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| AIUB-Logo  American International University-Bangladesh (AIUB) | **AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH (AIUB)**  Faculty of Science and Technology (FST)  Department of Computer Science (CS)  Undergraduate Program |



I. Course Core and Title

**CSC 3114: Software Engineering**

II. Credit

**3 credit hours (2 hours of theory and 3 hours Lab per week)**

III. Nature

**Core Course for CSE**

IV. Prerequisite

**CSC 2210: Object Oriented System Analysis and   
 Design**

**V. Vision:**

Our vision is to be the preeminent Department of Computer Science through creating recognized professionals who will provide innovative solutions by leveraging contemporary research methods and development techniques of computing that is in line with the national and global context.

**VI. Mission:**

The mission of the Department of Computer Science of AIUB is to educate students in a student-centric dynamic learning environment; to provide advanced facilities for conducting innovative research and development to meet the challenges of the modern era of computing, and to motivate them towards a life-long learning process.

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| **COURSE PLAN** | **Summer 2021-2022** SEMESTER |



**VII - Course Description:**

* Comprehend introduction to the modern study of software engineering.
* Discuss the present software engineering practices.
* Discuss various process models used software engineering
* Describe requirements engineering and design process.
* Comprehend the technologies used in coding and testing.
* Discuss the software project management and planning

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**VIII – Course outcomes (CO) Matrix:**

By the end of this course, students should be able to:

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| **COs** \* | **Description** | **Level of Domain**\*\* | | | | **PO  Assessed**\*\*\* | |
| C | P | A | S |
| CO1 | *Analyze* the impact of software engineering models over various context of software development to assess societal, health, safety, legal and cultural issues. |  | 4 |  | CT | PO-f-1 | |
| CO2 | *Explain* appropriate software engineering model, project management roles and their skills in the context of professional engineering practice and solutions to complex engineering problems in a software development environment. |  | 5 |  | CT | PO-f-2 | |
| *C: Cognitive; P: Psychomotor; A: Affective; S: Soft-skills (CT: Critical Thinking, TS: Teamwork)*  *\* CO assessment method and rubric of COs assessment is provided in Appendix section \*\* The numbers under the ‘Level of Domain’ columns represent the level of Bloom’s Taxonomy each CO corresponds to.*  *\*\*\* The numbers under the ‘PO Assessed’ column represent the PO each CO corresponds to.* | | | | | | |

**IX – Topics to be covered in the class:**

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| **TOPICS** | **Learning Objective(s)** | **Time Frame** | **Suggested Activities** | **Teaching Strategy(s)** | **CO mapped** |
| Introduction to Software Engineering - Software & Software Engineering | Knowing Mission & Vision of AIUB and course outline  Understand various building blocks of software and engineering | Week 1 | Lecture: necessary explanation of the software and software engineering | Lecture notes, reallife examples, question-answer |  |
| Traditional Software Development Process Models | Understanding the different traditional process models in software engineering | Week 2 | Lecture: necessary explanation on phases of traditional process models | Lecture notes, reallife examples, question-answer | CO1 CO2 |
| Agile Development | Understand and appreciate the concepts of Agile methods in software engineering practice | Week 2 | Lecture: necessary explanation on principles of agile development | Lecture notes, reallife examples, question-answer | CO1 CO2 |
| Extreme Programming (XP) | Understand the values, phases, roles, and practices of XP in software engineering | Week 3 | Lecture: necessary explanation on XP process in software development | Lecture notes, reallife examples, question-answer | CO1 CO2 |
| SCRUM | Understand the phases, roles, and practices of SCRUM in software engineering | Week 3 and 4 | Lecture: necessary explanation on SCRUM process in software development | Lecture notes, reallife examples, question-answer | CO1 CO2 |
| Dynamic System Development Method (DSDM) | Understand the phases, roles, and practices of DSDM in software engineering | Week 4 and 5 | Lecture: necessary explanation on DSDM process in software development | Lecture notes, reallife examples, question-answer | CO1 CO2 |
| Feature Dirven Development (FDD) | Understand the process, roles and, practices of FDD in software engineering | Week 5 | Lecture: necessary explanation on FDD process in software development | Lecture notes, reallife examples, question-answer | CO1 CO2 |
| Requirements  Engineering | Understand the engineering process of requirements elicitation, analysis, modelling elements, specification and validation methods | Week 6 | Lecture: necessary explanation on the requirements engineering processes | Lecture notes, reallife examples, question-answer |  |
| Midterm Exam Week  Week 7 | | | | | |
| Design Concepts and User Interface Design | Understand various principles of software and user interface design | Week 8 | Lecture: necessary explanation on design principles of software and user interface | Lecture notes, reallife examples, question-answer |  |
| Testing Strategies | Understand various testing techniques and debugging strategies | Week 9 | Lecture: necessary explanation on testing techniques and debugging | Lecture notes, reallife examples, question-answer |  |
| Software Quality Attributes | Understand various quality attributes and their inter relations, trade-offs in software operations | Week 10 | Lecture: necessary explanation on software quality attributes | Lecture notes, reallife examples, question-answer |  |
| Product Metrics | Understand various Software Metrics and their usage | Week 11 | Lecture: necessary explanation on software product metrics | Lecture notes, reallife examples, question-answer |  |
| Software Configuration Management | Understand Software Configuration Management principles and version controlling | Week 12 | Lecture: necessary explanation on software configuration management | Lecture notes, reallife examples, question-answer |  |
| Estimation for Software Projects | Understand various  conventional software project estimation techniques | Week 13 | Lecture: necessary explanation on software effort estimation | Lecture notes, reallife examples, question-answer |  |
| Project Scheduling | Understand various conventional software project scheduling techniques | Week 13 | Lecture: necessary explanation on software project scheduling | Lecture notes, reallife examples, question-answer |  |
| Risk Management | Understand various Risk management strategy | Week 13 | Lecture: necessary explanation on risk management in project development | Lecture notes, reallife examples, question-answer |  |
| Final term Exam Week  Week 14 | | | | | |

