

**CT-365 Software Engineering**

**Complex Computing Problem (CCP)**

**Course Learning Outcomes:**

**CLO 2 (C6):** Prepare requirements and design specifications of a software project.

**CLO 3 (C3):** Apply software engineering knowledge effectively as an individual or team leader in a software project.

**Complex Problem Solving Attributes:**

- **CP-2 Depth of Analysis Required:** Has no obvious solution, and requires conceptual thinking and innovative analysis to formulate suitable abstract models.
- **CP-8 Interdependence:** Is a high-level problem possibly including many component parts or sub-problems.
- **CP-9 Requirements Identification:** Identification of a requirement or the cause of a problem is ill-defined or unknown.

**Problem Statement:**

FutureLearning Corporation needs a scalable, user-friendly learning platform that delivers flexible, personalized, and secure online education across diverse subjects. This "learning engine" will support varied content, adaptive learning paths, and progress tracking to enhance FutureLearning's role as a leader in distance learning.

**Problem Description:**

Imagine you are a WebApp designer at FutureLearning Corporation, a progressive distance learning company dedicated to offering high-quality online education. Your task is to design and implement an Internet-based "learning engine"—a core platform that will enable FutureLearning to deliver diverse educational content to students worldwide. The platform will support content across a wide range of subjects, allowing FutureLearning's content designers to develop and upload engaging educational material without needing extensive technical knowledge. The learning engine must handle various media formats (text, video, audio, and interactive elements) and deliver an engaging, personalized learning experience for each student.

As the main infrastructure for delivering courses, the learning engine will require capabilities such as student progress tracking, personalized learning pathways, interactive features (such as quizzes, simulations, and discussion forums), and scalability to accommodate FutureLearning's growing audience. Additionally, it must include a user-friendly interface to ensure accessibility and ease of navigation for all users, including those with disabilities.

**Assumptions & Constraints:**

- You are required to complete the task in your designated groups.
- You should assume a reasonable schedule, timeline, and budget. Modularize the tasks.
- You have limited access to specialized personnel.
- The solution should take compatibility, accessibility, privacy, scalability, and load constraints into account.
- The learning engine must support frequent content updates by non-technical staff. It should be simple, yet powerful.

**Deliverables:**

- **Requirements Specification:** Compile critical functional and non-functional requirements for the engine. Justify why each requirement is essential for meeting FutureLearning's goals [CLO-2].
- **System Design:** Design a high-level architecture for this learning engine. Include UML models, and describe the major components (e.g., content management, user interface, analytics), detailing how they interact to support the functional requirements [CLO-2].
- **Test Plan:** Plan a thorough list of Test Cases to validate all the functionality and requirements in the requirements specification [CLO-3].
- **Project Plan:** Construct the PERT/CPM Chart highlighting the activities on the critical path and calculation of time estimates [CLO-3].

### Complex Computing Problem Assessment Rubrics

Criteria and Scales		
Satisfactory (2)	Average (1)	Unsatisfactory (0)
<b>Criterion 1: Clarity of Objective:</b> To what extent has the student understood the objective? (CP9: <i>Requirement Identification</i> )		
The student has correctly identified the requirements.	The student has correctly identified some requirements.	The student has misunderstood the requirements.
<b>Criterion 2: Innovation:</b> To what extent has the student used innovative analysis? (CP2: <i>Depth of Analysis Required</i> )		
The student has used conceptual thinking and innovative analysis to formulate suitable abstract models.	The student has used some conceptual analysis to formulate suitable abstract models.	The student has not performed thorough analysis and the model lacks required concepts.
<b>Criterion 3: Modularity:</b> To what extent has the student been able to identify the interdependent functionalities? (CP8: <i>Interdependence</i> )		
The student has clearly divided the problem with respect to the functionalities and their interactions.	The student has divided the problem with respect to the functionalities and their interactions to a limited extent.	The student has not been able to divide the problem with respect to the functionalities and their interactions.
<b>Criterion 4: Validation:</b> To what extent has the student rationalized the solution? (CP2: <i>Depth of Analysis Required</i> )		
The student has clearly justified that the solution meets the requirements.	The student has partially justified that the solution meets the requirements.	The student has not been able to justify that the solution meets the requirements.
<b>Criterion 5: Planning:</b> To what extent has the student formulated a realistic plan? (CP8: <i>Interdependence</i> )		
The student has formulated a realistic plan considering the risks and constraints.	The student has formulated a partially realistic plan considering the risks and constraints.	The student has formulated an unrealistic plan.

Total marks: \_\_\_\_\_/10

Teacher's signature: \_\_\_\_\_