

American International University-Bangladesh (AIUB)  
**Department of Computer Science  
Faculty of Science & Technology (FST)**

**PROJECT TITLE**

A Software Engineering Project Submitted

By

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| **Semester: Summer 24-25** | | **Section:** | **Group Number:** | |
| SN | Student Name | Student ID | Contribution (CO3+CO4) | Individual Marks |
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The project will be evaluated for the following Course Outcomes



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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** | Total Marks | |
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| Appropriate Process Model Selection and Argumentation with Evidence | [5 Marks] |  |
| Evidence of Argumentation Regarding Process Model Selection | [5Marks] |  |
| Analysis of the impact of societal, health, safety, legal, and cultural issues | [5Marks] |  |
| Submission, Defense, Completeness, Spelling, grammar, and Organization of the Project report | [5Marks] |  |
| **CO4: *Develop* a project management plan to manage software engineering projects following the principles of engineering management and economic decision process** | Total Marks | |
|  | |
| Develop the project plan, its components of the proposed software products | [5Marks] |  |
| 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 | [5Marks] |  |
| Identify all the potential risks in your project and prioritize them to overcome these risk factors. | [5Marks] |  |
| **CO5:** **Perform as an effective team member or leader in diverse team settings and solve multi-disciplinary problems in the computer science and engineering domain** | Total Marks | |
|  | |
| Taking project responsibility: perform assigned tasks on time independently | [5Marks] |  |
| Contribution to project group meetings, sharing fruitful ideas | [5Marks] |  |
| Positive attitude towards group work, collaboration, compromise, helping others to understand their project work responsibility | [5Marks] |  |
| Showing respect and value towards other team member's opinion | [5Marks] |  |



# PROJECT PROPOSAL

## Background to the Problem

* Write the background description that helps to show your project into the right context of a problem domain and gives everyone involved a common view of the project.

## Solution to the Problem and Process Model Selection

* Describe what your project scopes and features are.
* Create a user story table and add the user story table here.
* Add the User Story Board that you made using Trello.
* What are the existing software solutions that are available to solve mentioned problem?
* Select one software development process model from the models taught in the course that best suits your project.
* Provide an analysis of the project environment, including the nature of requirements and whether they are stable or likely to change.
* Explain how the selected model supports your team size, communication and coordination of tasks. Is the solution feasible to meet the business objective?
* Evaluate how flexible the model is in adapting to changes in scope, technology, or user requirements.
* Provide deep insight that demonstrate and preset a creative solution to the real‐life problem.
* Describe the target group of users of your solution? And how will they benefit from your proposed solution to the problem?
* Describe the contribution of your project to the development of scientific results that are identified and well documented.
* Presents enough evidence to support argument for your model selection in developing your proposed solution.
* Discuss how the process model manages project risks and uncertainties at different stages.
* Relate the process model to the project schedule, showing how it supports timely delivery and meeting deadlines.
* Lastly, present a justification that explains clearly why the chosen model is more suitable than other alternatives.

# 1.3 Project Role Identification and Responsibilities

* Identify the main roles involved in the project, covering both development and management aspects.
* Describe the responsibility of each role in key stages such as requirements gathering, design, implementation, testing and deployment.
* Specify which roles are responsible for decision making, quality assurance and resource management.
* Explain how responsibilities are distributed among the team members and justify the allocation based on skills and expertise.

## 2. SOFTWARE REQUIREMENTS SPECIFICATIONS (SRS) / PRODUCT REQUIREMENTS DOCUMENT (PRD)

## 2.1 Functional Requirements

* Provide a clear description of the major functionalities your system will perform.
* List down the core services, operations and features that users will be able to use.
* Explain how each function supports the overall objectives of the project.
* Describe workflows that represent how a user will complete a specific task through the system.
* Represent requirements using user stories or use case style descriptions, where appropriate.
* Define acceptance criteria that determine when a functional requirement is successfully implemented.

## 2.2 Non-Functional Requirements

* Identify the quality attributes that the system should satisfy in addition to its functional behaviour.
* **Performance**: What response times, processing capacity, or efficiency levels are expected?
* **Reliability**: How will the system ensure stable and uninterrupted service?
* **Integrity/Security**: What protections will safeguard data, authentication, authorization, and privacy?
* **Usability**: What level of ease of use, accessibility, and user experience should be maintained?
* **Maintainability**: How will the system support future modifications, bug fixes, or upgrades?
* **Scalability**: How should the system grow to support more users, data, or extended features?

