SFE 4030: SOFTWARE TESTING AND QUALITY ASSURANCE

Prerequisite APT 2080: Introduction to Software Engineering

3 Credit Units

Rationale

Computer Science 688: Software Testing and Quality Assurance studies the state-of-the-art and main research challenges of two important aspects of software engineering: testing and quality. The course also examines various approaches and methodologies used in software testing and quality assurance. Course topics are defined and illustrated by examples and papers from current peer-reviewed research literature in the area under study. The course will prepare students to independently conduct research in software testing and quality assurance, and to apply that knowledge in their future research and practice.

COMP 688 focuses on the widely-adopted and emerging principles and knowledge of software testing and quality assurance, and provides the knowledge of and research skills in these areas of study. This course is designed for those who are about to start research in software testing and quality assurance, and for practitioners and managers of any aspect of software development. The knowledge of, and research skills in the area of software engineering will enable new researchers to apply their knowledge of software testing and quality assurance when identifying research topics, solving research problems, and addressing various research challenges. Practitioners and those with managerial responsibilities in software development will be able to apply the knowledge of the state-of-the-art in software testing and quality assurance. Software developers will also be able to apply the skills gained in this course in everyday practice by adding novel and more innovative approaches to their knowledge areas.

Course Description

Topics include methods of testing, verification and validation, quality assurance processes and techniques, methods and types of testing, and ISO 9000/SEI CMM process evaluation.

Learning outcomes

At the end of the course, students will be able to:

1. Describe software engineering testing process
2. Describe the quality assurance process and its role in software development.
3. Demonstrate variety of testing techniques, methods, and tools.
4. Describe the state of the practice verification and validation techniques.
5. Demonstrate proficiency in managing a software project to customer requirements.
6. Describe the impact of ISO 9000 and the capability maturity model on software quality and testing

Course Content

Introduction to Software Quality, Quality Assurance, Quality Engineering, Testing: Concepts, Issues and Techniques. Test Activities, Management, and Automation. Coverage and Usage Testing Based on Checklists and Partitions. Input Domain Partitioning and Boundary Testing. Coverage and Usage Testing Based on Finite-State Machines and Markov Chains. Control Flow, Data Dependency, and Interaction Testing. Control Flow, Data Dependency, and Interaction Testing. Elements of software testing, Localization testing, types of testing (black box & white box testing), automated testing tools, Effective methods of software testing, the test process, Testing Techniques: Adaptation, Specialization, and Integration. Defect Prevention and Process Improvement. Automated software assessment, product metrics, analysis of measurement, Software project tracking and oversight, Quality control metrics, Quality control measurement areas, quality control statistics, Metric derivation Software Quality planning, assurance and Standards, Risk Analysis, Quality Scheduling, tracking and control, Techniques of enhancing software quality (Fagan method, structured programming and clean room software development, Formal methods, software complexities and solutions), Software auditing (Comparing Quality Assurance Techniques and Activities. Feedback Loop and Activities for Quantifiable Quality Improvement), Software Configuration Management.

Teaching Methodology

The course will be taught by lecture, group work, exercises, and demonstrations (labs)

Instructional material & equipment

Textbooks, whiteboard, handouts, electronic projector and laptop, Internet access, software and the library.

Method of evaluation

Class assignments, take-home assignments, tests, small projects to demonstrate use of software tools

Laboratory Work	20%
Project	20%
Assignments	10%
Mid-semester	20%
Final semester exams	30%
Total	**100%**

Course Text:

Software Testing and Continuous Quality Improvement, Third Edition by William E. Lewis – 2008

Recommended Reading

1. Software quality engineering: testing, quality assurance, by Jeff Tian – 2005
2. Software testing and quality assurance by B.S.Ainapure – 2009