

# SOFTWARE DEVELOPMENT DESIGN AND PRACTICE – LAB SESSIONS

*Spring 2025*

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In the lab sessions, you will focus on practical aspects of **software development design and practice**, learning how to **architect, implement, and deploy** a structured software project from scratch. Each lab session will introduce a **new design or development aspect**, helping you apply best practices in real-world software engineering.

By the end of the semester, you will have a **fully deployed software product** with:

1. A structured Git repository
2. A backend with RESTful APIs
3. A frontend interface (simple)
4. Database integration
5. Authentication & security mechanisms
6. CI/CD pipelines for automated testing & deployment
7. Dockerized components
8. Full documentation and a final presentation

You are expected to actively participate, follow the lab instructions, and collaborate with your peers. Lab sessions focus on **practical software development methodologies**, ensuring you gain hands-on experience in designing scalable and maintainable software systems.

## Group Requirements

You have to create a group of 3 people for the project until **12<sup>th</sup> of March** and choose a group representative. Your group representative will be responsible for correspondence and submissions. Please make sure you choose someone who is accountable. Group representative will send an email to the lab instructor Ersin Onur Erdogan ([ersinonur.erdogan@iuc.edu.tr](mailto:ersinonur.erdogan@iuc.edu.tr)) including the group members information (full name, student number, e-mail address for each member; a group nickname, and project name). Only group representative will send emails and make submissions; **HOWEVER**, the contribution of each member **MUST** be clearly stated. If you have **ANY** problems regarding group formation or any disagreement, inform your lab instructor immediately!

## Project Requirements

You start your project from scratch as a group and will have built the entire project by the end of the semester. You are supposed to **MAKE SUBMISSIONS EACH WEEK** demonstrating your work progress and you will be **GRADED** by weekly submissions. You are not asked to suddenly present your project at the end of the semester without making and interim (weekly) submissions.

AFTER YOUR GROUP FORMATION, you will choose a project to implement either one of the below or anything like social media platform, e-trading platform, car rental platform or whatever is accepted ONLY IF the project includes authentication, authorization (role based access to some features), email verification and notification, CRUD operations, and no bugs!

- Task Management System: Authentication, Email Verification, Create&Assign&Update Tasks, Role-based Access Control, Email Notification for Task Assignments & Updates
- Learning Management System: Authentication, Email Verification, Course & Study Group Creation, Document Sharing & Collaborative Notes, Task & Deadline Email Reminders
- Job Application Manager: Authentication, Email Verification, Posting Jobs (Company, Position, Status, Info), Data Visualization for Job Applications, Email Notifications for Reminders, Deadlines, etc
- Online Quiz & Exam Platform: Authentication, Email Verification, Quiz Creation with Multiple-Choice and Open-Ended Questions, Auto-Grading for Multiple-Choice Quizzes & Exams, Email Notifications for Quiz & Exam Assignment, Grades etc.
- Inventory Management System: Authentication, Email Verification, Product Stock Management, Supplier and Purchase Order Tracking, Email Notification for New Orders, Low Inventory etc.

### **Weekly Schedule**

Your weekly schedule is below. Starting from the first week, lab sheets for each week will be shared with you.

- Week 1. Project Setup & Git
- Week 2. Object-Oriented Design & UML
- Week 3. Implementing Business Logic (OOP & SOLID)
- Week 4. APIs & Database Integration
- Week 5. Implementing Design Patterns
- Week 6. Git Collaboration & Pull Requests Reviews
- Week 7. Authentication & Security
- Week 8. Unit Testing & Test-Driven Deployment
- Week 9. CI/CD & Automated Deployment
- Week 10. Code Review & Refactoring & Debugging & Optimization
- Week 11. Containerization
- Week 12. Final Debugging & Documentation