

# CSCI 568: Requirements Engineering

## Spring 2024

### **Time and Location**

**Monday 2-5:20 PM**

SAL104 Henry Salvatori, Computer Science Center

Mon 2 pm – 5:20 pm

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### **Instructor**

Mahdi Eslamimehr, PhD, MBA

Office Hours: Monday, 11 am – 1 pm or any time by appointment in PHE 514

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### **Catalogue Description**

Aims to equip students with techniques for successful requirements analysis and requirements engineering (RE) of software-intensive systems. Students will learn a systematic process of developing requirements through co-operative problem analysis, representation, and validation. Prerequisite: CS577A or equivalent, or software engineering experience.

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### **Detailed Description**

The course will expose students to both the current state of the art in requirements engineering and a systematic method for engineering high-quality requirements. The course introduces fundamental concepts and principles including the aim and scope of requirements engineering, the products and processes involved, requirements qualities to aim at and flaws to avoid, and the critical role of requirements engineering in system and software engineering. The course then focuses on system modeling in the specific context of engineering requirements. It presents a multi-view modeling framework that integrates complementary techniques for modeling the system-as-is and the system-to-be.

The course will cover one chapter from the required textbook (listed below) each week.  
The topics covered as follows:

#### Chapter 1: Introduction to Requirements Engineering

- What Are Requirements?
- Requirements Engineering Activities
- Bodies of Knowledge
- Requirements Engineering Paradigms

#### Chapter 2: Preparing for Requirements Elicitation

- Stakeholders
- Stakeholder Prioritization
- Communicating with Stakeholders
- Stakeholder Negotiations

#### Chapter 3: Requirements Elicitation

- Preparing for Elicitation
- Elicitation Techniques
- Eliciting Hazards

#### Chapter 4: Writing the Requirements Document

- Requirements Agreement and Analysis
- Requirements Representation Approaches
- Requirements Documents

#### Chapter 5: Requirements Risk Management

- Requirements Verification and Validation
- Standards for V&V
- Risk Mitigation Techniques

#### Chapter 6: Formal Methods

- What Are Formal Methods?
- Formal Methods Classification
- Limitations of Formal Methods

#### Chapter 7: Agile Requirements Engineering

- Extreme Programming and Scrum
- User Stories
- Challenges for RE in Agile Methods

#### Chapter 8: Tool Support for Requirements Engineering

- Traceability Support
- IBM DOORS
- RE Tool Best Practices

#### Chapter 9: Requirements Management

- Standards for Requirements Management
- CMMI
- Antipatterns in RE

#### Chapter 10: Value Engineering of Requirements

- Cost Estimation and COCOMO
  - Function Points
  - Win-Win Negotiations
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### **Learning Objectives**

The specific objectives of the course are to:

1. Introduce students to the models, processes, and challenges in requirements engineering.
  2. Provide them with an understanding of the relationship between software and system requirements, as well as between requirements and architecture in software-intensive systems.
  3. Equip them with the common requirements modeling and analysis notations, techniques, and tools.
  4. Develop the capability to elicit, model, analyze, and adapt requirements in large software-intensive projects.
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### **Required Textbook**

- Requirements Engineering for Software and Systems by Phillip Laplante, CRC Press, 2014.
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### **Schedule**

Week	Topic	Reading	Tasks
1	Introduction	Ch. 1	
2	UNIVERSITY HOLIDAY		
3	Requirements Elicitation	Ch. 2	Ch. 2 homework
4	Requirements Elicitation	Ch. 3	Ch. 2 quiz, Ch. 3 homework
5	Writing Requirements	Ch. 4	Ch. 3 quiz, Ch. 4 homework
6	UNIVERSITY HOLIDAY		
7	Risk Management	Ch. 5	Ch. 4 quiz, Ch. 5 homework
8	Formal Methods	Ch. 6	Ch. 5 quiz, Ch. 6 homework
9	Specification and Agile Methods	Ch. 7	Ch. 6 quiz, Ch. 7 homework
10	Tool Support	Ch. 8	Ch. 7 quiz, Ch. 8 homework
11	Requirements Management	Ch. 9	Ch. 8 quiz, Ch. 9 homework
12	Value Engineering	Ch. 10	Ch. 9 quiz, Ch. 10 homework
13	Advanced Topics		Ch. 10 quiz
14	Advanced Topics		
15	Software Patents		
FINAL	N/A	N/A	Final projects due

