

COMP3019J University Website Project

Design Document

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Group 20

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1 Introduction

1.1 Project Goals

The primary goal of this project is to design and implement a comprehensive university website that offers a personalized and functional experience for different types of users. The website will provide students, teachers, library staff and other security personnel with an interface to manage their profiles, interact with others, and access university resources based on their roles. The website is expected to enhance user engagement, facilitate communication, and streamline administrative processes within the university.

1.2 Target Users and Use Cases

The target users of the website include students, teachers, library staff, security personnel, administrative staff and external visitors. Each user type has specific features tailored to their role:

- **Students:** Students will have access to their dashboard, which display timetables, profiles, and enrolled courses. They can register for courses, check their grades, interact with teachers and fellow students, view library collections, and check their own borrowing history, as well as manage their electric bike licenses.
- **Teachers:** Teachers will have a dashboard that shows the courses they teach, timetable, profiles, and office location. They can create and manage courses, interact with students, view library collections.
- **Library staff:** Library staff will have access to features that allow them to manage book inventories, track book loans, and assist users with book reservations. They can also update library resources and monitor the availability of digital content for users.
- **Security personnel:** Security personnel will manage electric bike licenses and oversee vehicle registrations on campus.
- **Administrative staff:** Administrative users will have full control over the system, including managing user registrations, overseeing course creation, and handling overall database management to ensure smooth system operation.
- **External visitors:** Unregistered users will have limited access to parts of the website, such as viewing general information about the university, available library resources without the ability interact with internal functions.

1.3 Technological Stack Overview

The university website will be built using a modern and robust technological stack to ensure reliability, security, and scalability. The core technologies to be used include:

- **Frontend:** The user interface will be developed using HTML, CSS, and JavaScript to create an interactive and responsive design. Libraries like Bootstrap or Material UI may be incorporated for consistent styling across the website.

- **Backend:** The server-side logic will be implemented using Flask (Python), providing a flexible framework for managing user authentication, database interactions, and session management.
- **Database:** MySQL will be used as the primary database management system to store user profiles, course data, library resources, electric bike licenses, and forum information. The database will include the design of tables with appropriate relationships, such as primary and foreign keys, to ensure data integrity and support efficient querying and management.
- **Security:** The website will ensure secure handling of sensitive data, such as passwords, using encryption mechanisms. Proper user authentication and authorization will be implemented to protect user privacy and data access.

This technology stack has been chosen for its simplicity, flexibility, and suitability for the scale of the university website project, ensuring a smooth user experience and maintainability.

2 Website Functionalities

2.1 System Use Case Overview

The following sections describe the system's functionalities. The *Common Use Cases* subsection outlines features accessible to multiple user types, such as library search and forum participation. Subsequent sections cover features unique to each user type, including course management for teachers and e-bike management for security personnel.

The Use Case Diagram is below:

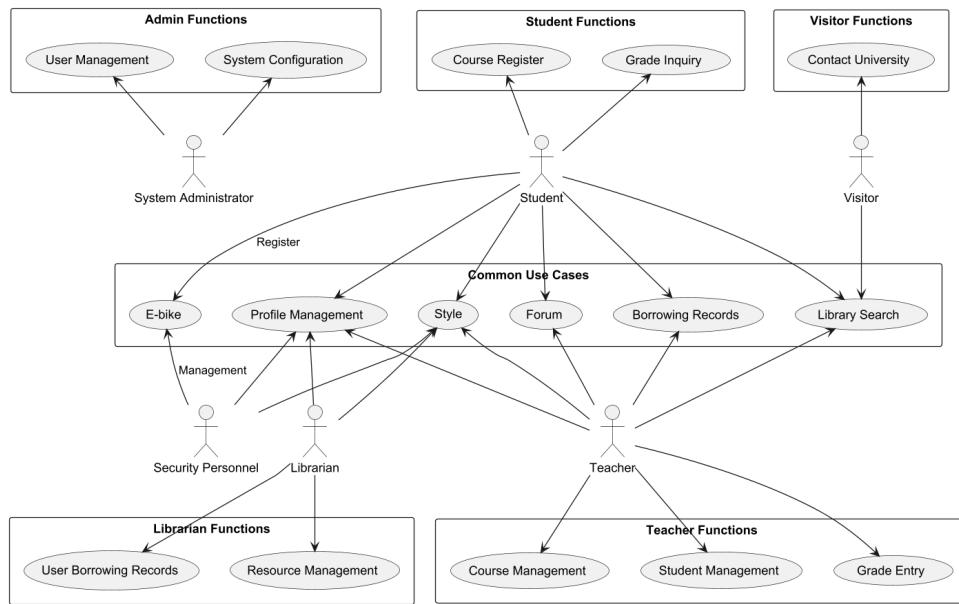


Figure 1: System Use Case Diagram

2.2 Common Use Cases

2.2.1 Library Search

Description The Library Search allows students, teachers, and visitors to search for books, journals, and articles using various criteria like title, author, or keywords. Logged-in users can also view their borrowing history. After using this feature, users obtain detailed information about resource availability and location.

