Software Architectures

Course Code:

CSE 447

Course Period:

Spring

Course Type:

Area Elective

Credits:

3

Theoric:

3

Practice:

0

Laboratory Hour:

0

ECTS:

5

Course Language:

English

Course Coordinator:

Mert Özkaya [1]
Courses given by:

Mert Özkaya [1]
Course Objectives:

The goal of this course is to introduce the notion, principles, and techniques in software architectures. The course aims at teaching students how to specify software architectures using various techniques and apply further operations on them such as analysis and

implementation code generation. The students are also expected to apply their knowledge in projects, requiring the architectural specification and analysis of sufficiently large and complex software systems. The course also gives the students the opportunity of contributing to the ongoing research conducted in the university.

Course Content:

The basic concept of software architectures, architectural styles, modelling software architectures, architecture description languages, XCD, visualizing software architectures, UML, analysis of software architectures, implementing software architectures, specifying software architectures for non-functional properties, domain specific software architectures

Course Methodology:

1: Lecture, 2: Question-Answer, 3: Lab, 4: Case-study

Course Evaluation Methods:

A: Testing, B: Experiment, C: Homework, D: Project

Learning Outcomes	Program Learning Outcomes	Teaching Methods	Assessment Methods
1. The student will learn what software architecture is and its advantages in software design	2,3	1	A, D
2. The student will learn visual techniques and the UML language for specifying software architectures	2,3,7	1,13	A, D
3. The student will learn architecture description languages for specifying software architectures including XCD	2,3	1,13	A, D
4. The student will compare visual techniques with architecture description languages in terms of their support for software architectures	2,3,4	1	A, D
5. The student will learn how to analyse software architectures	2,3,4,5	1, 13	A, D
6. The student will learn how to implement software architectures	3,4	1,13	A, D
7. The student will learn how to specify software architectures that meet non-functional properties	2,3,5	1, 13	A, D

8. The student will learn domain specific software architectures	4	1,13	A,D
9. The student will learn how to do research on software architectures and write academic papers on their research	7	1,8,3,10,13, 15	A,D

COURSE CONTENT

Week	Topics	Study Materials
1	Introduction	Lecture Notes, Book
2	Architectural Styles	Lecture Notes, Book
3	Software Connectors	Lecture Notes, Book
4	Introduction to Architectural Modelling	Lecture Notes, Book
5	Architecture Description Languages	Lecture Notes, Book, Scientific Paper
6	Introduction to the XCD Architecture Description Language-1	Scientific Paper, Thesis
7	Introduction to the XCD Architecture Description Language-2	Scientific Paper, Thesis
8	Midterm	
9	Visualizing Architectural Models	Lecture Notes, Book
10	Analysing Architectural Models	Lecture Notes, Book
11	Implementating Architectural Models	Lecture Notes, Book
12	Applied Architectures	Lecture Notes, Book
13	Non-functional Properties in Software Architecture Design	Lecture Notes, Book
14	Introduction to Domain Specific Software Engineering	Lecture Notes, Book

RECOMMENDED SOURCES

Textbook	R. N. Taylor, N. Medvidovic, E. M. Dashofy. 2009. Software Architecture: Foundations, Theory, and Practice. 1st edition. **Wiley**.

Additional Resources	1. P. Clements et al., Documenting Software Architectures: Views and Beyond, 2nd ed. Addison-Wesley Professional, 2010. 2. Ozkaya M. (2014). A Design-by-Contract based Approach for Architectural Modelling and Analysis. Ph.D. thesis, City University London, U.K. 3. N.Medvidovic & R.N. Taylor. A classification and comparison framework for Software Architecture Description Languages. 4. L.Dobrica & E.Niemela. A survey on software architecture analysis methods. IEEE Trans. on Software Engineering, Vol. 28, No. 7, pp.638-654, July 2002.

MATERIAL SHARING

Documents	coadsys.yeditepe.edu.tr/
Assignments	coadsys.yeditepe.edu.tr/
Exams	The written exams will be given at predetermined dates, times and locations during mid-term and final exam weeks.

COURSE CATEGORY Expertise/Field Courses

ASSESSMENT

IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-term	1	30
Project	1	40
Total		70
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		70
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		30
Total		**100**

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	Contribution
1	Adequate knowledge in mathematics, science and Computer Engineering subjects; ability to use theoretical and applied information in these areas in complex computer engineering problems.	

2	Ability to identify, formulate, and solve complex computer engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.	**X**
3	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.	**X**
4	Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.	**X**
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems.	**X**
6	Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually.	
7	Ability to communicate effectively both orally and in writing; knowledge of a minimum of one foreign language.	**X**
8	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.	
9	Awareness of professional and ethical responsibility.	
10	Information about business life practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development.	
11	Knowledge about contemporary issues and the global and societal effects of engineering practices on health, environment, and safety; awareness of the legal consequences of engineering solutions.	

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION

Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Excluding the exam week: 12xTotal course hours)	13	3	39
Hours for off-the-classroom study (Pre-study, practice)	14	4	56
Project	1	30	30
Midterm examination	1	2	2
Final	1	2	2

Total Work Load	129
Total Work Load / 25 (h)	5,16
ECTS Credit of the Course	5