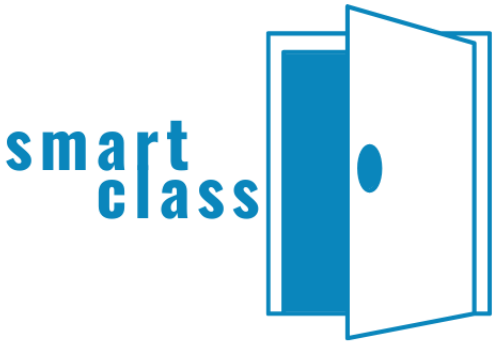
King Saud University

College of Computer and Information Sciences

Department of Computer Science

CSC343: System Analysis & Design



Name	ID	Task Assigned
Shatha Alabbad	444200515	REQ-03 ,REQ-08 , scenario 2 + rest is equally disturbed
Nouf Aljuried	444201018	REQ-01 , REQ-06 scenario 3 + rest is equally disturbed
Maram Alsheddi	444200628	REQ-02 ,REQ-07, scenario 1 + rest is equally disturbed
Reema Alsamrani	444201193	REQ-04 ,REQ-09, scenario 4 + rest is equally disturbed

i. Customer Statement of Requirements (CSR)

A. Problem Statement

As a faculty member or student at the university, locating available classrooms quickly and efficiently poses a significant challenge. The current method of finding vacant classrooms relies on either random inquiries or outdated paper schedules, which consumes valuable time and energy. This lack of an efficient classroom availability system often leads to delays in academic activities and missed opportunities for collaborative learning.

Faculty members frequently need additional classrooms on short notice, whether for holding extra sessions, conducting meetings, or organizing academic events. Without a streamlined system, finding an appropriate room is cumbersome and frustrating. Students also face similar issues when looking for available classrooms for group study sessions or project meetings, especially for larger groups of four or more. The absence of a unified platform to check room availability forces students to rely on word-of-mouth information or manual searches, which are both time-consuming and unreliable.

A solution that provides up-to-date information about classroom availability would significantly improve the efficiency of academic activities. Such a system would enable users to easily find rooms based on their needs, saving time and effort. It would also allow users to express their preferences and provide feedback on room conditions. The ability to book rooms in advance or join a waitlist for fully occupied rooms would help ensure that everyone has a fair chance to access university facilities.

By providing a more organized and transparent way to access available classrooms, this solution would promote better utilization of free spaces, encourage collaborative learning among students, and enhance the overall academic environment at the university.

B. Glossary of Terms

Term	Definition
Classroom Availability	The status of a classroom indicating whether it is free or occupied at a given time
Faculty member	A university professor or lecturer who can book classrooms for lectures or meetings
Student	A user who can search for classroom availability but cannot directly book rooms (except under certain conditions)
Section	Specific class offering of a course, identified by a unique section number
Course Name	The title of an academic course
Booking	The process by which a faculty member or Student reserves a classroom for a specific date and time
Classroom Details	Information about a specific classroom, including capacity, location, technology, and scheduled courses
Issue Reporting	A feature allowing users to report problems with a classroom, such as broken equipment or poor ventilation
Waitlist	A queue system where users can request a room when it is fully booked and get notified if it becomes available
Notifications	Alerts sent to Students regarding classroom changes, bookings, waitlist updates, or maintenance issues.

System Administrator	The system administrator responsible for managing user roles, classroom data, and resolving technical issues

ii. System Requirements

A. Enumerated Functional Requirements

REQ-x	Description
REQ-01	The system shall allow users to book classrooms. ○ The system shall allow faculty members to book available classrooms directly. ○ Students can book a classroom only if they are in a group. ○ Each student group can only book one classroom per week. ○ If a classroom is fully booked, students can join a waitlist and receive notifications when it becomes available. ○ Bookings must be confirmed within 10 minutes, or they will be automatically canceled.
REQ-02	The system shall be integrated with Edugate 1. User Authentication: ○ The system shall authenticate users via Edugate Single Sign-On (SSO). 2. Classroom Schedule Synchronization: ○ The system shall fetch real-time class schedules, exams, and special reservations from Edugate. 3. Faculty Assignment Retrieval: ○ Faculty members shall be able to see their assigned classrooms for each lecture.
REQ-03	The system shall allow user to be able to search for available classroom: ○ The system shall allow students to search for any section's assigned classroom using the section number and course name, enabling them to quickly search for scheduled rooms without manual inquiries. ○ The system shall enable Students or Faculty member to search for available classrooms based on building, floor, and seating capacity. The system shall display real-time availability, allowing users to find suitable classrooms efficiently.
REQ-04	The system shall users to Issue Reporting and receiving Notification ○ The system shall allow students and faculty members to report issues in classrooms, such as broken equipment or ventilation problems, through an online interface. ○ The system shall provide a form where users can describe the issue, select the affected classroom, and attach optional images.