Data Outcomes

- **READ** - Library resource information, availability status, resource location
- **CREATE** - Search history log entry (for logged-in users)

Related UI For the related user interface, click [Figure 5](#).

2.2.2 Borrowing Records

Description Borrowing Records enables students and teachers to view their current loans, due dates, past borrowing history, and any overdue fines. Users can also renew eligible items. After using this feature, users can track their borrowed items and manage renewals.

Data Outcomes

- **READ** - Current borrowed items, due dates, past borrowing history, fines/penalties
- **UPDATE** - Loan status and due dates (in case of renewals)
- **CREATE** - Log entry of borrowing record access

Related UI For the related user interface, click [Figure 7](#).

2.2.3 Profile Management

Description Profile Management allows students, teachers, librarians, and security personnel to update personal information such as contact details, privacy settings, and profile pictures. After using this feature, users will have updated their profile with any necessary changes reflected in the system.

Data Outcomes

- **READ** - Current profile information
- **UPDATE** - Personal details, contact information, privacy settings
- **CREATE** - Log entry of profile changes

Related UI For the related user interface, click [Figure 14](#).

2.2.4 Forum Participation

Description Forum Participation allows students and teachers to create or reply to discussion threads on various academic or campus-related topics. After using this feature, users contribute to ongoing discussions or start new ones to engage with the university community.

Data Outcomes

- **CREATE** - New forum posts or replies
- **READ** - Existing forum threads and replies
- **UPDATE** - User's forum activity status

Related UI For the related user interface, click [Figure 8](#).

2.2.5 Style Customization

Description Style Customization enables students, teachers, librarians, and security personnel to personalize the interface by adjusting settings such as color schemes and fonts. After using this feature, users will have their preferred visual settings applied, improving their experience.

Data Outcomes

- **READ** - Current style settings
- **UPDATE** - User's style preferences
- **CREATE** - Log entry of style changes

2.3 Student Functions

2.3.1 Course Register

Description The Course Register feature allows students to view available courses, register for classes, and drop courses during specified periods. After using this feature, students can view their updated course schedule, along with confirmation of their successful registrations or drops.

Data Outcomes

- **READ** - Available courses, current course schedule, course details
- **CREATE** - New course registrations
- **UPDATE** - Student's course schedule
- **DELETE** - Dropped courses from student's schedule

Related UI For the related user interface, click [Figure 11](#).

2.3.2 Grade Inquiry

Description Grade Inquiry enables students to securely access and review their academic performance, including current course grades, GPA, and past transcripts. After using this feature, students can track their progress and obtain a detailed view of their academic records without making any modifications.

Data Outcomes

- **READ** - Current course grades, historical grades, overall GPA, academic transcript
- **CREATE** - Log entry of grade inquiry access

Related UI For the related user interface, click [Figure 12](#).

2.3.3 E-bike Registration

Description E-bike Registration allows students to register their electric bicycles with the university system, including details such as brand, model, and license plate number. After using this feature, students can view their registration information and receive confirmation, while the security department is notified of the new registration.

Data Outcomes

- **CREATE** - New e-bike registration entry
- **UPDATE** - Existing e-bike information (if applicable)
- **READ** - Current e-bike registration details

Related UI For the related user interface, click [Figure 15](#).

2.4 Teacher Functions

2.4.1 Course Management

Description Course Management for teachers enables instructors to create, update, and manage course information within the university's system. Teachers can set up courses, schedule classes, and manage course materials. After using this feature, teachers ensure that students have access to up-to-date course details throughout the semester.

Data Outcomes

- **CREATE** - New course entries
- **READ** - Existing course information
- **UPDATE** - Course details, schedules, materials
- **DELETE** - Outdated course materials or information

Related UI For the related user interface, click [Figure 18](#).

2.4.2 Student Management

Description Student Management allows teachers to view and interact with the list of enrolled students. After using this feature, teachers have access to organized records of student performance, helping them provide personalized instruction.

Data Outcomes

- **READ** - Student enrollment list, individual student profiles
- **UPDATE** - Attendance records, student groupings
- **CREATE** - Log entries for student management activities

Related UI For the related user interface, click [Figure 19](#).

2.4.3 Grade Entry

Description Grade Entry allows teachers to input and update student grades for assignments, exams, and participation. After using this feature, grades are recorded, final grades calculated, and students are able to view their academic progress.

Data Outcomes

- **CREATE** - New grade entries
- **READ** - Existing grade information
- **UPDATE** - Individual assignment grades, overall course grades
- **DELETE** - Incorrect grade entries (if applicable)

Related UI For the related user interface, click [Figure 19](#).

