Student Course Management System (Java - ArrayList Based)

# 1. Introduction

The Student Course Management System is a console-based Java project designed to simulate a simple Learning Management System (LMS). It allows admins to manage students and courses, while students can register, login, and enroll or remove courses. This project uses ArrayLists instead of a database and is implemented using Object-Oriented Programming principles in Java.

# 2. Objectives

- Practice Object-Oriented Programming concepts in Java  
- Implement a mini in-memory database using ArrayLists  
- Simulate authentication and enrollment system  
- Structure a Java project using packages and modular code  
- Provide hands-on experience in menu-driven console applications

# 3. Project Structure

DB/  
 ┣ main → Main.java (entry point)  
 ┣ features → UserManagement.java, CourseManagement.java, EnrollmentManagement.java  
 ┣ models → User.java, CourseModel.java, LoginModel.java  
 ┣ util → Utils.java

# 4. Modules

## 4.1 Models (Data Layer)

- User.java → userId, username, email, phone, password, userType, courses  
- CourseModel.java → courseId, courseName, courseDuration  
- LoginModel.java → email, password

## 4.2 Features (Business Logic)

- UserManagement → Add/Delete Students  
- CourseManagement → Add/Delete Courses  
- EnrollmentManagement → Register, Login, Enroll/Remove Courses

## 4.3 Utils & Main

- Utils.java → Helper methods for input (Scanner)  
- Main.java → Entry point, menu system for Admin and Student

# 5. Java Concepts Involved

- Object-Oriented Programming (Encapsulation, Abstraction, Classes & Objects)  
- Collections Framework (ArrayList)  
- Control Flow (loops, conditionals)  
- User Input Handling (Scanner)  
- Modular Programming with Packages  
- Simple Authentication and Enrollment Logic  
- One-to-Many Data Relationships (User ↔ Courses)

# 6. Execution Flow

1. Start Program → Main Menu  
2. Register Student or Login (Admin/Student)  
3. Admin: Add/Delete Students, Add/Delete Courses  
4. Student: Login → Enroll in Courses, Remove Courses  
5. Exit Program

# 7. Sample Input/Output

Example Run:  
===== MENU =====  
1. Login  
2. Register (Student)  
3. Exit  
Enter choice: 2  
Name: John  
Email: john@gmail.com  
Phone: 9876543210  
Password: john123  
Registered user: John  
  
===== MENU =====  
1. Login  
2. Register (Student)  
3. Exit  
Enter choice: 1  
Email: admin@gmail.com  
Password: admin123  
Login successful: Admin  
Admin Menu: 1.Add Student 2.Delete Student 3.Add Course 4.Delete Course  
Enter option: 3  
Course Name: Java  
Course Duration: 3 months  
Course added: Java  
  
Student Menu: 1.Enroll Course 2.Remove Course  
Enter option: 1  
Enter Course ID: 1  
Enrolled John in Java

# 8. Conclusion

The Student Course Management System demonstrates how ArrayLists can be used as a simple in-memory database to implement a console-based LMS. It applies OOP principles, modular project design, and authentication logic to give students practical experience with Java development. This project forms a strong foundation for more advanced systems using real databases and GUIs.