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| A picture containing diagram  Description automatically generated | **AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH (AIUB)**  Faculty of Science and Technology (FST)  Department of Computer Science (CS)  Undergraduate Program |

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| **COURSE PLAN** | **SEMESTER: Summer23-24** |
| **I. Course Core and Title**  CSC 3112 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 | 1. **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.   1. **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. |

## **VII - Course Description**

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

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

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

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| **COs** \* | **Description** | **Domain  Level** \*\*\* | | | **PO  Assessed** \*\*\*\* |
| C | P | A |
| CO1 | **Explain** the impact of software engineering over various context of software development to assess societal, health, safety, legal and cultural issues |  |  | 3 | PO-f-1 |
| CO2 | **Explain**various software engineering principles in solving problems over various context of software development environment |  |  | 3 | PO-f-1 |
| CO3 \*\* | **Select**appropriate software engineering models, project management roles and their associated skills for the complex software engineering project and evaluate the sustainability of developed software, taking into consideration the societal and environmental aspects | 5 |  |  | PO-g-1 |
| CO4  \*\* | **Develop** project management plan to manage software engineering projects following the principles of engineering management and economic decision process |  | 4 |  | PO-k-1 |
| *C: Cognitive; P: Psychomotor; A: Affective Domain*  *\* CO assessment method and rubric of COs assessment is provided in later section*  *\*\* COs will be mapped with the Program Outcomes (POs) for PO attainment \*\*\* The numbers under the ‘Level of Domain’ columns represent the level of Bloom’s Taxonomy each   CO corresponds to.*  *\*\*\*\* The numbers under ‘PO Assessed’ column represent the POs each CO corresponds to.* | | | | | |

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

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| **Time Frame** | **CO**  **Mapped** | **Topics** | **Teaching**  **Activities** | **Assessment Strategy(s)** |
| Week 1 | CO1, CO2 | Introduction to Software Engineering - Software & Software Engineering | Lecture, Question-answer, Lab Practice | Quiz, Term Exam, Project |
| Week 2 | CO1, CO2 | Traditional Software Development Process Models | Lecture, Question-answer, Lab Practice | Quiz, Term Exam, Project |
| Week 3 | CO1, CO2  CO3 | Agile Methodologies of Software Development | Lecture, Question-answer, Lab Practice | Quiz, Term Exam, Project |
| Week 4 | CO1, CO2  CO3 | Extreme Programming (XP), SCRUM Practices in Software Development | Lecture, Question-answer, Lab Practice | Quiz, Term Exam, Project |
| Week 5 | CO1, CO2  CO3 | DSDM Practices in Software Development Environment | Lecture, Question-answer, Lab Practice | Quiz, Term Exam, Project |
| Week 6 | CO1, CO4 | FDD Practices in Software Development Environment | Lecture, Question-answer, Lab Practice | Quiz, Term Exam, Project |
| Week 7 | CO1, CO4 | Fundamentals of Requirements Engineering in Software Development | Lecture, Question-answer, Lab Practice | Quiz, Term Exam, Project |
| Midterm (Week 8) | | | | |
| Week 9 | CO1, CO4 | Software Quality Attributes in Software Development | Lecture, Question-answer, Lab Practice | Quiz, Term Exam, Project |
| Week 10 | CO1, CO4 | Software Design Concepts and User Interface Design | Lecture, Question-answer, Lab Practice | Quiz, Term Exam, Project |
| Week 11 | CO1, CO4 | Testing strategies in Software Testing Activities | Lecture, Question-answer, Lab Practice | Quiz, Term Exam, Project |
| Week 12 | CO1, CO4 | Software Configuration Management & Software Product Matrix | Lecture, Question-answer, Lab Practice | Quiz, Term Exam, Project |
| Week 13 | CO1, CO4 | Estimation and Resource Allocation | Lecture, Question-answer, Lab Practice | Quiz, Term Exam, Project |
| Week 14 | CO1, CO4 | Risk Analysis for Software Project Development | Lecture, Question-answer, Lab Practice | Quiz, Term Exam, Project |
| Week 15 | CO1, CO4 | Project Scheduling in Software Development | Lecture, Question-answer, Lab Practice | Quiz, Term Exam, Project |
| Final term (Week 16) | | | | |
| Makeup Evaluation (Week 17) | | | | |