2.5 Library Staff Functions

2.5.1 Resource Management

Description Resource Management enables librarians to oversee and maintain the library's collection of materials. This feature allows librarians to add new books, journals, and other resources, update existing information, and remove outdated or damaged items from the catalog. After using this feature, users can see the updated library catalog, ensuring access to accurate and up-to-date resources.

Data Outcomes

- **CREATE** - New resource entries in the catalog
- **READ** - Existing resource information
- **UPDATE** - Resource details (e.g., title, author, location, availability status)
- **DELETE** - Entries for resources no longer in the library collection

Related UI For the related user interface, click [Figure 24](#).

2.5.2 User Borrowing Records Management

Description User Borrowing Records Management allows librarians to oversee and manage the borrowing activities of library users. This functionality enables librarians to record new loans, process returns, manage renewals, and track user borrowing history. After using this feature, borrowing activities are accurately recorded and users can be held accountable for borrowed materials.

Data Outcomes

- **CREATE** - New borrowing record entries
- **READ** - Existing borrowing histories, due dates, fine records
- **UPDATE** - Loan statuses, renewal information, fine payments
- **DELETE** - Resolved overdue records or paid fines (if applicable)

Related UI For the related user interface, click [Figure 23](#).

2.6 Security Personnel Functions

2.6.1 E-bike Management

Description E-bike Management enables security personnel to manage and regulate electric bicycle use on campus. This feature allows security staff to review E-bike registrations, approve or reject requests, and address policy violations. After using this feature, the system ensures compliance with campus policies and helps manage parking and safety standards.

Data Outcomes

- **READ** - E-bike registration information, usage data
- **UPDATE** - Registration status, incident reports
- **CREATE** - New policy violation records, audit logs
- **DELETE** - Outdated or invalid E-bike registrations

Related UI For the related user interface, click [Figure 29](#).

2.7 Administrator Functions

2.7.1 User Management

Description User Management enables the system administrator to create, update, and manage user accounts within the university campus management system. This functionality allows the administrator to add new user accounts for students, teachers, librarians, and security personnel, modify user details, reset passwords, adjust permissions, and delete accounts. After using this feature, user accounts are maintained securely, ensuring the integrity of the system.

Data Outcomes

- **CREATE** - New user accounts
- **READ** - Existing user account information
- **UPDATE** - User account details, permissions
- **DELETE** - User accounts no longer needed

Related UI For the related user interface, click [Figure 34](#).

2.7.2 System Configuration

Description System Configuration allows the system administrator to customize and manage various settings of the university campus management system. This feature enables administrators to adjust system parameters, enforce security policies, configure course management settings, and define activity rules. After using this feature, the system remains aligned with institutional needs and security requirements.

Data Outcomes

- **READ** - Current system configuration settings
- **UPDATE** - System configuration parameters
- **CREATE** - New configuration options (if custom configurations are allowed)
- **DELETE** - Obsolete configuration options

Related UI For the related user interface, click [Figure 32](#).

2.8 Visitor Functions

2.8.1 Contact Us

Description Contact Us is a public-facing feature that allows guests to access important contact information for various university departments. This functionality provides non-registered users with email addresses, phone numbers, and physical addresses of key university offices, helping guests make inquiries. After using this feature, guests can successfully obtain the information needed to communicate with the university.

Data Outcomes

- **READ** - University and department contact information
- **CREATE** - Anonymous access log entries

Related UI For the related user interface, click [Figure 35](#).

3 Database Design

3.1 Entity-Relationship Diagrams

The database for the university website currently includes several key tables: `user`, `student_profile`, `teacher_profile`, `library_staff_profile`, `security_personnel_profile`, `course`, `course_registration`, `library_resources`, `library_loan`, `e_bike_license`, `forum_post` and `forum_reply`.

These tables represent the foundational structure for managing users and their interactions with the system, such as course enrollment and profile management. To support additional functionalities outlined in the introduction, tables have been added to manage library resources, electric bike licenses, and forum discussions. These expansions ensure that students, teachers, library staff, and security personnel can effectively interact with the system in their respective roles.

The Entity-Relationship Diagrams are on the next page:

