CSE 4283
Software Testing and Quality Assurance

REQUIRED/ELECTIVE:
Computer Science – Elective
Software Engineering – Required
Computer Engineering – Elective

CATALOG DATA:
(Prerequisite: CSE 4214 with a grade of C or better). Three hours lecture. 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.

PREREQUISITE BY TOPIC:
1. Computer Programming
2. Software design
3. Software quality
4. Software Engineering and lifecycle management
5. Object Oriented paradigm
6. Basic file structures and data representations

TEXTBOOKS AND OTHER REQUIRED MATERIAL:

COORDINATOR:
Dr. David A. Dampier

COURSE OBJECTIVES:
1. Provide an introduction to the software engineering testing process
2. Describe the quality assurance process and its role in software development.
3. The student will be instructed in a variety of testing techniques, methods, and tools.
4. The student will be able to describe the state of the practice verification and validation techniques.
5. The student will demonstrate proficiency in managing a software project to customer requirements.
6. The impact of ISO 9000 and the capability maturity model on software quality and testing will be addressed.

TOPICS COVERED:

<table>
<thead>
<tr>
<th>Lecture</th>
<th>(Number of class hrs)</th>
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<tbody>
<tr>
<td>1. The Quality Movement</td>
<td>3</td>
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<td>2. The Quality Assurance Organization</td>
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<td>3. Quality Reviews</td>
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<td>4. Statistical Quality Assurance</td>
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<td>5. Verification and Validation Techniques</td>
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<td>6. Test Methods, Types and Tools</td>
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<td>7. ISO 9000 and CMM</td>
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<td>8. Other Quality Topics</td>
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CONTRIBUTION TO PROFESSIONAL COMPONENT:
Engineering Topics of Engineering Science and Design
ASSESSMENTS:
1. Quizzes and Examinations
2. Homework
3. Term paper

RELATIONSHIP TO PROGRAM OUTCOMES:

Note: Parenthesized list indicates the ABET criteria, Computer Engineering outcomes, and Software Engineering outcomes addressed by each performance criteria.

Performance Criteria:
1. The student will be able to describe, discuss, and apply the commonly accepted principles of software quality assurance. (a, k, se4, se6, se8)
2. The student will be able to select the correct test procedure for a given software development scenario. (e, k, se7)
3. The student will be able to describe the impact of ISO 9000 processes on a software development organization and differentiate between ISO 9000 and capability maturity model processes. (j, k, se6)
4. The student will be able to implement object oriented software test procedures, design test cases, execute test procedures, and document results. (c, g)
5. The student will demonstrate proficiency in managing a software inspection and walkthrough - and know the difference between the two. (d, k, se6)
6. The student will be able to apply standard quality techniques to system delivery and to apply appropriate processes. (c, k, se6)
7. The student will be able to implement a statistical quality assurance program. (a, k)
8. The student will demonstrate an ability to document their work to an acceptable standard. (g, se2)

PREPARED BY:
David A. Dampier, Department of Computer Science and Engineering, March 27, 2005.

ESTIMATE CSAB CATEGORY CONTENT:

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<th>CORE</th>
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<td>Data Structures</td>
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<td>Algorithms</td>
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<tr>
<td>Software Design</td>
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| Computer Organization and Architecture |
| Concepts of Programming Languages |

ORAL AND WRITTEN COMMUNICATIONS:
Students are expected to be able to effectively communicate with a customer and to develop an efficient test plan based on the software specification. The students are also expected to describe, document, and defend a robust quality assurance program for a medium to large-scale software development activity. This is accomplished through written documentation submitted as class projects. Oral presentations will also be required as part of the process delivery. Additionally, a term paper describing some aspect of software quality assurance will be expected of the class.

SOCIAL AND ETHICAL ISSUES:
None.
THEORETICAL CONTENT:

1. Statistical Analysis
2. Metrics theory
3. Object Oriented analysis, design, and testing

PROBLEM ANALYSIS:

Students are provided with in class scenarios related to software development activities and ask to develop appropriate quality processes and test plans

SOLUTION DESIGN:

None