	○ Upon submission, the system shall generate a unique issue ID and send a confirmation notification to the reporter. ○ The system shall automatically notify the maintenance team via email or an internal notification system. ○ The system shall allow maintenance staff to update the status of reported issues (e.g., "In Progress," "Resolved"). ○ The system shall provide a dashboard for tracking reported issues, categorized by status and location.
REQ-05	The system shall allow students to join a group. ○ displaying available groups based on the student's enrolled courses. ○ allow the student to select a group. ○ verify if the group meets the minimum member requirement (4 students). ○ add the student to the group and notify members once the group meets the required number of members.

B. Enumerated Nonfunctional Requirements

REQ-x	Description
REQ-06	*The system must provide real-time updates on classroom availability with* : ○ The system shall respond to search queries within 2 seconds. ○ Classroom availability should be updated in real-time (every 5 seconds). ○ The system must handle at least 2,000 concurrent users without performance degradation.
REQ-07	*The system shall provide an intuitive user interface with:* ○ Easy navigation for searching and booking classrooms. ○ Minimal learning curve for first-time users. ○ Consistent design across different devices. ○ Access all features within 3 clicks or less.
REQ-08	*Security (Role-Based Access Control):* ○ Faculty members shall have exclusive access to book and manage classroom reservations ○ Students shall only have viewing access to classroom availability and schedules, however, under certain conditions they may be allowed to book classrooms ○ The system shall prevent unauthorized bookings, ensuring that only eligible users can make reservations

REQ-09	*System Reliability (Availability & Downtime):* ○ The system shall maintain a 99.9% uptime, ensuring that classroom availability data remains accessible at all times. ○ Scheduled maintenance shall not exceed 43.2 minutes per month to meet uptime requirements. ○ The system shall implement failover mechanisms and redundancy strategies to minimize unexpected downtime. ○ In case of system failure, recovery procedures shall restore functionality within 5 minutes for critical services. ○ System availability shall be monitored continuously, with automated alerts for any downtime incidents.

C. On-Screen Appearance Requirements

Fig1. entry page to accessing the SmartClass system.

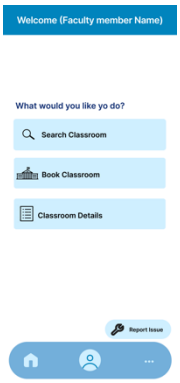


Fig2. Faculty Dashboard

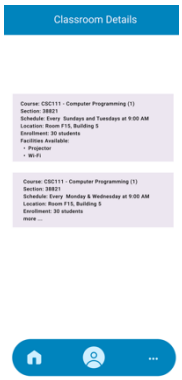


Fig3. Faculty Dashboard (classsroom Details)

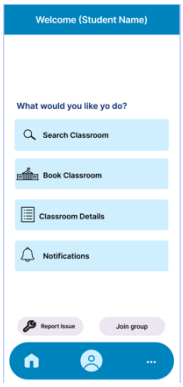


Fig4. Student Dashboard

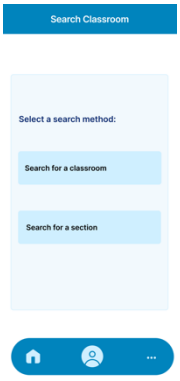


Fig5. Student Dashboard (Search Classroom)

