

The Islamia University of Bahawalpur
Department of Computer Science & IT

MS(Computer Science)

Course: CS31032 – Requirement Engineering

Instructor: Dr. Imran Sarwar Bajwa

Contact: imran.sarwar@iub.edu.pk

Teacher Assistant: TBA

Class Timings: 4:00 PM – 7:00 PM

Class Day: Saturday

Office Hours: Mon-Thu 4:00 PM - 5:00 PM

Class Duration: 48 Credit Hours

Overview:

The course will discuss concepts for systematically establishing, defining and managing the requirements for a large, complex, changing and software-intensive systems, from technical, organizational and management perspectives. The course will consider the past, present and future paradigms and methodologies in requirements engineering. The course will cover informal, semi-formal and formal approaches, while striking a balance between theory and practice. The course will involve building models of both requirements engineering process and requirements engineering product, concerning both functional and non-functional goals/requirements/specifications, using a systematic decision-making process.

The course will be conducted as a mix of lectures and seminar-style discussions. Lectures are expected to be highly dynamic and interactive. Besides active participation during class discussions, students are expected to participate in a team-oriented requirements engineering project.

Learning Outcomes:

Having successfully completed this course, the student will be able to:

1. Examine the state-of-the-art for research & practice in Requirements Engineering.
 - Role of RE in software and systems engineering
 - Current techniques, notations, methods, processes and tools used in RE
2. Gain practical experience in selected RE techniques
3. Understand the essential nature of RE
 - Breadth of skills needed for RE, and the many disciplines on which it draws
 - Contextual factors & practicalities that affect the success of various approaches to RE
4. Gain a basic grounding for research in RE
 - Methodological issues for RE research
 - Current research issues and the direction of the field
 - Awareness of the literature

Teaching Methodology:

The lectures will be conducted in a discussion environment. The students will be encouraged to participate and ask questions during each class session. Topics from the course outline will be taught in a session and a research paper related to each topic will be given to the students to read it. The research

paper will be discussed in the next session. Sessions for group discussion will be arranged to discuss the research papers.

Students will also write one research paper during the semester and submit it in an international conference. A list of international conferences is also available at the end of the course outline. Students are informed to carefully note the submission dates to avoid any inconvenience.

Problems and examples related to each topic will also be done in the class and some exercises will be given to the students as homework.

Homework:

Some of the exercises will be routine, but others will be more challenging. I do not expect you to solve all of the homework problems, but I hope that you will benefit from working on the difficult ones. A few hints on the homework assignments:

- **Start early:** Difficult problems are not typically solved in one sitting. Start early and let the ideas come to you the course of a few days.
- **Be rigorous:** Each problem has (sometimes unwritten) requirements that you need to solve it. You may need to study some extra material. Do not restrict to class lectures. Consult a few other books from library and web, as well.
- **Be Concise:** Express your answers at the proper level of detail. Give enough details to clearly present your solution.
- **Work with Others:** Some of the problems will be difficult, and it will often be helpful to discuss them with your other classmates. Feel free to form study-groups. Students are encouraged to discuss the difficulties and possible solutions with each other and then each of them should prepare their own solution.

Exams:

Mid term can be closed book/open book (closed discussion). 100% exam will be based on the theory (text and research papers) and exercises discussed in the class.

The final exam will be closed book. 50% exam will be based on the research papers produced by the students and rest of the 50% will be based on the theory (text and research papers) and exercises discussed in the class.

There will be occasional group discussion sessions, in which students have to discuss the research papers assigned for (homework) study.

Honor Code:

All work submitted for credit must be your own.

Students are supposed to produce original material in their homework, assignments and especially research paper. Plagiarism¹ in any case is not acceptable.

*The student found submitted plagiarized work will be given **zero credit** and may also have financial penalty as well.*

Grading:

- 30% Mid Term Exam

¹ Plagiarism is an act of fraud and it happens if somebody steals and passes off ideas/work of others or uses work of others without their prior permission.

- 50% Final Term Exam
- 20% Research Paper Discussion

Text and References:

In addition to articles/research papers from various journals and periodicals, material from the following sources will be used in the course.

- Managing Software Requirements: A Unified Approach by Dean Leffingwell and Don Widrig
- Requirements Engineering and Management for Software Development Projects by Murali Chemuturi, ISBN: 9781461453765, Publication Date: 2013
- Requirements Engineering by Elizabeth Hull; Kenneth Jackson; Jeremy Dick, ISBN: 1852338792, Publication Date: 2005
- Requirements engineering a good practice guide by Sommerville, Ian | Pete Sawyer, ISBN: 9788126524570, Publication Date: 2014, Published by : Wiley India Pvt. Ltd.
- Requirements Engineering by Elizabeth Hull; Ken Jackson; Jeremy Dick, ISBN: 1852338792, Publication Date: 2005

