizing UML language**	**4**

8.	**Program verification and CASE tools**	**4**
9		
Total		**33**

No	Lab Topics	Contact Hours
Total		

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Assignment**	**Weekly**	10%
2.	**Midterm Exam**	6	20%
3.	**Final Project and Presentation**	11	20%
4.	**Final Exam**	12	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	Baier, Christel, and Joost-Pieter Katoen. Principles of model checking. MIT press, 2008..
Supportive References	Huth, Michael, and Mark Ryan. Logic in Computer Science: Modelling and reasoning about systems. Cambridge university press, 2004.
Electronic Materials	• Access to the Saudi Digital Library (SDL). • Using the learning management system of the university – Rafid System (https://lms.bu.edu.sa/).
Other Learning Materials	• Nielsen Norman Group: https://www.nngroup.com/

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• A classroom or lecture hall with a whiteboard for 25 students.
Technology equipment (projector, smart board, software)	• A digital image projection system with a connection to a desktop computer and laptop computer. • High speed Internet connection
Other equipment (depending on the nature of the specialty)	**None**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	• Students • Faculty • Peer Reviewers • Program Leader • Course Coordinator	•Surveys (indirect). •Direct feedback from students. •Course evaluation by Peer Reviewers (indirect). •Class visit by Program Leader (indirect). •Comprehensive Course report (where we can find information about teaching difficulties and action plan)
Effectiveness of Students assessment	• Students • Faculty • Peer Reviewers • Program Leader • Exam Evaluation Committee • Course Coordinator	• Surveys (indirect). • Direct feedback from students. • Course evaluation by Peer Reviewers (indirect). • Class visit by Program Leader (indirect) • Exam evaluation by the Exam Evaluation Committee (indirect)
Quality of learning resources	• Students • Faculty • Peer Reviewers • Course Coordinator	• Surveys (indirect) • Course evaluation by Peer Reviewers (indirect). • Comprehensive Course report (where we can find information about difficulties and challenges about learning resources as well as consequences and action plan)
The extent to which CLOs have been achieved	• Faculty • Program Leader	• Student Results (direct)

Assessment Areas/Issues	Assessor	Assessment Methods
	• Course Coordinator	• Comprehensive Course report (where we can find the CLO assessment results)
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Curriculum Committee
REFERENCE NO.	
DATE	28 April 2024