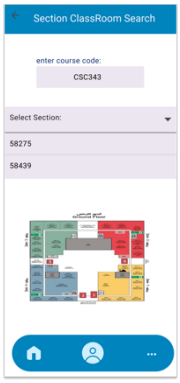


Fig6. Search for classroom by Section

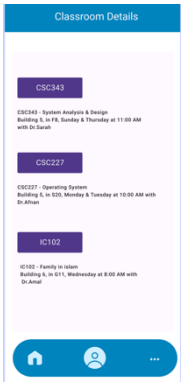


Fig7. Student Dashboard (Classroom details)

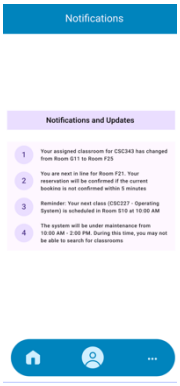


Fig8. Student Dashboard (Notifications)

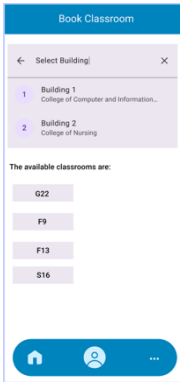


Fig9. User Dashboard (Book Classroom)

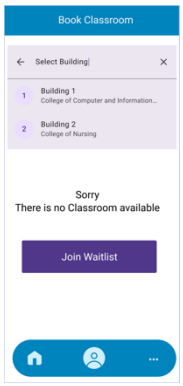


Fig10. User Dashboard (Book Classroom)

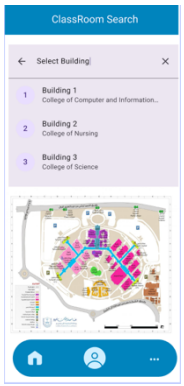


Fig11. User Dashboard (Search Classroom)

Fig12. User Dashboard (Search Classroom)

iii. Functional Requirements Specification

A. Stakeholders

- **Faculty Members**: Primary users who search for or need to book classrooms for lectures, meetings, or additional sessions.
- **Students**: Primary users who search for available classrooms or need to book classrooms for group study sessions or project meetings.
- **University Administration**: Responsible for managing classroom schedules, system policies, and resolving conflicts.
- **IT Department**: Manages system maintenance, security, and technical support.
- **Assistant**: Participates in reporting issues related to classroom conditions.

B. Actors and Goals

- **Faculty Member (Initiating Actor)**: The primary goal is to book classrooms for lectures, extra sessions, and meetings efficiently without delays.
- **Student (Initiating Actor)**: The primary goal is to find and book available classrooms for group study sessions or project meetings, provided the group meets the minimum member requirements.
- **University Administration (Participating Actor)**: Manages classroom schedules, resolves conflicts, and approves exceptional booking requests.
- **IT System (Participating Actor)**: Provides real-time data on room availability, booking confirmations, waitlist notifications, and security features.
- **Assistant (Participating Actor)**: Assists in reporting classroom issues and ensuring maintenance requests are submitted

