**TS-001: User Registration (New User)**

**Description**: Verify that new users can register and are assigned a default "guest" role.

* **Preconditions**: None.
* **Test Steps**:
  1. User navigates to the registration page.
  2. User enters necessary details (e.g., name, email, password).
  3. User submits the registration form.
  4. The system creates the user account with the "guest" role by default.
  5. The user is directed to a confirmation page or login page.
* **Expected Result**:
  1. The new user account is created successfully.
  2. The user is assigned the default "guest" role.
  3. User receives a confirmation or success message.

A screenshot of a computer

AI-generated content may be incorrect.

**TS-002: User Login**

**Description**: Verify that users (students, faculty, and admins) can log into the system with correct credentials.

* **Preconditions**: The system is running, and users have valid accounts.
* **Test Steps**:
  1. User navigates to the login page.
  2. User enters their credentials (email and password).
  3. System verifies the credentials and grants access.
  4. User is directed to the appropriate dashboard based on their role (admin, faculty, student).
* **Expected Result**:
  1. Users can log in successfully with valid credentials.
  2. Admins are directed to the admin dashboard, faculty to the attendance management page, and students to their personal attendance page.

A screenshot of a web page

AI-generated content may be incorrect.

**TS-003: User Login with Invalid Credentials**

**Description**: Verify that users cannot log in with incorrect credentials.

* **Preconditions**: User account exists with valid credentials.
* **Test Steps**:
  1. User navigates to the login page.
  2. User enters invalid credentials (wrong email/password).
  3. System rejects login attempt and shows an error message.
* **Expected Result**:
  1. The user is unable to log in.
  2. A relevant error message (e.g., "Invalid credentials") is displayed.
  3. Login attempt is logged for security purposes.

A person sitting on the floor

AI-generated content may be incorrect.

**TS-001: Attendance Marking via Facial Recognition**

**Description: Verify that attendance is marked when a student's face is detected.**

* **Preconditions:**
  + **Student is enrolled.**
  + **Camera and system are functional.**
  + **Session is activated by faculty.**
* **Test Steps:**
  + **Student enters the classroom and faces the camera.**
  + **The system captures and processes the student's face.**
  + **If a match is found, attendance is recorded.**
  + **If spoofing is detected, attendance is not recorded, and the event is logged.**
* **Expected Result:**
  + **Student is marked present if they meet the criteria (e.g., attendance recorded only if the student stays for over 1 hour).**
  + **Attendance logs update in real-time.**
  + **Graphical representation updates for faculty and admin.**

**TS-002: Graphical Attendance Analysis**

**Description**: Ensure that attendance data is displayed in graphical format for easy analysis.

* **Test Steps**:
  1. Faculty or admin logs into the system.
  2. Navigate to the Attendance Analytics section.
  3. Graphs are displayed based on:
     + Daily, weekly, and monthly trends.
     + Student-wise and subject-wise reports.
     + Comparison charts like average attendance and students at risk.
* **Expected Result**:
  1. Attendance data is shown as bar charts, line graphs, and pie charts.
  2. Faculty and admin can filter by date, student, or subject.
  3. Students can view their personal attendance trends.

*Student Homepage:*

A screenshot of a phone

AI-generated content may be incorrect.

*Faculty Dashboard:*  
A graph with different colored bars

AI-generated content may be incorrect.A screenshot of a web page

AI-generated content may be incorrect.

**TS-003: Low Attendance Warnings and Notifications**

**Description: Ensure students receive alerts when their attendance falls below the threshold.**

* **Preconditions: Attendance tracking is enabled.**
* **Test Steps:**
  1. **The system monitors attendance weekly and monthly.**
  2. **If a student's attendance drops below 75%, they receive an automated email and a highlighted alert.**
  3. **Faculty and admin receive a report of students at risk.**
* **Expected Result:**
  1. **Students receive timely alerts and warnings.**
  2. **Faculty and admin can track at-risk students.**

A screenshot of a cell phone

AI-generated content may be incorrect.

A screenshot of a computer

AI-generated content may be incorrect.

**TS-004: Encrypted Authentication for Secure Login**

**Description: Ensure secure login with encrypted authentication.**

* **Preconditions: User attempts to log in.**
* **Test Steps:**
  1. **User enters their email and password.**
  2. **The system encrypts the password and saves it in a hashed format in the database.**
* **Expected Result:**
  1. **Unauthorized access attempts are blocked.**
  2. **Passwords are stored securely in an encrypted format.**
  3. **Failed login attempts are logged for security auditing.**

A screenshot of a computer

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**TS-05: Recent Classes Attended (Student Dashboard Feature)**

**Description**: Ensure students can view their recently attended classes on the homepage.

* **Preconditions**: Student has attended at least one class, and the system is actively tracking attendance.
* **Test Steps**:
  1. The student logs into the system.
  2. The homepage displays a "Recent Classes" section.
  3. The system lists the most recent classes attended, including:
     + Course Name
     + Date and Time
     + Attendance Status (Present/Late/Absent)
     + Total Duration Stayed
  4. The student clicks on a class entry for more details.
* **Expected Result**:
  1. The student sees a list of recent attended classes.
  2. The system highlights sessions with incomplete attendance or flagged statuses.
  3. The student can access detailed reports for more insights.