\* The faculty reserves the right to change, amend, add or delete any of the contents.

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**XI- Course Requirements**

1. **Student Attendance**

All students are expected to attend all scheduled classes as well as counselling, and to read all assigned chapters/materials before coming to class. At least 80% class attendance is mandatory to pass the course. If there is any assignment given to the students, they have to submit it before the deadline decided by the course teacher

1. **Class Participation & Peer Evaluation**   
   Students are expected to participate actively in the class. Your contribution towards your team will be counted too.
2. **Quiz & Exam**

For both terms, there will be at least 2 quizzes based on the theoretical knowledge and conceptual understanding of the topic covered discussed in the classes.

1. **Lab Assignment/Projects**

Submit report based on the given software engineering related problems in the lab. Assignment report should be presented by the dateline assigned.

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**XII – Evaluation & Grading System**

The following grading system will be strictly followed in this class

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**Mid Term Exam:**Term Exam: 40%  
Quizzes: 30%  
Attendance & Performance: 10%

Lab Evaluation: 20%

**Final Term Exam:**Term Exam: 40%  
Quizzes: 30%  
Attendance & Performance: 10%

Lab Evaluation: 20%

**Semester grade:** 40% midterm + 60% final term

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| **Letter** | **Grade Point** | **Numerical %** |
| A+ | 4.00 | 90-100 |
| A | 3.75 | 85 - < 90 |
| B+ | 3.50 | 80 - < 85 |
| B | 3.25 | 75 - < 80 |
| C+ | 3.00 | 70 - < 75 |
| C | 2.75 | 65 - < 70 |
| D+ | 2.50 | 60 - < 65 |
| D | 2.25 | 50 - < 60 |
| F | 0.00 | < 50 |
| I |  | Incomplete |
| W |  | Withdrawal |
| UW |  | Unofficially Withdrawal |

The evaluation system will be strictly followed as par the AIUB grading policy.

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**XIII – Teaching Methods**

Maximum topics will be covered from the textbook. For the rest of the topics, reference books will be followed. Some Class notes will be uploaded on the web. White board will be used for most of the time. For some cases, multimedia projector will be used for the convenience of the students. Students must study up to the last lecture before coming to the class and it is suggested that they should go through the relevant chapter before coming to the class. Just being present in the class is not enough- students must participate in classroom discussions.