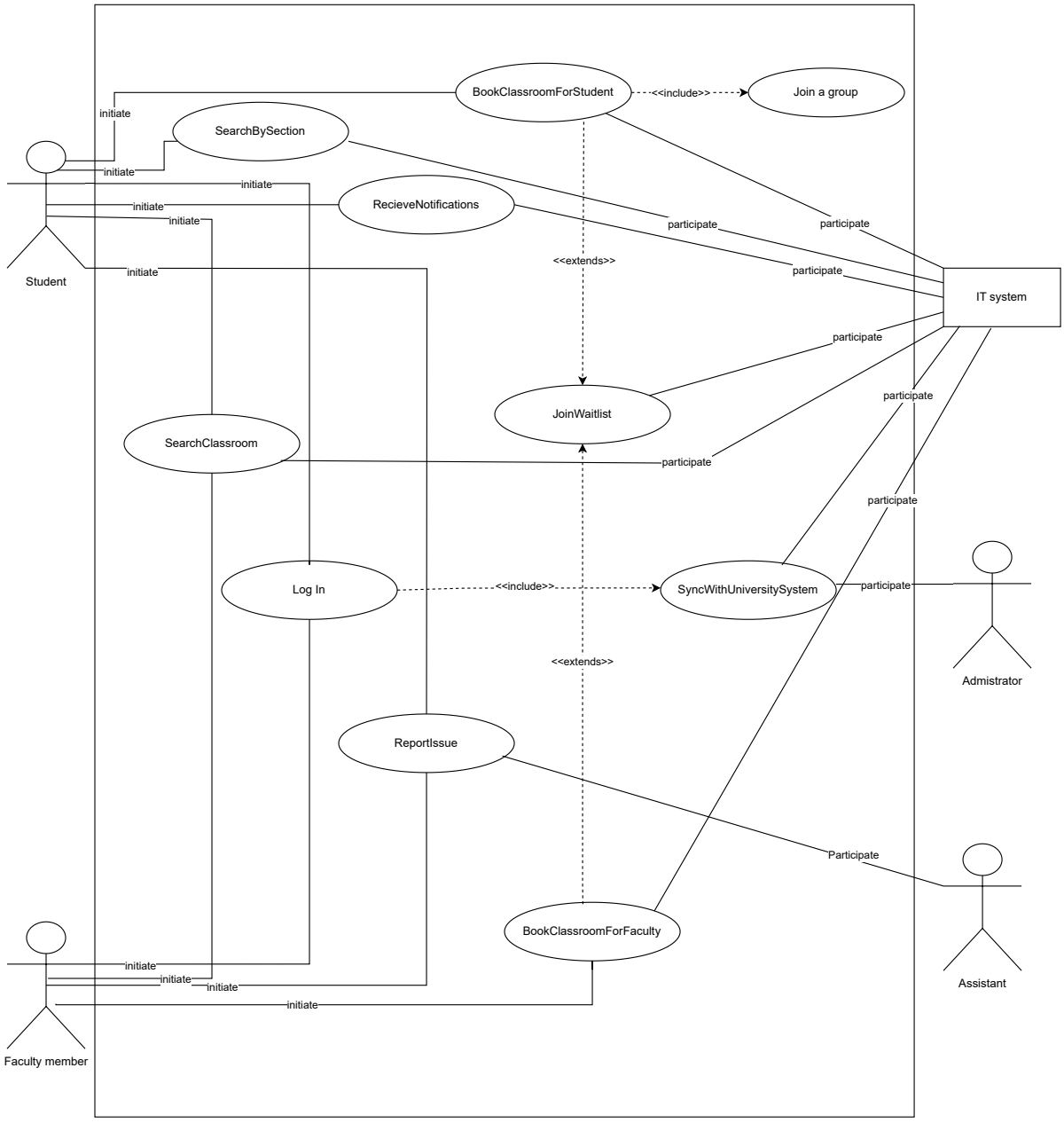
C. Use Cases

I. Casual Description

UC-X	Use Case Name	Description	Corresponding REQ ID
UC-1	Log In	Users can log in to the system using their username and password	REQ-02
UC-2	Search for Classroom	Student or faculty member searches for an available classroom using filters such as building, floor, and seating capacity. The system displays real-time classroom availability	REQ-03
UC-3	Search by section (student)	Student can search for classroom by entering section number and course code. The system retrieves and displays the classroom details	REQ-03
UC-4	Book a Classroom for faculty	faculty member searches for an available classroom and submits a booking request	REQ-01
UC-5	Book a Classroom for student	A student group searches for and books a classroom for study sessions or meetings. The system verifies that the group meets the minimum member requirement before allowing the booking	REQ-01, REQ-05
UC-6	Receive Notifications	A student receives a real-time notification when their assigned classroom is changed	REQ-04
UC-7	Report Issues	Students or faculty can report classroom issues (e.g., broken projector, missing chairs, ventilation problems**)** through the system	REQ-04
UC-8	Sync with University system	The system integrates with the university scheduling system to fetch real-time schedules, exams, and reservations**,** ensuring classroom availability remains accurate. If synchronization fails, administrators are notified	REQ-02

UC-9	Join a group	Students can join an available group for their enrolled courses if the group meets the minimum member requirement	REQ-05
UC-10	Join a Waitlist	If a classroom is fully booked, students or faculty members can join a waitlist to be notified when a classroom becomes available.	REQ-01