A screenshot of a computer

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**TS-06: Student Subject Enrollment and Admin Approval Process**

**Description**: Verify that students can enroll in subjects with a limit of three active subjects, and that the admin can approve additional subjects and update subject statuses.

**Preconditions**:

* The student is logged into their account.
* The student has not exceeded the subject limit (three active subjects).
* Admin has control over subject approval and status changes.

**Test Steps**:

1. **Access Subject Enrollment Page**:
   * The student navigates to the Subject Enrollment section.
   * The system displays the available subjects.
2. **Select Subjects**:
   * The student selects up to three subjects for enrollment.
   * If the student attempts to select a fourth subject, an approval request is sent to the Admin Panel.
3. **Submit Enrollment Request**:
   * The system marks newly selected subjects as "Pending."
   * The student cannot access course materials or attendance tracking until the request is approved.
4. **Admin Approval Process**:
   * The Admin Panel displays all Pending enrollments.
   * The admin reviews and approves requests, changing their status from Pending → Active.
   * If a student is approved for more than three subjects, the admin can manually override the limit.
5. **Status Update**:
   * Once the semester ends or a student completes a course, the admin updates the status from Active → Completed.
   * Completed subjects cannot be edited or removed.

**Expected Result**:

* Students can enroll in up to three subjects, with additional subjects requiring admin approval.
* Pending subjects are inaccessible until approved by the admin.
* The admin has the authority to update the status of subjects (Pending → Active → Completed).

A screenshot of a computer

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A white background with red text and black text

AI-generated content may be incorrect.

**TS-07: User Settings Management**

**Description**: Verify that users can change their password, update their time zone, and view FAQs from the settings section.

**Preconditions**:

* The user is logged into their account.
* The user has access to the settings page.
* The user has internet connectivity.

**Test Steps**:

1. **Access Settings Page**:
   * The user navigates to the settings page via their account dashboard.
   * The system displays options to change the password, select the time zone, and view FAQs.
2. **Change Password**:
   * The user clicks on the "Change Password" option.
   * The system prompts the user to enter their current password, followed by a new password.
   * The user enters the required information and submits the change.
   * The system validates the input and updates the password if valid, showing a success message. If the input is invalid (e.g., incorrect current password or weak new password), an error message is displayed.
3. **Set Time Zone**:
   * The user clicks on the "Time Zone" option.
   * The system displays a list of available time zones.
   * The user selects their desired time zone.
   * The system updates the time zone and confirms the change with a success message.
4. **View FAQs**:
   * The user clicks on the "FAQs" section.
   * The system displays a list of frequently asked questions and answers.
   * The user can scroll through the FAQ list or use a search bar to find specific topics.
   * The system allows easy navigation and provides relevant information for common user inquiries.

**Expected Result**:

* Users can successfully change their password if the current password is valid and the new password meets system requirements.
* The user can update their time zone, and the system reflects the change accordingly.
* The FAQ section provides a helpful and easy-to-navigate list of frequently asked questions with answers, including a search function for specific topics.

A screenshot of a computer

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**TS-008: Start Attendance Manually**

**Description**: Ensure faculty can start attendance manually when required.

* **Preconditions**: Faculty is logged in; the system is ready for attendance recording.
* **Test Steps**:
  1. Faculty clicks the "Start" button to begin attendance.
  2. The system activates the camera and begins face detection.
  3. The session remains active until faculty stops attendance.
* **Expected Result**:
  1. Attendance begins only when faculty initiates it.
  2. Logs include session start and end times.

A screenshot of a computer

AI-generated content may be incorrect.

**TS-009: Viewing and Downloading Attendance Records**

**Description**: Ensure faculty and admins can view and download attendance reports.

* **Preconditions**: Attendance data is available.
* **Test Steps**:
  1. Faculty or admin navigates to the Attendance Records section.
  2. The system displays sortable and filterable records.
  3. Faculty clicks the "Download" icon and selects the format (CSV/PDF/Excel/JSON).
* **Expected Result**:
  1. Attendance records are easily accessible.
  2. Faculty and admin can export data for documentation purposes.

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AI-generated content may be incorrect.