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**XIV – Textbook/ References**

1. Software Engineering: A Practitioner’s Approach, Seventh Edition, Roger S. Pressman
2. Software Engineering, Sommereville
3. An Integrated Approach to Software Engineering, Pankaj Jalote
4. Object Oriented Software Engineering, Ivar Jacobson, Magnus Christerson, Patrik Jonsson, Gunnar Overgaard
5. Systems Analysis and Design: An Object-Oriented Approach with UML, 5th Edition, Alan Dennis
6. The Art of Computer Programming, The, Volumes 1-3 Boxed Set (2nd Edition), Donald E. Knuth
7. Component Software: Beyond Object-Oriented Programming, Clemens Szyperski
8. Practices of an Agile Developer: Working in the Real World, Venkat Subramaniam, Andy Hunt
9. Code Complete: A Practical Handbook of Software Construction, Steve McConnell
10. Lectures will be provided online at the course website weekly.



**XV - List of Faculties Teaching the Course**

DR. M. MAHMUDUL HASAN

DR. SM HASAN MAHMUD

FARZANA BENTE ALAM



**XVI – Verification:**

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| **Prepared by :**  ---------------------------------  **Dr. M. Mahmudul Hasan**  *Course Convener*  Date:......................................... | **Moderated by :**  ---------------------------------  **Dr. M. Mahmudul Hasan**  *Point Of Contact*  *OBE Implementation Committee for CS*  Date:......................................... | |
| **Checked by:**  ....................................................  **Dr Md Abdullah Al Jubair**  *Head*,  *Department of Computer Science*  Date:.......................................... | **Certified by:**  .........................................................  **Dr. Dip Nandi**  *Director*,  *Faculty of Science & Information Technology*  Date:............................................... | **Approved by:**  .........................................................  **Mr. Mashiour Rahman**  *Associate Dean*,  *Faculty of Science & Information Technology*  Date:............................................... |

**APPENDIX**

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| **Table 1: Knowledge Profile (WK / K)** | | |
| **Curriculum** | | |
| **Indicator** | | **Attribute** |
| **K1** | Theory based natural science | A systematic, theory-based understanding of the natural sciences applicable to the discipline |
| **K2** | Conceptual based mathematics | Conceptually based mathematics, numerical analysis, statistics and the formal aspects of computer and information science to support analysis and modeling applicable to the discipline |
| **K3** | Theory based engineering fundamentals | A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline |
| **K4** | Forefront specialist knowledge for practice | Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline |
| **K5** | Engineering Design | Knowledge that supports engineering design in a practice area |
| **K6** | Engineering Practice (Technology) | Knowledge of engineering practice (technology) in the practice areas in the engineering discipline |
| **K7** | Comprehension of engineering in society | Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the engineer’s professional responsibility to public safety; the impacts of engineering activity; economic, social, cultural, environmental and sustainability |
| **K8** | Research Literature | Engagement with selected knowledge in the research literature of the discipline |

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| **Table 2: Range of Complex Engineering Problem Solving (WP / P)** | | |
| **Complex Engineering Problems have characteristic P1 and some or all of P2 to P7** | | |
| **Indicator** | **Title** | **Description** |
| **P1** | Depth of knowledge required | Cannot be resolved without in-depth engineering knowledge at the level of one or more of K3, K4, K5, K6 or K8 which allows a fundamentals-based, first principles analytical approach |
| **P2** | Range of conflicting requirements | Involve wide-ranging or conflicting technical, engineering and other issues |
| **P3** | Depth of analysis required | Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models |
| **P4** | Familiarity of issues | Involve infrequently encountered issues |
| **P5** | Extent of applicable codes | Are outside problems encompassed by standards and codes of practice for professional engineering |
| **P6** | Extent of stakeholder involvement and conflicting requirements | Involve diverse groups of stakeholders with widely varying needs |
| **P7** | Interdependence | Are high level problems including many component parts or sub-problems |

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| **Table 3: Range of Complex Engineering Activities (A)** | | |
| **Complex activities means (engineering) activities or projects that have some or all of the following characteristics** | | |
| **Indicator** | **Title** | **Description** |
| **A1** | Range of resources | Involve the use of diverse resources (and for this purpose resources include people, money, equipment, materials, information and technologies) |
| **A2** | Level of interaction | Require resolution of significant problems arising from interactions between wide-ranging or conflicting technical, engineering or other issues |
| **A3** | Innovation | Involve creative use of engineering principles and research-based knowledge in novel ways |
| **A4** | Consequences for society and the environment | Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation |
| **A5** | Familiarity | Can extend beyond previous experiences by applying principles-based approaches |

