IS663 –System Analysis & Design

Syllabus

Fall 2023

Instructor
Sameh Sabet
Department of Informatics
Ying Wu College of Computing
New Jersey Institute of Technology

Instructor	Sameh Sabet	**Office Hours**	by appointment (please email first) Online Thursday, Friday 5pm-8pm
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Please contact me via Canvas **first and/or via email. I generally respond to emails within an hour.**

I. COURSE SPECIFICATIONS

Course: IS 663
Course Title: System Analysis and Design
Prepared: August 2023
Course Prerequisite: IS-601
some programming knowledge is strongly encouraged

II. COURSE OVERVIEW

This course develops the skills necessary to analyze, design and manage the development of effective enterprise-scale information systems solutions incorporating contemporary methods and effective organizational and global project management practices. It focuses on technical business systems analysis and design techniques, and covers key software engineering principles, methods and frameworks, including process models, agile and lean principles, project and risk management, estimation, requirements elicitation and analysis, modeling, system and software architecture, design patterns, and quality systems. Students will actively participate in discussions, review selected articles, participate in team exercises and collaborate on projects involving analysis and prototyping of applications addressing real-world problems and integrating current and emerging technologies.

III. OUTCOMES EXPECTED UPON THE COMPLETION OF THE COURSE

Upon the completion of the course the students will be able to:

- Describe the structure, activities, flows, control loops, value creation and best practices related to classical and modern lifecycle models, including Agile methods such as Scrum
- Contrast and compare different process models for suitability to project characteristic, needs and context
- Select, customize, or define hybrid process models for specific classes of

development projects

- Run agile (simulated) start-up projects using Agile frameworks and performing the roles of a product owner, scrum master and team member.
- Build Product Backlogs (PBLs), writing user stories
- Do analysis, specification and design of software applications using techniques such as use cases, scenarios, design patterns and design heuristics
- Perform essential project management functions, including planning and risk management in global and collaborative projects
- Estimate projects using classical and agile estimation techniques
- Build prototypes.
- Describe DevOps concepts and CI/CD pipelines
- Compare different architectural models, levels and types of architecture
- Describe the fundamentals of quality assurances and quality frameworks

IV. ACADEMIC INTEGRITY

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu

V. GRADE STRUCTURE

ACTIVITY	**POINTS**
Exam	30
Project	40
Labs, Discussions and Participation	30
TOTAL POINTS	**100**

Generally speaking the final letter grades will follow a curve. While not an exact prescription, it is a pretty good guide.

A	(25%)
B+	(25%)
B	(30%)
C+/C/F	(20%)

VI COURSE TEXTS AND READINGS

A. TEXTS

Required

"Software Engineering," Ian Sommerville, 10th Edition

Recommended

"Software Engineering: A Practitioner's Approach," R. Pressman, McGraw Hill, NY 2003.

B. READING ASSIGNMENTS (to be read before the indicated session)

Note: The readings listed below are open to change. I will continue to update (add/remove/modify) the readings if/when I find more relevant papers as the semester progresses. I will, however, keep you informed of the changes as they occur.

VII. PROJECTS

The Projects are an opportunity for you to apply the concepts we will discuss throughout the semester to solve "real-world" problems. Working as a team, you are to demonstrate your mastery of the concepts, methods, tools, and techniques covered in class.

You will be required to view the project from many angles - customer, analyst, developer, tester, manager and end user. You will develop and analyze requirements, project plans, designs and will eventually prototype your design.

Details about the project will be discussed on Canvas.

Project teams should made up of 4 to 6 students.

Deliverables

Requirements Package 30

Design Documents 40
Prototype & Presentation 30

VIII. DISCUSSIONS

Your overall grade for this component will be based on the quality of your effort in leading and participating in class discussions and exercises.

Class Discussion: You will be responsible in participating in online discussion on the week's theme for each class. This assumes you have thoroughly synthesized the information from the readings and has picked out a few relevant points to have a meaningful discussion. The purpose is not only to present your ideas, but also to elicit comments from the rest of the class in a meaningful discussion. A very useful way of doing this is by asking thought-provoking questions.

