

Software Requirements Analysis

Code & No:	<u>CS 437</u>
Credits:	<u>3(3,0,1)</u>
Pre-requisite:	<u>CS360</u>
Co-requisite:	<u>None</u>
Level:	<u>9 or 10</u>

Module Description:

This course helps in learning techniques for eliciting requirements. Languages and models for representing requirements. Analysis and validation techniques, including need, goal and use-case analysis. Requirements in the context of system engineering. Specifying and measuring external qualities: performance, reliability, availability, safety, security, etc. Specifying and analyzing requirements for various types of systems: embedded systems, consumer systems, web-based systems, business systems, systems for scientists and other engineers. Resolving feature interactions. Requirements documentation standards. Traceability. Human factors. Requirements in the context agile processes. Requirements management: Handling requirements changes.

Module Aims:

- Elicit requirements using a variety of techniques
- Organize and prioritize requirements
- Apply analysis techniques such as needs analysis, goal analysis, and use case analysis
- Validate requirements according to criteria such as feasibility, clarity, freedom from ambiguity, etc.
- Represent functional and non-functional requirements for different types of systems using formal and informal techniques
- Specify and measure quality attributes
- Negotiate among different stakeholders in order to agree on a set of requirements
- Detect and resolve feature interactions

Student Outcomes (SOs):

- (a) An ability to apply knowledge of computing and mathematics appropriate to the program's student outcomes and to the discipline
- (b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- (c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- (d) An ability to function effectively on teams to accomplish a common goal
- (e) An understanding of professional, ethical, legal, security and social issues and responsibilities
- (f) An ability to communicate effectively with a range of audiences

- (g) An ability to analyze the local and global impact of computing on individuals, organizations, and society
- (h) Recognition of the need for and an ability to engage in continuing professional development
- (i) An ability to use current techniques, skills, and tools necessary for computing practice.
- (j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices. [CS]
- (k) An ability to apply design and development principles in the construction of software systems of varying complexity. [CS]
- (j) An ability to use and apply current technical concepts and practices in the core information technologies of human computer interaction, information management, programming, networking, and web systems and technologies. [IT]
- (k) An ability to identify and analyze user needs and take them into account in the selection, creation, evaluation, and administration of computer-based systems. [IT]
- (l) An ability to effectively integrate IT-based solutions into the user environment. [IT]
- (m) An understanding of best practices and standards and their application. [IT]
- (n) An ability to assist in the creation of an effective project plan. [IT]

Course Learning Outcomes (CLOs):

1. **To understand various issues and difficulties in requirements engineering.**
2. **To be able to use several requirements elicitation techniques to obtain requirements from stakeholders.**
3. **To understand the use of various informal and semi-formal languages to document requirements.**
4. **To Analyze and model requirements using appropriate object-oriented techniques using UML.**
5. **Able to validate requirements and understands Requirements management.**

SOs and CLOs Mapping:

CLO/SO	a	b	c	d	e	f	g	h	i	j	k	l	m	n
CL01	√					√								
CL02									√					
CL03	√													
CL04		√												
CL05											√			

No.	Topics	Weeks	Teaching hours
1	Basics of requirements engineering	1	3
2	Requirements inception and elicitation	1	3
3	Requirements analysis and specification - modeling techniques- inception vs. specification-techniques for writing high-quality requirements	2	6
4	Documentation standards (e.g., IEEE 830-1998)-goal-oriented modeling-Structured analysis and other techniques	2	6
5	UML v2 and URN notations-external qualities management, contract specification	2	6
6	Requirements verification, and validation	2	6
7	Requirements management traceability, priorities, changes, baselines-tool support (e.g., DOORS)	2	6
8	Examples of requirements approaches in typical development processes-requirements for various types of systems: embedded systems, consumer systems, web-based systems, business systems, systems for scientists and other engineers	1	3
9	Requirements engineering in RUP-Requirements engineering in agile methods	1	3
Total		14	42

Textbook:

- Requirements Engineering 3rd ed. 2011 Edition by Elizabeth Hull , Ken Jackson Jeremy Dick

Essential references:

- Ian K. Bray, *An Introduction to Requirements Engineering*, Addison Wesley, 2002
- Ian F. Alexander, Richard Stevens, *Writing better requirements*, Addison-Wesley, 2002 - for the topic of how to write requirements
- Elizabeth Hull, Ken Jackson, Jeremy Dick, *Requirements Engineering*, Springer-Verlag, 2004 - for the topic of traceability and an introduction to the DOORS tool