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

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

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| PO Indicator ID | PO Indicators Definition (As per the requirement of WKs) | Domain | K | P | A |
| PO-f-1 | Accepts and recognize the role of engineering in society, health, safety, legal and culture. | Affective Level 3 (Valuing) |  |  |  |
| PO-f-2 | Design solution for complex engineering problem in accordance with professional practices | Cognitive Level 5 (Evaluating) | K7 | P1 P3 P7 |  |
| PO-k-1 | Apply engineering management principles and economic decision making to solve engineering projects as a team | Psychomotor Level 4  (Articulation) |  |  |  |
| PO-g-1 | Evaluate sustainability of complex engineering problems considering society and environment. | Cognitive Level 5  (Evaluating) | K7 | P1  P2  P6 |  |

## **XI – K, P, A Definitions**

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| **Indicator** | **Title** | **Description** |
| 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 |
| 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 |
| 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 |

## **XII – 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** | **Mapped Pos** | **Assessment Method** | **Assessment Rubric** |
| CO1 | *Explain* the impact of software engineering over various context of software development to assess societal, health, safety, legal and cultural issues | PO-f-1 | Project | Rubric for Project |
| CO2 | *Explain* various software engineering principles in solving problems over various context of software development environment | PO-f-1 | Project | Rubric Quiz/Exam |
| CO3 | *Select* appropriate software engineering models, project management roles and their associated skills for the complex software engineering project and evaluate the sustainability of developed software, taking into consideration the societal and environmental aspects | PO-g-1 | Project | Rubric for Project |
| CO4 | *Develop* project management plan to manage software engineering projects following the principles of engineering management and economic decision process | PO-k-1 | Project | Rubric for Project/Quiz/ Term Exam |

**XIII – Evaluation and Assessment Criteria**

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| **CO1: Explain the impact of software engineering over various context of software development to assess societal, health, safety, legal and cultural issues** | | | | |
| **Assessment Criteria** | **Missing/Incorrect (0)** | **Inadequate  (1-2)** | **Satisfactory (3)** | **Excellent (4-5)** |
| **Problem Analysis** | Problem is not analyzed using state‐of‐the-art resources, and technologies to produce an explanation of a software engineering project problem. | Analyze the problem with few uses of state‐of‐the-art resources, and technologies to produce an explanation of a software engineering project problem. | Discuss the problem analysis with moderate uses of state‐of‐the-art resources, and technologies to produce an explanation of a software engineering project problem. | Discuss the problem analysis with best uses of state‐of‐the-art resources, and technologies to produce an explanation of a software engineering project problem. |
| **Socio-cultural Impact** | Analysis of the impact of the software product in societal, health, safety, legal and cultural and Environmental issues has not been addressed in the project | Poorly analyzed of the software product in societal, health, safety, legal, cultural, or environmental issues in the project | Provided analysis of the impact of the software product in societal, health, safety, legal and cultural issues in the project properly. | Analysis of the impact of the software product in societal, health, safety, legal and cultural issues in the project was done in details and excellent way. |
| **Related Solutions and Studies** | Have not provided the existing software product/research within the problem area (other’s work) including studies of previous works, their findings, and how to fill the gap from the provided solutions. | Offers a partially developed solution in a limited or superficial way, with inconsistencies or evidence of previous works conducted has not been provided. | Delivers a clear and workable solution, shows comparison of previous works and propose solution addressing previous work studies in the domain, and solve the gap among the solutions. | Excellently demonstrate the project idea, discuss the existing software product/research within the problem area (other’s work) including studies of previous works, their findings, and how to fill the gap from the provided solutions. |

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| **CO2:** *Explain* various software engineering principles in solving problems over various context of software development environment | | | | |
| **Assessment Criteria** | **Missing/Incorrect (0)** | **Inadequate  (1-2)** | **Satisfactory (3)** | **Excellent (4-5)** |
| **Content Knowledge** | The knowledge of the problem is not demonstrated and unable to explain already established practices and principles in solving real life problems. | The knowledge of the problem is vaguely demonstrated and basic explanation to already established practices and principles in solving real life problems. | The knowledge of the problem is moderately demonstrated and sufficient explanation to already established practices and principles in solving real life problems. | The knowledge of the problem is clearly demonstrated and best explanation to already established practices and principles in solving real life problems. |
| **Selection and Argumentation** | Does not articulate a position or argument for the choosing the correct practice and principles of software engineering. | Articulates a position or argument for the choosing the correct practice and principles of software engineering poorly or with inadequate evidence | Articulates a position or argument for the choosing the correct practice and principles of software engineering properly. | Articulates a position or argument for choosing the correct practice and principles of software engineering with enough evidence or arguments. |

