SE 420 and SE 625 Software Quality Assurance

Spring 2019

INSTRUCTOR: Dr. Massood Towhidnejad (Dr. T)

OFFICE HOURS: **M, T, W 10:00 – 12:00**
AND (anytime I am in the office, AND the door is open), OR by appointment.

MEETINGS: LB 267, T & R 3:45 -5:00

OFFICE LOCATION: LB 354
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TEXTBOOKS & SUPPLEMENTARY MATERIALS: There is no text book for this class. The course content will be based on the class presentations and discussions, and recommended supplemental material. All these materials, and be found on the course website.

DESCRIPTION:
This course addresses the engineering issues, practices, and technologies associated with achieving quality software. The major activities and techniques used to ensure the quality of a software artifact are discussed. This course provides a framework for understanding the application of software verification and validation (V&V) processes and techniques throughout the software development life cycle. Typical products of V&V processes are identified and discussed and their relationships to V&V objectives are defined. The course will analyze various categories of V&V approaches including: technical reviews, software testing techniques and methodologies, Quality management throughout the development life cycle, and requirements tracing. The course emphasizes the importance of ensuring quality throughout the product life cycle, highlighting the value of ensuring quality early in any development or maintenance effort. Discussions of testing concepts, planning and controlling of testing activity, and integration-level testing are also included. The course covers the engineering practices required, discusses economics of software quality, and provides guidelines on addressing organizational issues involved in achieving quality.

GOALS:
The objective of this course is to prepare students to understand the role of ensuring quality in software development, recognizing its role from the elicitation, analysis, and specification of requirements through the implementation, delivery and operation of a software system. The focus will be achieving quality through sound software engineering practices. Students will learn techniques for analyzing software artifacts throughout the life cycle and how to incorporate these techniques in software development activities to help ensure quality.

PERFORMANCE OBJECTIVES:
Upon completion of this course as student will be able to

1. Define the elements of software quality.
2. Define the terminology commonly utilized in the V&V area.
3. Explain and be capable of using representative techniques for software V&V.
4. Explain the theoretical and practical limitations of V&V approaches.
5. Evaluate the applicability and likely effectiveness of a V&V approach for various artifacts.
6. Design and execute test cases
7. Develop and perform software V & V and/or test plan
8. Assess the effectiveness of the plan with respect to its objectives.
9. Software security and reliability.

COURSE OUTLINE*:

SAMPLE TOPIC	~CLASS HOURS	COURSE OBJECTIVES
Introduction to Software Quality	2	This provides the foundation for the definition of quality and quality software engineering. The role and techniques of verification and validation are introduced.
Elements of Software Quality	4	The elements of a quality product, achieving it, and measuring it are discussed.
Conducting Reviews, Walkthroughs and Inspections	5	The processes and individual and team skills needed for conducting peer reviews and inspections are discussed and practiced.
Software testing	8	Software testing theory and practice are presented. This presents specification, structure, and hybrid-based testing. Statistical testing is also considered.
Software Verification and Validation Techniques	3	More traditional V & V techniques and related development approaches are discussed as well as alternative approaches, e.g. Cleanroom, formal methods, fault tree.
Independent V&V	2	This discusses the role of and techniques for independent assessments of software artifacts.
Metrics	2	Brief discussion of metrics, establishing metrics program, and identifying appropriate measurement techniques
Quality Management	2	Management issues associated with implementing software quality assurance organization will be discussed
Software Security	4	Quality assurance activities required to build secure software
Software Reliability Engineering	3	The strategies and techniques for achieving reliability in software are discussed.
Economics of Software Quality	2	The economic value and trade-off issues associated with ensuring quality are discussed.
Standards	2	A brief discussion of quality standards is discussed.

* This is a tentative outline, and topics are not presented in any order.

GRADING SYSTEM:

SE 420 Students: There are four components that contributes to your final grade.

- Class Participation 10%
- Projects 35%
  - Documentation
  - Products
  - Presentation
- Quizzes 15%
- Two Exams 40%
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SE 625 Students: The above components will count toward 80% of your grade. In addition, you need to complete a research paper and project for an additional 20% of your grade.

- Research Paper & Project 20%
  - Presentation
  - Paper
  - Report