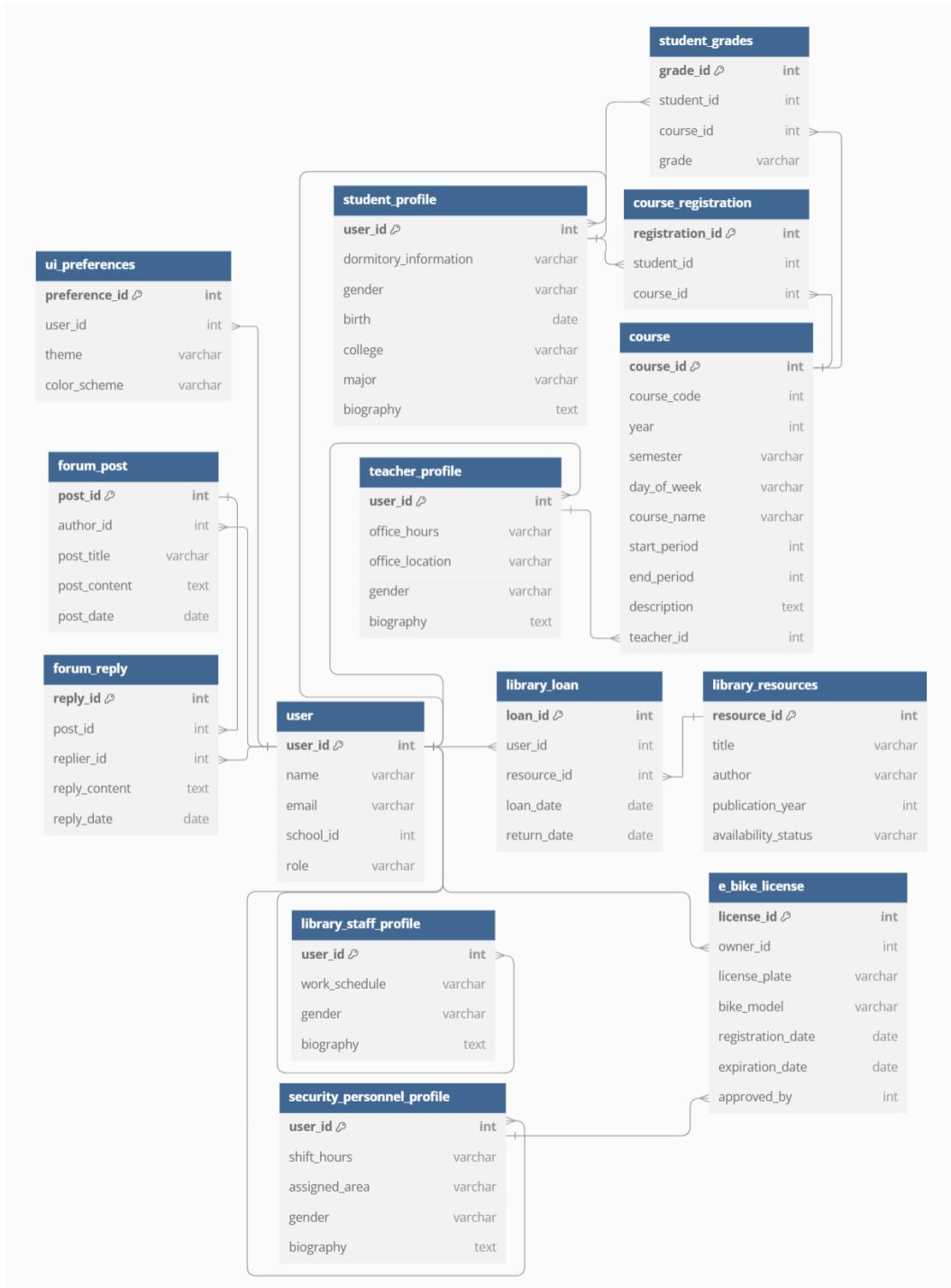


Figure 2: Entity-Relationship Diagram

3.2 Table Structures and Relationships

Below are the current and proposed tables, along with their respective fields and relationships:

- **user**: Contains user information common to all user types. Fields include:
 - `user_id` (Primary Key)
 - `name`
 - `email`
 - `school_id`
 - `role` (e.g., student, teacher, library staff, security personnel)
- **student_profile**: Stores additional information specific to students. Fields include:
 - `user_id` (Foreign Key referencing `user`)
 - `dormitory_information`
 - `gender`
 - `birth`
 - `college`
 - `major`
 - `biography`
- **teacher_profile**: Stores additional information specific to teachers. Fields include:
 - `user_id` (Foreign Key referencing `user`)
 - `office_hours`
 - `office_location`
 - `gender`
 - `biography`
- **library_staff_profile**: Stores additional information specific to library staff. Fields include:
 - `user_id` (Foreign Key referencing `user`)
 - `work_schedule`
 - `gender`
 - `biography`

- **security_personnel_profile:** Stores additional information specific to security personnel. Fields include:
 - `user_id` (Foreign Key referencing `user`)
 - `shift_hours`
 - `assigned_area`
 - `gender`
 - `biography`
- **course:** Contains information about the courses offered. Fields include:
 - `course_id` (Primary Key)
 - `course_code`
 - `year`
 - `semester`
 - `day_of_week`
 - `course_name`
 - `start_period`
 - `end_period`
 - `description`
 - `teacher_id` (Foreign Key referencing `teacher_profile`)
- **course_registration:** Tracks student registrations for courses. Fields include:
 - `registration_id` (Primary Key)
 - `student_id` (Foreign Key referencing `student_profile`)
 - `course_id` (Foreign Key referencing `course`)
- **student_grades:** Stores student's grade for each course. Fields include:
 - `grade_id` (Primary Key)
 - `student_id` (Foreign Key referencing `student_profile`)
 - `course_id` (Foreign Key referencing `course`)
 - `grade` (The grade received by the student)
- **library_resources:** Manages library books and resources. Fields include:
 - `resource_id` (Primary Key)
 - `title`
 - `author`
 - `publication_year`
 - `availability_status`

