

Test Plan

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1. Introduction

This document explains how we will test the University ERP System. The testing will make sure that everything works as it should, including user access, data accuracy, and the system's performance when it's in "Maintenance Mode." We will also check some extra features like Data Export, Password Security, and Database Backup.

2. Test Environment

The following environment was used to validate the application¹:

- **Operating System:** Windows 11
- **Java Version:** JDK 24
- **Database Engine:** MySQL 8.0
- **External Libraries:** mysql-connector-j, bcrypt (Auth), flatlaf (UI), opencsv.

3. Test Data Setup

The system was seeded with the following accounts to verify role separation:

Role	Username	Password	Purpose
Admin	admin1	password123	Full system access & Maintenance control.
Instructor	inst1	password123	Assigned to specific sections only.
Student	stu1	password123	Enrolled in 0 or 1 initial courses.
Student	stu2	password123	Used for negative testing (duplicate checks).

4. Acceptance Test Cases

4.1. Authentication & Security

Objective: Verify secure login, session management, and account safety features.

Test ID	Feature	Action / Steps	Expected Result	Status
SEC-01	Valid Login	Enter valid credentials for stu1.	Student Dashboard open connected to that username	PASS
SEC-02	Invalid Login	Enter stu1 with a wrong password.	Error message: "Invalid username or password".	PASS
SEC-03	Role Isolation	Login as stu1 and attempt to open Admin Panel.	Access denied; Admin buttons are not visible.	PASS
SEC-04	Password Hash	Inspect users_auth table in database.	Password column contains BCrypt hash (not plain text).	PASS
BON-01	Account Lockout	Enter wrong password 5 times consecutively.	Account status updates to 'LOCKED'; Login blocked.	PASS
BON-02	Change Password	Click "Change Password", enter old + new password.	Success message. Old password no longer works.	PASS

4.2. Student Module

Objective: Verify course browsing, registration logic, and transcript generation.

Test ID	Feature	Action / Steps	Expected Result	Status
STU-01	View Catalog	Click "Course Catalog".	Table loads with Course Code, Title, Credits, and Capacity.	PASS
STU-02	Register (Success)	Select a section with seats and click "Register".	Success message; Capacity decreases by 1; Appears in "My Schedule".	PASS
STU-03	Register (Full)	Attempt to register for a section with 0 capacity.	Error message: "Section is full".	PASS
STU-04	Register (Dup)	Attempt to register for the same section again.	Error message: "Already enrolled in this section".	PASS
STU-05	Drop Course	Select an enrolled course and click "Drop".	Success message; Course removed from schedule; Capacity increases.	PASS
STU-06	View Grades	Click "View Grades".	Displays list of completed courses with scores and final grades.	PASS
BON-03	Export Transcript	Click "Export to CSV" on Grade screen.	File dialog opens; .csv file is created with correct grade data.	PASS

4.3. Instructor Module

Objective: Verify section management and grading calculations.

Test ID	Feature	Action / Steps	Expected Result	Status
INST-01	View Sections	Login as inst1.	Dashboard displays <i>only</i> sections assigned to inst1.	PASS
INST-02	Enter Grades	Select student; Enter scores: Quiz(20), Mid(30), Final(50).	Scores are saved to database.	PASS
INST-03	Compute Final	Click "Calculate Grade" for the student above.	Total score = 100. Final Grade displays as 'A'.	PASS
INST-04	Privacy Check	Attempt to grade a student in another prof's section.	Action blocked / Section not visible.	PASS
BON-04	Export Grades	Click "Export Class List" on Section view.	.csv file is generated listing Student Names and current grades.	PASS

4.4. Admin Module & Maintenance

Objective: Verify system configuration, user management.

Test ID	Feature	Action / Steps	Expected Result	Status
ADM-01	Create User	Create a new Instructor (inst_new).	User added to users_auth and instructors tables.	PASS
ADM-02	Create Section	Create a new Section for an existing Course.	Section appears in the Catalog for students.	PASS
ADM-03	Maintenance ON	Toggle Maintenance Switch to ON .	Red Banner "MAINTENANCE MODE" appears on all screens.	PASS
ADM-04	Block Writes	While Maintenance is ON, login as Student and try "Register".	Action Blocked: "System is under maintenance".	PASS
ADM-05	Maintenance OFF	Toggle Maintenance Switch to OFF .	Banner disappears; Registration works normally.	PASS
BON-05	Backup DB	Click "Backup Database" button.	SQL Dump file is created in selected directory.	PASS
BON-06	Restore DB	Modify a user, then click "Restore Database" using backup.	Database reverts to previous state (User modification undone).	PASS

5. Grading Logic Verification

To ensure data accuracy, the grading algorithm was tested with the following boundary

values:

- **Logic Implemented:** Weighted Average (Quiz 20% + Midterm 30% + Endterm 50%).
- **Test Case 1 (Perfect Score):** $20 + 30 + 50 = 100 \rightarrow$ Grade **A**.
- **Test Case 2 (Average Score):** $15 + 20 + 35 = 70 \rightarrow$ Grade **C**.
- **Test Case 3 (Fail Score):** $5 + 10 + 10 = 25 \rightarrow$ Grade **F**.

6. Test Summary

- **Total Tests Executed:** 23
- **Tests Passed:** 23
- **Tests Failed:** 0
- **Conclusion:** The application meets all core functional requirements specified in the project brief. All implemented bonus features (CSV Export, Security Lockout, Backup/Restore) function correctly without destabilizing the core ERP features. Role-based security and Maintenance Mode enforce strict access control as required.