AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH (AIUB)

Faculty of Science and Technology (FST)
Department of Computer Science (CS)
Undergraduate Program

COURSE PLAN	SEMESTER: Fall 2023-2024
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	**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.

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:

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: *

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:

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

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:

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

CO1: *Explain* the impact of software engineering over various context of software development to assess societal, health, safety, legal and cultural issues

Assessment Criteria	Not Attended/ Incorrect (0)	Inadequate (1-2)	Average (3)	Good (4)	Excellent (5)
Evaluation Criteria	**Evaluation Definition**				
Problem Analysis	Background information of the problem area. Clearly state what is the real problem in the context of societal, health, safety, legal and cultural issues and why this problem is important to consider?				
Socio-cultural Impact	Provided an analysis of the impact of the software product in societal, health, safety, legal and cultural issues in the project				
Related Solutions and Studies	Demonstrate the novelty of the project idea, discuss the existing software product/research within the problem area (other's work). Who else have studied this problem? And what were their findings? How these studies related to the problem domain? What is the gap still existing to consider?				

CO2: *Explain* various software engineering principles in solving problems over various context of software development environment

Assessment Criteria	Not Attended/ Incorrect (0)	Inadequate (1-2)	Average (3)	Good (4)	Excellent (5)
Evaluation Criteria	**Evaluation Definition**				
Content knowledge	Demonstrates full knowledge of the software engineering practice and principles				
Selection and Argumentation	Articulates a position or argument for the choosing the correct practice and principles of software engineering				

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	Not Attended/ Incorrect (0)	Inadequate (1-2)	Average (3)	Good (4)	Excellent (5)
Evaluation Criteria	**Evaluation Definition**				
Selection of Software Engineering Models	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	Plan project with proper role identification and responsibility allocation in the software engineering project management activities				
Impact identification	Evaluate the sustainability of the developed software in terms of both society and the environment				

Formatting and Submission	Project report should be submitted within deadline following the appropriate structure, style, font, alignment, grammar, spelling, etc.

CO4: *Develop* project management plan to manage software engineering projects following the principles of engineering management and economic decision process					
Assessment Criteria	**Not Attended/ Incorrect (0)**	**Inadequate (1-2)**	**Average (3)**	**Good (4)**	**Excellent (5)**
Evaluation Criteria	**Evaluation Definition**				
Project Planning	Develop the project plan, its components of the proposed software products				
Effort Estimation and Scheduling	Identify all the activities/tasks related to project management and categorize them within the WBS structure. Perform detailed effort estimation correspond with the WBS and schedule the activities with resources				
Risk Management	Identify all the potential risks in your project and prioritize them to overcome these risk factors.				

Rubric for Project Assessment (CO3)

Criteria	Marks distribution (Max 4X5= 20)				Acquired Marks
	Missing/ Incorrect (0-1)	Inadequate (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.	
				Acquired marks:	
				CO Pass / Fail:	

Rubric for Project Assessment (CO4)

Marking Criteria	Marks Distribution (Maximum 3X5=15)				Acquired Marks
	Missing/ Incorrect (0-1)	Inadequate (2)	Satisfactory (3-4)	Excellent (5)	
Project Planning	Missing or incorrect project plan;	Insufficient project plan provided: project team, project tasks, goals etc. stated poorly.	Sufficient information provided : project team members, their tasks, project plan discussed in details.	Thorough and relevant project plan is provided; project plan is clear and easy to follow.	
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.	
				Acquired Marks:	
				CO Pass / Fail:	

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.

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	

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

FACULTY NAME	SIGNATURE
DR. KAMRUDDIN NUR	
DR. RAJARSHI ROY CHOWDHURY	
FARZANA BENTE ALAM	
TONNY SHEKHA KAR	

XVIII – Verification

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:.....