**TS-010: Manual Student Updates by Faculty**

**Description**: Ensure faculty can manually update student details in case of discrepancies.

* **Preconditions**: Faculty is logged in; the student is already registered.
* **Test Steps**:
  1. Faculty accesses the "Student Attendance Management" panel.
  2. Faculty searches for and selects the student.
  3. Faculty manually adjusts the student's attendance status, subject, or time.
  4. Changes are saved and reflected in the system.
* **Expected Result**:
  1. Faculty can make manual adjustments to student records.
  2. All changes are recorded and reflected instantly.

A screenshot of a computer

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**TS-011: System Health Monitoring for Admins**

**Description**: Ensure that system health metrics are displayed for admins.

* **Preconditions**: The system is live and operational.
* **Test Steps**:
  1. Admin logs into the dashboard.
  2. The System Health Panel displays:
     + Camera status (Active/Inactive).
     + Server uptime percentage.
     + Facial recognition accuracy percentage.
     + Recent errors or system warnings.
* **Expected Result**:
  1. Admin can identify system issues in real-time.
  2. CPU, memory, and disk usage are updated continuously.
  3. Downtime or recognition failures are logged.
  4. Critical warnings are highlighted for attention.

A screenshot of a computer

AI-generated content may be incorrect.

**TS-012: Admin Configuration Panel - Adjusting Attendance Thresholds and Rules**

**Description**: Ensure that admins can adjust system settings like attendance thresholds and facial recognition sensitivity.

* **Preconditions**: Admin is logged in.
* **Test Steps**:
  1. Admin navigates to the Configuration Panel.
  2. Admin updates settings such as:
     + Attendance thresholds (e.g., sending an alert when a student misses more than 2 classes).
     + Facial recognition sensitivity.
     + Session duration and cutoff time.
  3. Changes are saved and applied instantly.
* **Expected Result**:
  1. Admin can customize system settings in real-time.
  2. Changes reflect dynamically without restarting the system.

A screenshot of a computer

AI-generated content may be incorrect.

**TS-013: Real-Time Info Logs for Admin (CMD-Themed Monitoring Panel)**

**Description**: Ensure admins can view real-time logs of system events in a command-line interface.

* **Preconditions**: Admin is logged in; the system is actively processing events.
* **Test Steps**:
  1. Admin navigates to the "System Logs" panel.
  2. A real-time scrolling log display shows categorized entries like:
     + [INFO] Regular activities.
     + [DEBUG] Debugging info.
     + [WARNING] Non-critical issues.
     + [CRITICAL] Severe issues.
  3. Logs refresh dynamically without page reload.
  4. Admin can filter logs by severity and export if needed.
* **Expected Result**:
  1. Logs display in real-time with color-coded severity.
  2. Admin can quickly identify and address system issues.
  3. Critical warnings trigger immediate notifications.

A screenshot of a computer

AI-generated content may be incorrect.

**TS-014: User Management for Admin (Faculty & Student Management Panel)**

**Description**: Ensure admins can efficiently manage faculty and student records with search and filtering options.

* **Preconditions**: Admin is logged in; system has existing student and faculty records.
* **Test Steps**:
  1. Admin accesses the "User Management" panel.
  2. Admin can filter and search for users based on:
     + Name, ID, course, or department.
  3. Admin can update user details, including:
     + Name, email, role, and attendance records.
  4. Admin can apply bulk actions for user updates or deactivations.
  5. Admin can delete or deactivate users, with changes logged for future reference.
* **Expected Result**:
  1. Users are easily filtered and searched.
  2. Admin can update records in real-time.
  3. Bulk actions and deletions are processed effectively.
  4. Modifications are logged for auditing.

A screenshot of a computer

AI-generated content may be incorrect.

**TS-015: Preventing Spoofing and Unauthorized Attendance Marking**

**Description**: Ensure anti-spoofing measures prevent fake attendance marking.

* **Preconditions**: A user attempts to spoof the system.
* **Test Steps**:
  1. The system detects liveness factors like face depth, environmental conditions, and liveness detection.
  2. If a static image or video is detected, attendance is denied.
  3. A security alert is triggered for admins.
* **Expected Result**:
  1. Fake attendance attempts fail.
  2. Admin logs suspicious attempts for further review.

A screen shot of a computer

AI-generated content may be incorrect.

**TS-016: Role-Based Access Control**

**Description**: Ensure users (admin, faculty, and students) have appropriate access levels.

* **Preconditions**: Users have designated roles assigned.
* **Test Steps**:
  1. Admin logs in and verifies full access.
  2. Faculty logs in and verifies attendance management access.
  3. Students log in and verify they can only view their own attendance.
* **Expected Result**:
  1. Admin has full control over configurations and reports.
  2. Faculty can only manage attendance and view related data.
  3. Students can only see their personal attendance records.