Each student is expected to post (on Canvas) TWO days ahead of time (i.e. before Monday of that week) at least TWO questions they would like the rest of the class to contemplate (especially while reading the articles for that class). Please be advised that posting questions late or not at all WILL affect your grade.

At the end of the week (Sunday), each student must then pick TWO questions posted to reply to with their thoughts.

Here is the grade point distribution for this component (20 points):

Online Participation	10 points
Posting Questions	10 points

IX. Grading

Late assignments submissions may be accepted for partial credit, with every day late accruing a 10% penalty.

As a rule of thumb, any assignment you submit to me will be graded and returned within a week.

Online discussion grades will be reflected/updated whenever any other deliverable is graded and posted.

X. Schedule Class Meetings

Class materials are due on the following Sundays:

Session	Date	Topic	Readings	Deliverables
Session 1	09/05	Introduction	CH 1 , 11	
Session 2	09/11	SDLC Models: Basics, Comparative Analysis	CH 2 "Software Chronic Crisis," W. Wayt Gibbs, Scientific American, September 1994, pp. 86-95. "No Silver Bullet" by Fred Brooks, 1987, Brooks87.pdf PS. I know these are "ancient", but I want you to realize our challenges remain the same!	Project Teams Formed
Session 3	09/18	Process models (cont.) Requirements Engineering Process: Activities, Standards, Documentation	CH3	Project Proposal
Session 4	09/25	Requirements Modeling & Specification Overview: Structured and OO Approach, Use Cases, Informal and Formal Specifications, Data Flow	CH 4	

		Analysis; Methods: Data Flow Diagrams (DFD), Data Dictionary (DD), BNF, Process Description Examples		
Session 5	10/03	Requirements Modeling & Specification (Cont.) Methods: Use Cases and Scenarios Examples User Stories	CH 5 User Stories | Examples and Template | Atlassian	
Session 6	10/10	Project Management, Risk Management Cost Estimation	CH 22, 23 Project management with agile principles | Atlassian	
Session 7	10/17	Requirements Management Software Tools for Requirements Management, Modeling & Specification Tools	CH 25	Project Plan Due
Session 8	10/24	Design: Basic Concepts System & Software Architecture Design Methods & Tools HCI	CH 6	Req Due
Session 9	10/31	Design Methods and Notations	CH 24	

		Transitioning from Requirements to design - heuristics and guidelines Introducing Design Quality: Basic Elements, Cohesion & Coupling, Reviews, Verification		
Session 10	11/06	Object Oriented Analysis & Design (OOAD): Basics Concepts, Static & Dynamic Views, Object Dictionary, OOD Overview	CH 7	Architecture Doc Due
Session 11	11/13	OOAD - continued UML: Introduction, Notation, Diagrams	CH 16	
NOTHING DUE	11/20	THANKSGIVING BREAK		
Session 12	11/27	Design Patterns Change control	CH 7 (7.3), CH. 17	
Session 13	12/04	Quality Frameworks: SEI Maturity Model & ISO 9000	CH 24.2	Detailed Design Due
Session 14	12/11	Course Summary, Q&A - Exam Preparation		Project Final Presentation & Prototype
Session 15	12/15	Final	Take Home/Online 48 hours to complete Over the weekend	

XI. ANNOUNCEMENTS AND INSTRUCTIONS

Students are responsible for all postings on Canvas. Students should check Canvas at least two or three times a week for any updates. Any announcements or due dates on Canvas take precedence and are final.

***NOTE**: THE SCHEDULES AND PROCEDURES IN THIS COURSE ARE SUBJECT TO CHANGE IN THE EVENT OF EXTENUATING CIRCUMSTANCES. YOU WILL BE NOTIFIED OF DEVIATIONS.*

XII. DISABILITY ACCOMODATIONS

If you are in need of accommodations due to a disability please contact Scott Janz, Associate Director of the Office of Accessibility Resources & Services (OARS), Kupfrian Hall 201, to discuss your specific needs. A Letter of Accommodation Eligibility from the OARS authorizing your accommodations will be required.