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| **CO3:** *Select* appropriate software engineering models, project management roles and their associated skills for the complex software engineering project and evaluate the sustainability of developed software, taking into consideration the societal and environmental aspects | | | | | |
| **Assessment Criteria** | **Missing/Incorrect (0)** | **Inadequate  (1-2)** | **Satisfactory (3-4)** | **Excellent (5)** |
| **Selection of Software Engineering Models** | 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 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 |
| **Impact identification** | Student vaguely discuss the impact of societal, health, safety, legal, cultural, or environmental issues in their project | Student provided with partial relevance to the impact of societal, health, safety, legal, cultural, or environmental issues in their project | Student fairly provided the analysis to the impact of societal, health, safety, legal, cultural, or environmental issues in their project | Student comprehensively provided the analysis to the impact of societal, health, safety, legal, cultural, or environmental issues in their project |
| **Formatting and Submission** | 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. |

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| **CO4:** *Develop* project management plan to manage software engineering projects following the principles of engineering management and economic decision process | | | | | |
| **Assessment Criteria** | **Missing/Incorrect (0)** | **Inadequate  (1-2)** | **Satisfactory (3-4)** | **Excellent (5)** |
| **Project WBS and Testcases** | Missing or incorrect WBS or testcases based on proposed project requirements | WBS (project task list) or testcases for the proposed project stated poorly. | WBS (project task list) and testcases for the proposed project stated properly. | Thorough and relevant WBS (project task list) and testcases for the proposed project stated poorly. |
| **Effort Estimation and Scheduling** | Missing or incorrect effort estimation or schedules based on available project resources | Insufficient or poorly stated effort estimation or schedules based on available project resources | Correct or sufficient technique used for effort estimation or schedules based on available project resources | Project estimation was described using proper effort estimation or schedules based on available project resources |
| **Risk Management** | Risk analysis activities were missing or inappropriate for the specific project: unidentified risks or wrongly categorized risks or not prioritized properly. | Risks are partially identified(insufficient) and not properly categorized or not prioritized properly. | Sufficient and critical risks are identified(insufficient) and properly categorized but not prioritized properly. | Sufficient and appropiate risks are identified, analyzed, and properly categorized or prioritized. |

## **XIV- Course Requirements**

* Students are expected to attend at least 80% of the class.
* Students are expected to participate actively in the class.
* 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.
* Submit report based on the given course related problems.
* Submission of assignments and projects should be in due time.

## **XV – Evaluation & Grading System\***

The following grading system will be strictly followed in this course.

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| **Mid-term** | **Final term** |
| Term Exam: 40%  Quizzes: 30%  Attendance & Performance: 10%  Lab Evaluation: 20% | Term Exam: 40%  Quizzes: 30%  Attendance & Performance: 10%  Lab Evaluation: 20% |
| **Total Midterm Marks: 40%** | **Total Final term marks: 60%** |
| **Grand Total: 100 Marks** | |

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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 with the AIUB grading policy.*

*\* CO attainment will be achieved with 60% of the evaluation marks.*

## **XVI – Textbook/ References**

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

## **XVII - List of Faculties Teaching the Course**

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| **FACULTY NAME** | **SIGNATURE** |
| DR. KAMRUDDIN NUR |  |
| MS. SAEEDA SHARMEEN |  |
| FARZANA BENTE ALAM |  |
| TONNY SHEKHA KAR |  |
| MD. MASUM BILLAH |  |
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## **XVIII – Verification**

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| **Prepared by:**  ---------------------------------  **Farzana Bente Alam**  *Course Convener*  Date:......................................... | **Moderated by:**  ---------------------------------  **Dr. M. Mahmudul Hasan**  *Point Of Contact*  *OBE Implementation Committee*  Date:......................................... | **Checked by:**  ---------------------------------  **Dr. Akinul Islam Joney**  *Head (Undergraduate Program) Department of Computer Science*  Date:......................................... |
| **Verified by:**  ....................................................  **Dr. Md. Abdullah-Al-Jubair**  *Director*  *Faculty of Science & Information Technology*  Date:.......................................... | **Certified by:**  .....................................................  **Prof. Dr. Dip Nandi**  *Associate Dean*,  *Faculty of Science & Information Technology*  Date:............................................ | **Approved by:**  .........................................................  **Mr. Mashiour Rahman**  *Dean*,  *Faculty of Science & Information Technology*  Date:............................................... |