Conferences

- IEEE International Requirement Engineering Conference. <https://re20.org/>
- International Working Conference on Requirements Engineering: Foundation for Software Quality. <https://link.springer.com/conference/refsq>
- ACM/IEEE International Conference on Software Engineering. <https://conf.researchr.org/home/icse-2020>
- European Software Engineering Conference / ACM SIGSOFT Symposium on the Foundations of Software Engineering. <https://2020.esec-fse.org/>
- IEEE International Conference on Software Maintenance. <https://icsme2020.github.io/>
- Conference on Advanced Information Systems Engineering. <http://caise20.imag.fr/>
- Asia-Pacific Software Engineering Conference. <http://www.apsec-conferences.org/>

Journals

- Requirements Engineering Journal by Springer <https://www.springer.com/journal/766>
- IEEE Transactions on Software Engineering by IEEE <https://www.computer.org/csdl/journal/ts>
- Software: Practice and Experience <https://onlinelibrary.wiley.com/journal/1097024x>
- Software Quality Journal <https://www.springer.com/journal/11219>
- Information and Software Technology <https://www.journals.elsevier.com/information-and-software-technology>
- Empirical Software Engineering: An International Journal <https://www.springer.com/journal/10664>
- Software and Systems Modeling by Springer <https://www.springer.com/journal/10270>
- Information Systems by Elsevier <https://www.journals.elsevier.com/information-systems>
- IEEE Software by IEEE <https://www.computer.org/csdl/magazine/so>
- Information System Journal by Wiley <https://onlinelibrary.wiley.com/journal/13652575>

General Resources

- The [BCS RESG website](#) has a resource list including pointers to the main commercial tools
- Ian Alexander has written excellent [book reviews](#) of most of the RE books published in the last few years
- Al Davis maintains an [extensive bibliography](#) and other RE related links

Organisations

- The British Computer Society (BCS) has a very active [Requirements Engineering Specialist Group](#)
- The International Society for Information Processing (IFIP) has a [working group \(WG2.9\) on Requirements Engineering](#)
- The International Council on Systems Engineering has a [Requirements Working Group](#)
- The IEEE has a [Task force on Requirements Engineering](#), although it hasn't been active lately.

<i>Course Contents</i>			
<i>S. No.</i>	<i>Modules</i>	<i>Topics*</i>	<i>Session</i>
1.		<ul style="list-style-type: none"> – Introduction to Software Requirements – Interpretations of requirements, requirement hierarchies – Introduction to Requirement Engineering Body of Knowledge 	Session 1 Session 2 Session 3
2.		<ul style="list-style-type: none"> – Requirement related problem areas and Business Analyst Role – The role, tasks, essential skills & knowledge 	Session 4 Session 5 Session 6
3.		<ul style="list-style-type: none"> – Requirement Elicitation – Techniques for requirement elicitation, how to find missing requirements, satisficing requirements, performing elicitation sessions. 	Session 7 Session 8
4.		<ul style="list-style-type: none"> – Use Cases and User Stories – Identification of use cases, validating the use cases, using use cases for requirement elicitation, Introduction to user stories 	Session 9 Session 10
5.		<ul style="list-style-type: none"> – Requirement Analysis – Categorizing and prioritizing the requirements, identifying and resolving conflicting requirements, relevance of requirements to business goals, requirements feasibility, Process Flows 	Session 11 Session 12
6.		<ul style="list-style-type: none"> – Business Rules – The business rules approach, finding the business rules, specifying business rules, business rules relation to use cases, state transition diagram, decision table 	Session 13 Session 14
		MID TERM	Session 15 & 16
7.		<ul style="list-style-type: none"> – Requirement Specification – How to write requirements, check their completeness, using models to check completeness, SRS document, Vision and Scope document, Requirement specification in agile projects 	Session 17 Session 18
8.		<ul style="list-style-type: none"> – Data Requirements – Eliciting data requirements, Modeling/specifying data requirements, Business Data Diagram, Data Dictionary, Data Flow Diagram 	Session 19 Session 20
9.		<ul style="list-style-type: none"> – Non-functional Requirements – Software quality attributes, defining exploring and specifying software quality attributes, their relationship to functional requirements 	Session 21 Session 22
10.		<ul style="list-style-type: none"> – Validation and Verification of Requirements – Requirements review techniques, validating requirements against acceptance criteria, 	Session 23 Session 24

11.		<ul style="list-style-type: none"> – Traditional requirement practices vs Agile projects – Limitation of tradition approaches, requirement development in agile projects, adaptation of practices to agile projects – Managing the Requirements 	Session 25 Session 26
12.		<ul style="list-style-type: none"> – Requirement Change Management – The process for requirement change management, requirement traceability, impact analysis, tools overview 	Session 27 Session 28
13.		Research Paper/Case Study Presentation	Session 29 & 30
		Final Exam	Session 31 & 32

** Topics can be revisited depending upon the class background and interest.*

Dr. Imran Sarwar Bajwa

Chairman & Associate Professor
Computer Science Department
The Islamia University of Bahawalpur