II. Use Case Diagram



III. Fully-Dressed Description

Use case ID	Use case name
UC-1	Log In
Initiating actor:	Student, Faculty Member
Actor's goal:	To authenticate and gain access to the system's features based on their role (student, faculty)
Participating actor:	Administrator, IT System
Pre-condition:	Post-condition:
○ The user must be registered in the university system. ○ The system must be connected to the authentication database.	The user is successfully authenticated and redirected to their respective dashboard. The system grants access based on user roles (Student, Faculty).
Flow of event for success scenario:	1. → The user navigates to the Log In page. 2. ← The system displays fields for Username and Password. 3. → The user enters their credentials and clicks "Log In". 4. ← The system validates the credentials with the university database. 5. ← system retrieves the user's role (Student, Faculty), if the credentials are correct. 6. → The user successfully logs in and can access system functionalities.
Flow of event for extension (alternative scenario):	If the user forgets their password: ○ The system provides a "Forgot Password" option. ○ The user can reset their password via email verification.

Use case ID	Use case name
UC-2	Search for Classroom
Initiating actor:	Student, Faculty Member
Actor's goal:	To find an available classroom based on building, floor, or seating capacity
Participating actor:	IT system
Pre-condition:	Post-condition:
○ user must be logged into the system	○ The system displays a map of available classrooms based on the search criteria ○ The user successfully finds a suitable classroom for their needs
Flow of event for success scenario:	1. → The user selects the Search Classroom option 2. ← The user selects a building from the list 3. → The system fetches classrooms within the selected building 4. ← The user selects a floor, and an interactive map displays the layout 5. → The system highlights occupied and available classrooms based on real-time data 6. ← The user selects a classroom to view details
Flow of event for extension (alternative scenario):	○ If the user does not select a building or floor, the system prompts the user to select at least one search filter ○ If the system is unable to fetch real-time classroom availability, the system provides an option to retry or return to the main menu ○ If there are no available classrooms that match the selected building and floor, The system displays a message (please try again or select different building/floor)

Use case ID	Use case name
UC-5	Book a Classroom for student
Initiating actor:	Student
Actor's goal:	to reserve an available classroom for group study sessions or project meetings.
Participating actor:	IT System
Pre-condition:	Post-condition:
○ Student must be logged into the system. ○ Student must be a member of a group with at least 4 members.	○ The classroom is successfully booked. ○ The student group receives a booking confirmation notification. ○ If no rooms are available, the group is added to the waitlist.
Flow of event for success scenario:	1. → Student searches for available classrooms. 2. ← The system displays real-time classroom availability. 3. → Student selects a classroom and provides booking details. 4. ← The system verifies group eligibility and temporarily reserves the room. 5. → Student confirms the booking. 6. ← The system finalizes the booking and sends a confirmation notification.
Flow of event for extension (alternative scenario):	○ If the group doesn't meet the minimum requirement, the system prevents booking. ○ If the classroom is fully booked, the system prompts the student to join the waitlist. ○ If no rooms are available, the system sends a notification when a room becomes available.

Use case ID	Use case name
UC-7	Report Issues
Initiating actor:	Student, Faculty Member
Actor's goal:	To report issues in classrooms, such as broken equipment or ventilation problems, through

	an online interface to ensure timely maintenance and resolution.
Participating actor:	Assistant
Pre-condition:	Post-condition:
○ The user (student or faculty member) must be logged into the system. ○ The classroom issue reporting feature must be accessible.	○ The reported issue is recorded in the system with a unique issue ID. ○ The maintenance team is notified. ○ The reporter receives a confirmation notification.
Flow of event for success scenario:	1. → The actor logs into the system. 2. → The actor navigates to the "Report Issues" section. 3. → The actor selects the affected classroom. 4. → The actor describes the issue and optionally attaches an image. 5. → The actor submits the issue report. 6. ← The system generates a unique issue ID and stores the report. 7. ← The system sends a confirmation notification to the reporter. 8. ← The system notifies the maintenance team via email or internal notification. 9. → The maintenance team updates the issue status when work begins and upon resolution. 10. → The actor can track the issue status through a dashboard.
Flow of event for extension (alternative scenario):	○ If the actor does not fill in the required fields, the system prompts them to complete the missing information before submission. ○ If the system fails to generate an issue ID due to a technical problem, an error message is displayed, and the actor is prompted to try again later. ○ If the maintenance team does not update the status within a set period, the system sends a follow-up notification to the team.