- **library_loan:** Tracks book loans by students and other users. Fields include:
 - `loan_id` (Primary Key)
 - `user_id` (Foreign Key referencing `user`)
 - `resource_id` (Foreign Key referencing `library_resources`)
 - `loan_date`
 - `return_date`
- **e_bike_license:** Manages electric bike licenses for students, teachers, and library staff. Fields include:
 - `license_id` (Primary Key)
 - `owner_id` (Foreign Key referencing `user`)
 - `license_plate`
 - `bike_model`
 - `registration_date`
 - `expiration_date`
 - `approved_by` (Foreign Key referencing `security_personnel_profile`)
- **forum_post:** Stores user-created posts for the forum. Fields include:
 - `post_id` (Primary Key)
 - `author_id` (Foreign Key referencing `user`)
 - `post_title`
 - `post_content`
 - `post_date`
- **forum_reply:** Stores user replies to forum posts. Fields include:
 - `reply_id` (Primary Key)
 - `post_id` (Foreign Key referencing `forum_post`)
 - `replier_id` (Foreign Key referencing `user`)
 - `reply_content`
 - `reply_date`
- **ui_preferences:** Stores user preferences for the UI interface. Fields include:
 - `preference_id` (Primary Key)
 - `user_id` (Foreign Key referencing `user`)
 - `theme` (Preferred UI theme, e.g., light, dark)
 - `color_scheme` (Preferred color scheme, e.g., blue, green)

3.3 Primary and Foreign Key Design

Each table contains a primary key that uniquely identifies each record. Foreign keys are used to establish relationships between users and the entities they interact with. For example:

- The `user_id` field in `student_profile`, `teacher_profile`, `library_staff_profile`, and `security_personnel_profile` links the profiles to the core `user` table.
- The `course_id` field in `course_registration` and `student_grades` links students to the courses they have enrolled in and the grades they have received.
- The `license_id` in the `e_bike_license` table allows students to register electric bikes, which are approved by security personnel.
- The `post_id` and `reply_id` in the `forum_post` and `forum_reply` tables link forum posts and their replies to the users who created them.
- The `user_id` field in the `ui_preferences` table links users to their personalized interface settings, such as theme, font size, and color scheme.

3.4 Data Population Strategy

The initial data for the `user`, `course`, and `library_resources` tables will be seeded by administrators during development and testing phases. As users interact with the system, data will be dynamically added to the `course_registration`, `student_grades`, `library_loan`, `e_bike_license`, `forum_post`, `forum_reply`, and `ui_preferences` tables. The system will ensure that all data remains up-to-date and consistent across these entities, allowing users to track their course registrations, grades, library loans, and personalized interface preferences.

4 Web Page Design

4.1 Overview

The following sections provide an overview of the user interface elements. The *Mockups for common functions* subsection presents interfaces accessible by multiple user types, such as the library search page and profile management. Subsequent sections detail user-specific interfaces, including course management for teachers and e-bike registration for students.