# 3. PROJECT ESTIMATION AND SCHEDULING

## 3.1 Effort and Cost Estimation

* Define the scope of the project clearly before estimation.
* Apply **Lines of Code (LOC)** estimation by predicting the size of the system and converting it into effort using productivity rates.
* Apply the **COCOMO model** by selecting the appropriate project mode and calculating effort, development time, and staffing.
* Present results from all three estimation methods to show effort in person-hours or person-months.
* Mention assumptions and possible variation in results, since estimation always involves some level of uncertainty.

## 3.2 Project Scheduling

* Break the project into smaller tasks, show how the tasks are connected, and assign responsibilities.
* Allocate effort across phases such as analysis/design, coding, and testing (for example, using the 40–20–40 guideline).
* Develop a schedule with milestones and deadlines, represented in a timeline or Gantt chart.
* Include major deliverables tied to milestones and ensure outputs are clearly defined.
* Track progress through regular meetings, milestone reviews, and schedule checks.
* Use **Earned Value Analysis (EVA)** with measures such as Planned Value (BCWS), Earned Value (BCWP), Actual Cost (ACWP), Schedule Performance Index (SPI), Cost Performance Index (CPI), and variances (SV, CV) to evaluate progress.
* Recognize common causes of delay such as unrealistic deadlines, changing requirements, risks, technical or human issues, and miscommunication, and plan accordingly.

# GIT WORKFLOW

* Create a central repository for the project on GitHub and set the **master (or main) branch** as the primary branch for integration.
* Each member should clone the repository and create their own **feature branches** for assigned tasks. Work on new features or fixes within these branches.
* Add files, stage them and commit changes with clear messages that describe the purpose of each update.
* Push commits from the feature branches to the remote repository so other members can see progress.
* Use **pull** to fetch and integrate changes from the remote repository into local copies, ensuring everyone stays updated.
* Merge feature branches into the **master/main branch** only after the work is tested and reviewed, resolving any conflicts that occur.
* Show evidence of collaboration by maintaining a clear commit history (using logs) with multiple commits, merges and contributions from all group members.
* Keep the repository organized with a clean history that tracks the project workflow from initialization to completion.

# SOFTWARE DESIGN

**5.1 System Design**

* Draw the system design for your project using **Draw.io** or **LucidChart**.
* Prepare a **Use Case Diagram** by first defining all users (actors) and their roles. Show each actor’s interactions with the system through use cases inside a system boundary. Include relationships like include or extend where needed.
* Prepare a **Class Diagram** by identifying the main classes from your project. Add attributes and operations for each class, and show associations, generalizations, aggregations, or compositions between them.
* Prepare an Activity Diagram that visually represents the workflow of a system or process.
* Prepare a **Data Flow Diagram (DFD)** starting with the **Context Diagram** (system as one process with external entities).
* Ensure consistency in naming actors, classes, processes,and data flows across all diagrams so they support each other.

## UI / Wireframe Design

* Design the user interface of your project individually using **Figma** or **Balsamiq**.
* Build the wireframes directly from your **PRD table**. Each functional requirement defined in the PRD should have a corresponding screen or component in the UI.
* Use the **Trello user board** (or equivalent task board) as a reference to decide which features and user flows need to be represented in the prototype.
* Create clickable wireframes that connect the main screens together, showing how a user will navigate through the system.
* Ensure the wireframe matches the actors, roles, and functionalities described in the PRD and system design diagrams.
* Export the prototype and include screenshots or a link to your design as part of the report submission.

# TESTING

* The goal is to show how testing ensures quality and requirements conformance.
* Identify some testing methods that you want to use in the testing phase later for your project.
* Prepare **test cases** using a manual test case template which template taught you in the class.

# SOFTWARE PRODUCT METRICS

* Apply software product metrics to evaluate your project.
* Use **Function-based Metrics (Function Points)** by identifying inputs, outputs, files, interfaces, and inquiries to measure the functionality delivered by the system.
* Apply **Object-Oriented and Class Metrics** such as size, complexity, coupling, cohesion, and inheritance measures (e.g., WMC, DIT, NOC, CBC, LCOM) to assess the structure and quality of your design.
* Include **Operation-oriented Metrics** by measuring average operation size, complexity, and number of parameters per operation.
* Apply **Maintenance Metrics** such as the **Software Maturity Index (SMI)** to check the stability of your project across changes and updates.

# CONCLUSION AND FUTURE WORK

* Write a conclusion and future work based on your project.

**Text Format:**

* Style: Times New Roman
* Size: 12
* Space: 1.15
* Alignment: Justify