**Syllabus / Course Outline**

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| **Course Name: Software Quality Assurance**  |
| **Course Code: CSCS351** | **Course Type: Elective** | **Course Credits: 3**  |
| **Class Timings: TR 1530-1645 hrs.** | **Section: A**  | **Student Meeting Hours/ Office Hours: MW 1200-1330 hrs.** |
| **Instructor Name: Dr. Aasia Khanum** |
| **Instructor Contact Details**Email: aasiakhanum@fccollege.edu.pkOther:Office Hours (face to face and/ or online): Online: MW 1200-1400 hrs. Face to face: TR: 1500-1530 hrs.Guidelines for contacting instructor: You can use email for an appointment in case your preferred timings are not the same as the above. |
| **Course Description**:Pre-requisites if any: COMP220 Software Engineering |
| **Course Objectives or** [**Student Learning Outcomes**](https://docs.google.com/document/d/1me9vpl8iKR_zNX9gIODm7gkVFY9VkuSKpUJe1VyI57M/edit) **(SLOs)***Upon completion of the course, the students shall be able to:*1. Describe the fundamental concepts of software quality assurance.
2. Define software quality requirements for sample projects
3. Apply and evaluate appropriate processes and tools to a software development project for quality assurance.
4. Understand the role of metrics in software quality assurance and apply these metrics to measure quality of various phases of software development lifecycle
5. Evaluate and implement a quality assurance plan to a development project
6. Apply various types of testing and review techniques.
7. Appreciate important standards related to SQA
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**Course Content, Learning Material & Activities Schedule**

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| **WEEK** | **TOPICS** | **ASSIGNMENT/ACTIVITY** |
| 1 | Overview and Basic Concepts: SDLC (traditional and agile), defining Quality, Process vs. Product Quality, SQA, QA vs. QC, errors, faults, failures, defect prevention, defect containment, defect reduction, Fault tolerance, Failure containment, Economics of quality | Assignment 1: Real life software failure |
| 2 | Standards and Models of Software Quality: Product vs. process based models, McCall, ISO/IEC 25000, ISO 9001, ISO/IEC/IEEE 12207, IEEE-730, ISO/IEC 29110, Specific standards for an application domain, CMMI. | Tutorial: Git Assignment 2: Git |
| 3 | Software Reviews:Personal review, desk check-type review, Reviews described in IEEE-1028 andCMMI for development model, The Walkthrough, The Inspection, The Project launch review, Agile meetings, Selection of a review typeSoftware Audit:Audit and problem resolution according toISO/IEC/IEEE 12207, Audit according to the CMMI-Dev model, Audit according to IEEE-1028, Corrective actions | case-study: Code Review |
| 4 | Verification and validation (V&V):Standards (IEEE-1012) and models which require or define V&V, Independent V&V, Traceability, V&V techniques, Checklists, The V&V plan, Testing,  Basic Definitions, Role of Test Specialist, Test types, Unit testing, Feature testing, Integration testing, Regression testing  | Case study: website validation |
| 5 | SQA and Test Documents:IEEE 829, Test cases, Test strategy, Test Plan, SQA Plan. | Assignment 2: Test documentation  |
| 6 | Measurement and MetricsThe importance of measurement, metrics, The measurement process of ISO/IEC/IEEE 12207, ISO/IEC/IEEE 15939 Measurement standard, Measurement in the CMMI-Dev model, The survey as a measurement tool, The implementation of a measurement program, Practical considerations |  |
| 7 | Black Box Test Strategies Separation into Equivalence Classes , Boundary Values Analysis , Cause-effect Graphs, State Transition Tests, Black Box Tests and Commercial Products (COTS) | Quiz 1 |
| 8 |
| 9 | White box testing strategies: Flow Graphs , Data Flow Based Testing, Mutation Testing | Quiz 2 |
| 10 | Risk management:Risk management according to standards ISO 12207, ISO 9001, and ISO 16326 andthe CMMI-Dev model, ISO/IEC/IEEE 16085 Risk Management standardSoftware quality assurance planFundamentals of Software Release Management |  |
| Assignment 3: SQA Plan |
| 11 | Software Configuration ManagementThe usefulness of software configuration management (SCM), SCM activities, IEEE-828 Configuration management standard, SCM library and branches, Configuration control, Configuration status accounting, Configuration audit, The implementation of SCM in a small organization, SCM policy |  |
| 12 | Software Reliability EngineeringIntro to DevOps tools and methodology | Guest speaker: DevOps |
| 13-14 | QA Tools and selection criteria | Hands-on activity |
| 15 | **Project Presentations** |  |

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### **Textbooks, Materials, Supplies, and other Resources**

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* *Jeff Tian: "Software Quality Engineering: Testing, Quality Assurance, and Quantifiable Improvement ", Wiley/IEEE press (recommended textbook)*
* *.D. Galin: “Software Quality Assurance: From Theory to Implementation”, Pearson Education.*
* *Linda Westfall : “The Certified Software Quality Engineer Handbook”*
* *William E. Lewis, "Software testing and Continuous Quality improvement", 3rd Edition, CRC Press.*
* *G. Gordon Schulmeyer: “Handbook of Software Quality Assurance”, Artech House.*
* *K. Naik and P. Tripathy: “Software Testing and Quality Assurance”, Wiley.*
* *Claude Y. Laporte, Alain April: “Software Quality Assurance”, Wiley/IEEE Press*
* *Dorothy Graham: “Experiences of Test Automation: Case Studies of Software Test Automation”*

**Course Requirements:**

**Class Activities 10%**

**Assignments:** 10%

**Quizzes:**  10%

**Midterm exam**: 20%

**Final term exam:**  35%

**Project 15%**

**TOTAL 100%**

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**Attendance Policy:**

-*75% attendance is mandatory.*

**Student Support Services**

[Student Counseling Services](https://www.fccollege.edu.pk/ccc/campus-counseling-center/). Students can contact the [Campus Counseling Center](https://www.fccollege.edu.pk/ccc/campus-counseling-center/) at 0331-444-1518 or email

 ccc@fccollege.edu.pk.

[Writing Center](https://www.fccollege.edu.pk/faculty-of-humanities/writing-center/)

[Mercy Health Center](https://www.fccollege.edu.pk/mercy-health-center/)

**Other Useful FCCU Policy Documents:**

[Sexual Harassment Policy](https://www.fccollege.edu.pk/wp-content/uploads/Doc1.pdf)

[Anti-Corruption Policy](https://www.fccollege.edu.pk/wp-content/uploads/Anti-corruption.pdf)

[Academic integrity](https://www.fccollege.edu.pk/policy-on-academic-integrity/)

[Plagiarism Policy](https://www.fccollege.edu.pk/wp-content/uploads/FCCU-Plagiarism-Policy.pdf)

 [Academic Calendar](https://www.fccollege.edu.pk/academic-calendar/)

**Additional Communication**:

1. Honor FCC Core Values:

*I expect that you will strictly follow the core values of FCCU and put your entire effort to learn as per the course requirements, attend classes, read the textbook(s)/other assigned reading material and do the assignments in the stipulated time period*

1. Clarify Expectations for Teacher Response to students, for example,:

Following the signature, in emails, you can add: *"I generally respond to emails between the hours of 9 AM and 9 PM. If I do not respond within 48 hours, feel free to send a follow-up email."*

Or you can also include something like this in the course outline: *"This class is available 24/7 but the instructor is not. I will respond to an email Monday through Friday (until 3 pm) unless it is a holiday or extenuating circumstances intervene. During the workweek, you can expect a response within 24 hours, and I expect the same courtesy from my students.*"