

COURSE DESCRIPTION

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|-------------------------------------|----------------------|---------------------------|-----------|
| Department and Course Number | CS 437 | Course Coordinator | Jiang Guo |
| Course Title | Software Engineering | Total Credits | 5 |

Current Catalog Description:

Methodologies and tools for the specification, design, development, testing, evaluation, and maintenance of software systems. Ethical issues in software development. Laboratory activities on team interactions, problem analysis and software development. This course satisfies the upper division writing requirement.

Textbook:

Pressman, Roger., *Software Engineering – A Practitioner’s Approach, 6th Edition*, McGraw Hill, 2004

References:

None.

Course Goals:

At the end of the course, students are able to

- Estimate the cost and effort for software projects
- Make schedules for software projects
- Elicit software requirement
- Create data models, flow-oriented models, and behavior models
- Convert requirement models into software architectures
- Implement component-level design
- Choose proper software testing strategies
- Use software testing techniques
- Understand ethical issues in software development

These course goals contribute to the success of **Student Learning Outcomes 1.a, 3, 4, 5, and 6.**

Prerequisites by Topic:

- Data Structures and Algorithms
- Writing Proficiency

Major Topics Covered in the Course:

- Estimation for Software Project
- Software Project Scheduling

- Software Process
- Requirement Engineering
- Analysis Modeling
- Design Engineering
- Architecture Design
- Component-level Design
- Software Testing Strategies
- Software Testing Techniques
- Ethical issues

Laboratory Projects (specify number of weeks on each):

Students are divided into small groups, 4 students in each group, to complete a large project on a selected topic from their survey or industry experience:

- Week 1: Estimate the effort of a selected project
- Week 2: Build data model, flow-oriented model and behavior model for the selected project
- Week 3: Design software architecture based on the requirement
- Week 4: Create the component-level design
- Week 5: Progress reports
- Week 6: Implement system components
- Week 7-8: Integrate system components
- Week 9: Conduct testing
- Week 10: System Demo and Presentation

Estimate Curriculum Category Content (Quarter Hours)

| Area | Core | Advanced | Area | Core | Advanced |
|-----------------|------|----------|-----------------|------|----------|
| Algorithms | | | Data Structures | | |
| Software Design | 4.0 | | Prog. Languages | 1.0 | |
| Comp. Arch. | | | | | |

Oral and Written Communications:

Each student group must give two to three presentations during the quarter, including a final presentation on the proposed project. Each presentation is 30 minutes long. The audience is invited to ask questions during the presentation. The instructor grades class presentations and gives feedback to the students.

Each student group must also complete a draft/progress project report in the first part of the quarter and a final project report at the end of the quarter. These project reports are divided into three parts that contains Requirement Specification, Design

Specification, and Implementation Code. The final project report is at least 50 pages long. Both the draft and the final version of the report are reviewed by the instructor, and feedback is given to help students improve their written communication skills.

Social and Ethical Issues:

Software Engineering Code of Ethics is described by the following principles:

- PUBLIC - Software engineers shall act consistently with the public interest.
- CLIENT AND EMPLOYER - Software engineers shall act in a manner that is in the best interests of their client and employer consistent with the public interest.
- PRODUCT - Software engineers shall ensure that their products and related modifications meet the highest professional standards possible.
- JUDGMENT - Software engineers shall maintain integrity and independence in their professional judgment.
- MANAGEMENT - Software engineering managers and leaders shall subscribe to and promote an ethical approach to the management of software development and maintenance.
- PROFESSION - Software engineers shall advance the integrity and reputation of the profession consistent with the public interest.
- COLLEAGUES - Software engineers shall be fair to and supportive of their colleagues.
- SELF - Software engineers shall participate in lifelong learning regarding the practice of their profession and shall promote an ethical approach to the practice of the profession.

Theoretical Content:

- COCOMO Model (1 week)
- Graph Matrices (1 week)

Problem Analysis:

In the first part of the course, students learn the basic concepts of software project estimation and the software development process. In the latter part of the course, students learn software requirement analysis, software architecture design, software component design, software algorithm representation, system integration, and system testing. Students also learn how to use project and software metrics.

Solution Design:

Solution design in this course mostly involves choosing appropriate analysis, design, and testing approaches to perform certain requirement analysis, software design and testing tasks. These include creating dataflow, state transition, and entity-relationship diagram; mapping transform flow, analyzing transaction flow; designing test cases, including graph-based testing, equivalence partitioning, and boundary value analysis.