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## Grading and Evaluations

There are four components to the final grade:

- Quizzes are 40% of the grade (~4% each)
- Homework is 20%
- In-class student presentation is 20%
- Course project is 20%

Quizzes will be administered at the start of class each week. Quizzes are closed-book and closed-notes. Quizzes will typically include 3-4 short answer questions and last 20-25 minutes. The questions will primarily address key concepts from the material covered in previous week's lecture and the associated chapter in the textbook. However, any material covered up until that point in the semester may appear on a quiz. Quizzes will be graded by Dr. Eslamimehr, not the grader, so please address questions or concerns about quiz grading directly to Dr. Eslamimehr. Graded quizzes will be returned and reviewed the following week. Quizzes are a crucial component of your grade, so if you are not performing as well as you'd like, seek out help during office

hours or by scheduling an appointment with Dr. Eslamimehr early in the semester while there's still time for improvement.

Homework will be due before the beginning of class each week. Homework should be submitted via the D2L course website. Late homework submissions (*i.e.*, those submitted after 2 p.m. on Mondays) will not receive any credit. Each homework assignment will consist of four or more questions from those found at the end of each chapter of the textbook. Homework will be graded by the grader, but please CC Dr. Eslamimehr on any emails related to questions or concerns about homework grading.

In-class student presentations will be given each week starting with Week 7. Depending on the final size of the class, there will usually be 2-3 presentations each week, with each presentation lasting 20-25 minutes. You must select a scholarly research paper to be the subject of your presentation from the attached list of papers, or you may request approval to present another paper not on the list. Only one student may present each paper, so the first student to request a given paper will be assigned that paper. You may also request the day you wish to present your paper. Further details about the expectations and grading of the presentations will be provided in a separate document.

Course projects will be due on the final exam day for the class. The course project will require you to create a requirements model using a multi-view modeling framework. The course project will be difficult and time-intensive, so it is imperative that you begin work on it as soon as possible so that you have time to seek out help if you encounter difficulty. During the first 6 weeks of the class, a portion of the class time will be devoted to training you in the use of the modeling framework. A detailed description of the requirements and grading criteria for the project will be provided in a separate document.

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### **Academic Integrity**

Students must work independently on all assignments; collaborating on assignments is considered cheating and will be penalized accordingly. All USC students are responsible for reading and following the USC Student Conduct Code, which prohibits plagiarism. Some examples of behavior that is not allowed are: copying all or part of someone else's work (by hand or by looking at others' files, either secretly or if shown) and submitting it as your own; giving another student in the class a copy of your assignment solution; consulting with another student during an exam; and

copying text from published literature without proper attribution. If you have questions about what is allowed, please discuss it with the instructor.

Students who violate University standards of academic integrity are subject to disciplinary sanctions, including failure in the course and suspension from the University. Since dishonesty in any form harms the individual, other students, and the University, policies on academic integrity have been and will be strictly enforced.

**When an academic integrity violation occurs, I am REQUIRED to report it to the University.** I may recommend a sanction on the violation report, but the Office of Student Judicial Affairs and Community Standards makes the final determination on sanctions.

**Part B – University Student Conduct Code (see Section 13):**

<https://policy.usc.edu/student/scampus/part-b/>

**How to Report Academic Misconduct:**

<https://sjacs.usc.edu/faculty/misconduct/>

**Academic Integrity: A Guide for Graduate Students:**

[http://www.usc.edu/student-affairs/student-conduct/grad\\_ai.htm](http://www.usc.edu/student-affairs/student-conduct/grad_ai.htm)

**Academic Dishonesty Sanction Guidelines:**

<https://policy.usc.edu/files/2016/02/Appendix-A.pdf>

**Report of Academic Integrity Violation:**

<https://sjacs.usc.edu/files/2015/03/AppendixB.pdf>