**Mapping of PO/PLO and K, P, A of this course:**

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| --- | --- | --- | --- | --- | --- |
| **PO-f: The Engineer and Society**  Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the  consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems (K7) | | | | | |
| PO Indicator ID | PO Indicators Definition (As per the requirement of WKs) | Domain | K | P | A |
| PO-f-1 | Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues in relation to professional engineering practice and solution. | Psychomotor  Level 4 (Analyze) | K7  Comprehension of engineering in society | P1, P4, P5 | A1, A3,  A4 |
| PO-f-2 | Assess the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems. | Psychomotor  Level 5 (Evaluate) | K7  Comprehension of engineering in society | P1, P6 | A2, A3,  A5 |

## **Mapping of CO - Assessment Method and Rubric**

The mapping between Course Outcome(s) (COs) and The Selected Assessment method(s) and the mapping between Assessment method(s) and Evaluation Rubric(s) is shown below:

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| --- | --- | --- | --- | --- | --- |
| COs | Description | POs | Learning Domain | Assessment Method | Assessment Rubric |
| CO1 | *Analyze* the impact of software engineering models over various context of software development to assess societal, health, safety, legal and cultural issues. | F-1 | Psychomotor | Project | Rubric for Project |
| CO2 | *Explain* appropriate software engineering model, project management roles and their skills in the context of professional engineering practice and solutions to complex engineering problems in a software development environment. | F-2 | Psychomotor | Project | Rubric for Project |

## **Rubric for Project Assessment (CO1)**

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| --- | --- | --- | --- | --- | --- |
| Marking Criteria | Marks Distribution (Maximum 3X5=15) | | | | Acquired Marks |
| **Inadequate (1-2)** | **Satisfactory (3)** | **Good (4)** | **Excellent (5)** |
|  |  |  |  |  |  |
| Background  Analysis | No background information regarding the project is  given; project goals and benefits are  missing. | Insufficient background information is given; project goals and benefits are  poorly stated | Sufficient background information is given; the purpose and goals of the project are explained. | Thorough and relevant background information  is given; project goals are clear and easy to identify. |  |
| Analysis the impact of societal, health, safety, legal and cultural issues | Student vaguely discuss the impact of societal, health, safety, legal and cultural issues in their project | Student provided with partial relevance to the impact of societal, health, safety, legal and cultural issues in their project | Student fairly provided the analysis to the impact of societal, health, safety, legal and cultural issues in their project | Student comprehensively provided the analysis to the impact of societal, health, safety, legal and cultural issues in their project |  |
| Existing Studies and Relevant Example | Ambiguous representative example. | Partially identify / indicate towards real-life example. | Real-life example is fairly connected towards the definition. | Comprehensively defend with real life example. |  |
| Acquired Marks: | | | | |  |
| CO Pass / Fail: | | | | |  |

## **Rubric for Project Assessment (CO2)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Criteria | Marks distribution (Max 3X5= 15) | | | | Acquired  Marks |
| **Inadequate (1-2)** | **Satisfactory (3)** | **Good (4)** | **Excellent (5)** |
| Argumentation of Model selection with Evidence of Argumentation | Does not articulate a position or argument of choosing appropriate model. Does not present any evidence to support the arguments for the choice of the model | Articulates a position or argument for choosing models that is unfocused or ambiguous. Presents incomplete/vague evidence to support argument for model choice | Articulates a position or argument of choosing models that is limited in scope. Does not present enough evidence to support the argument for the choice of the model | Clearly articulates a position or argument for the choosing software engineering models. Presents sufficient amount of evidence to support argument for the model selection |  |
| Role identification and Responsibility Allocation | The project has poor project management plans for identifying roles and assigning the responsibilities | Identify few roles in the project management where some of the roles are left alone with any project responsibilities | Identify most of the roles in the project management and assign their responsibilities | Well planned project with proper role identification and responsibility allocation in the project management activities |  |
| Submission, Completeness, Spelling, grammar and Organization of the Project report | Project report is not complete and Several errors in spelling and grammar. Present a Confusing organization of concepts, supporting  arguments, and  real-life example.  Sentences rambling, and details are repeated. | Some errors in spelling and grammar. Some problems  of organizing the answer in a logical order of defining,  elaborating, and providing real-life examples. | Few errors in spelling and grammar. Presents most of the details in a logical flow of  organization in  definition,  details, and  example. | Project report is complete and No errors in spelling and grammar. Consistently  presents a logical  and effective  organization of definition,  details, and real-life example of  the topic. |  |
| Acquired marks: | | | | |  |
| CO Pass / Fail: | | | | |  |