4.2 Mockups for common functions

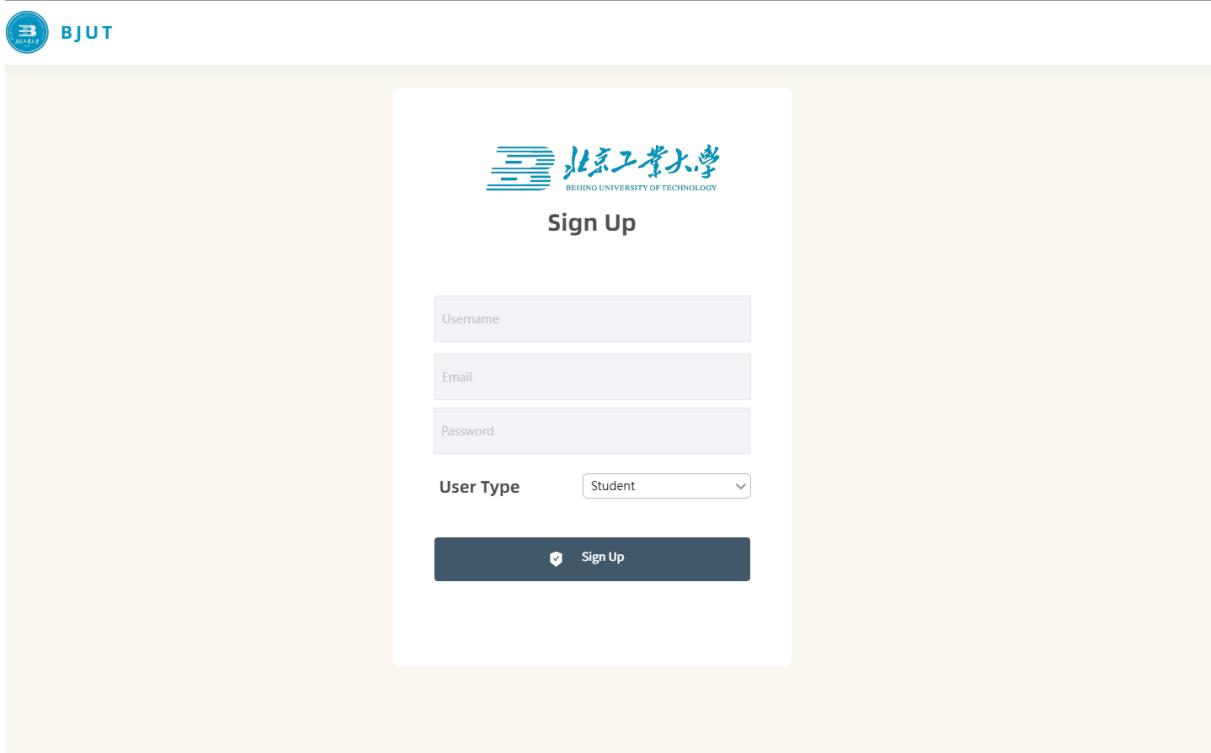


Figure 3: Register Page

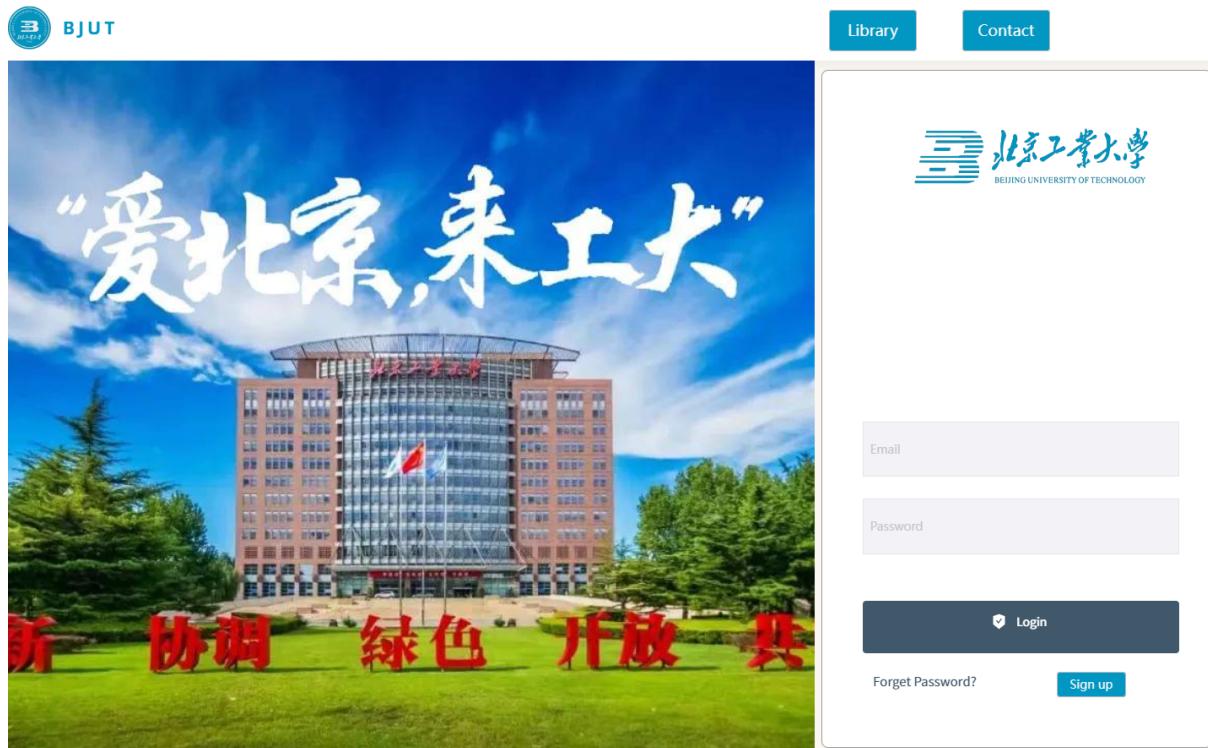


Figure 4: Login Page

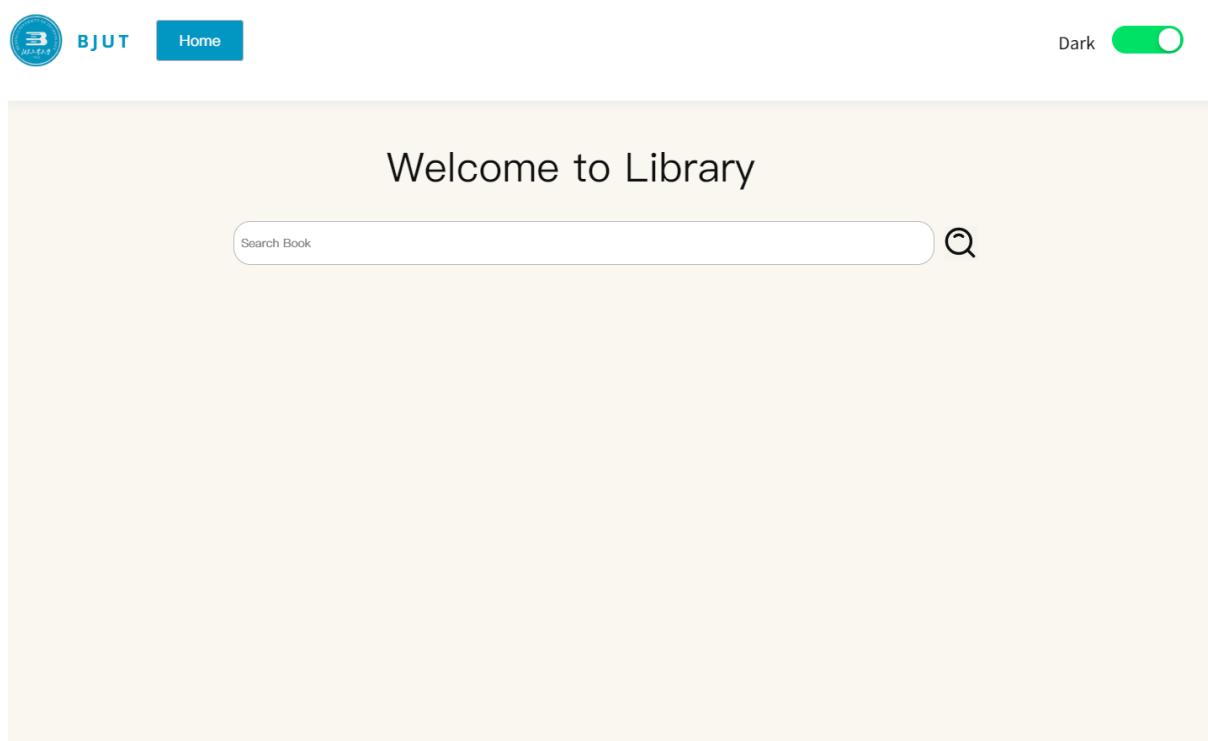


Figure 5: Book Searching Page

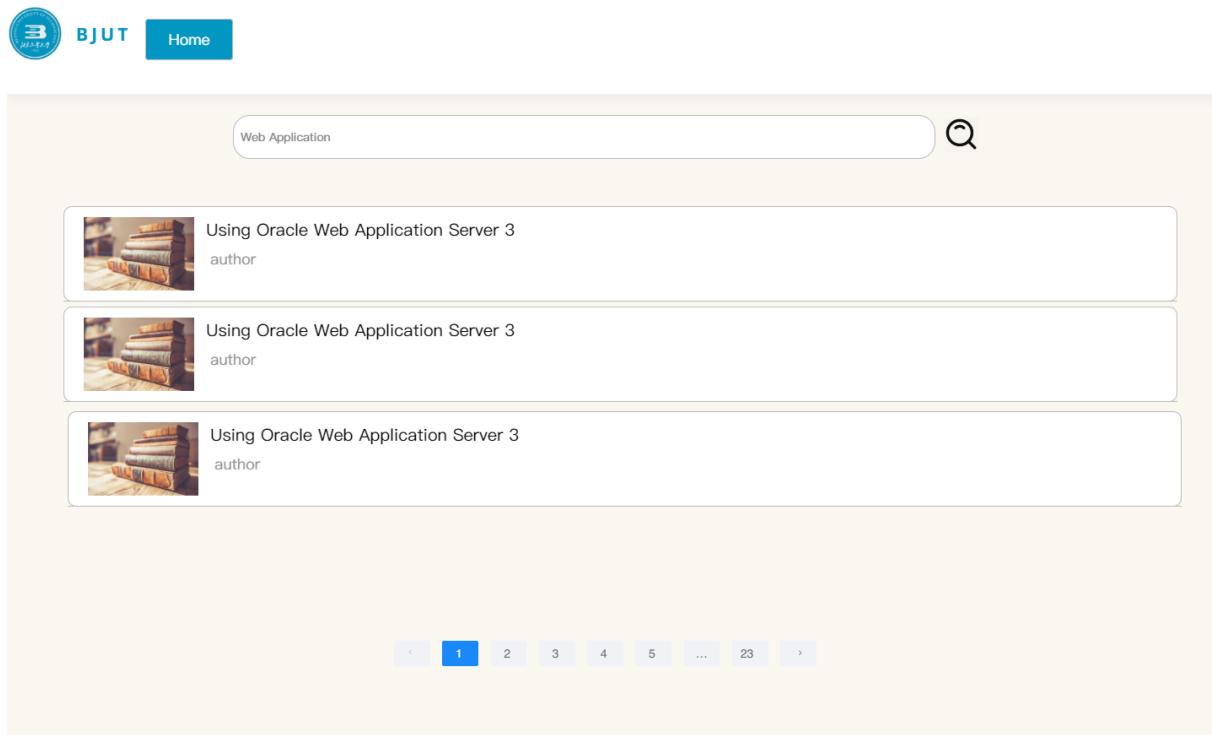


Figure 6: Book Searching Result Page

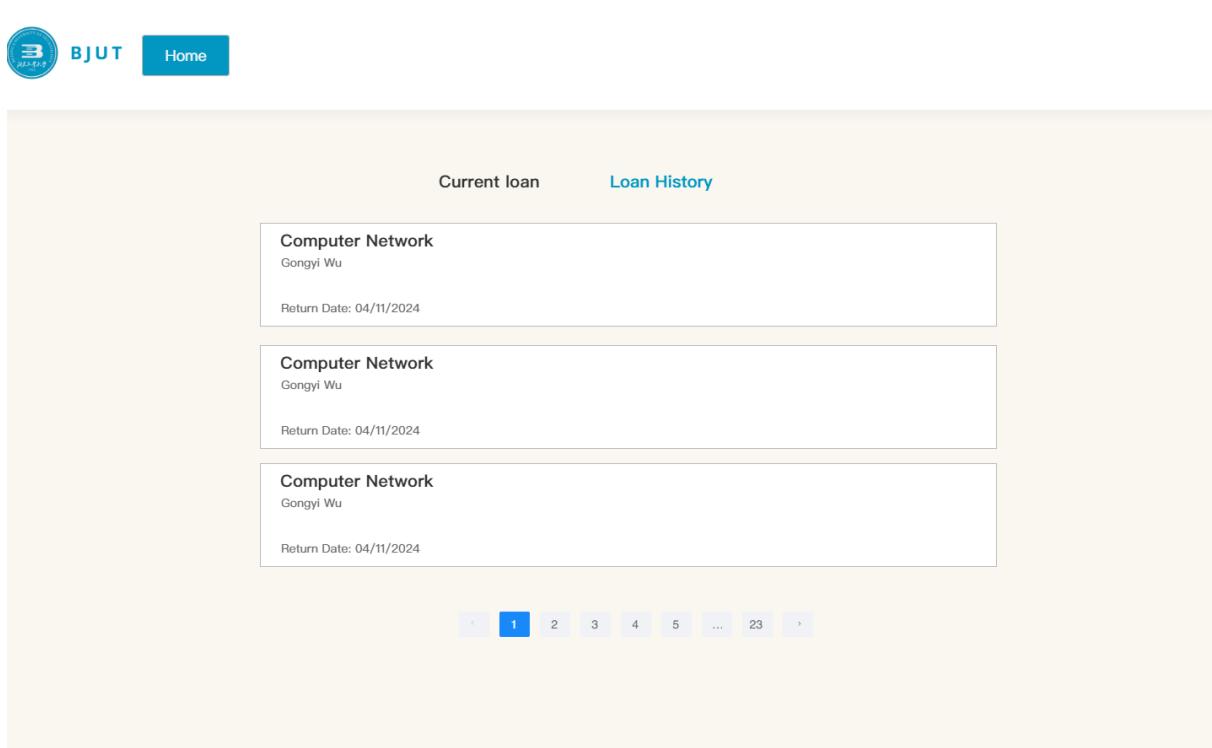


Figure 7: Loan Record Page

The screenshot shows the BJUT Forum page. At the top left is the university's logo and name. On the right, there is a large, dark, blurred image. Below the header, a blue button on the left says "Create Thread". The main area is titled "BJUT Forum" and contains a list of posts:

- Free Tutoring Sessions Available by Bohan Zhang (2 replies)
- Join the Photography Club! by Le Liu (8 replies)
- Lost and Found: Blue Backpack by Yunhan Gao (20 replies)

Figure 8: Forum Page

The screenshot shows a detailed view of a post in the forum. At the top left is the university's logo and name. On the right, there is a large, dark, blurred image. The post title is "Free Tutoring Sessions Available". The post content is:

Hey everyone,
I wanted to let you know that the Student Learning Center is offering free tutoring sessions for various subjects, including Math, Science, and English. It's a great opportunity to get extra help and improve your grades.
For more information, visit the Student Learning Center website or contact [Contact Information].

Best Bohan Zhang

Comments

Submit Comment

A comment section is shown below:

 Thank your information.

Figure 9: Forum Detail Page

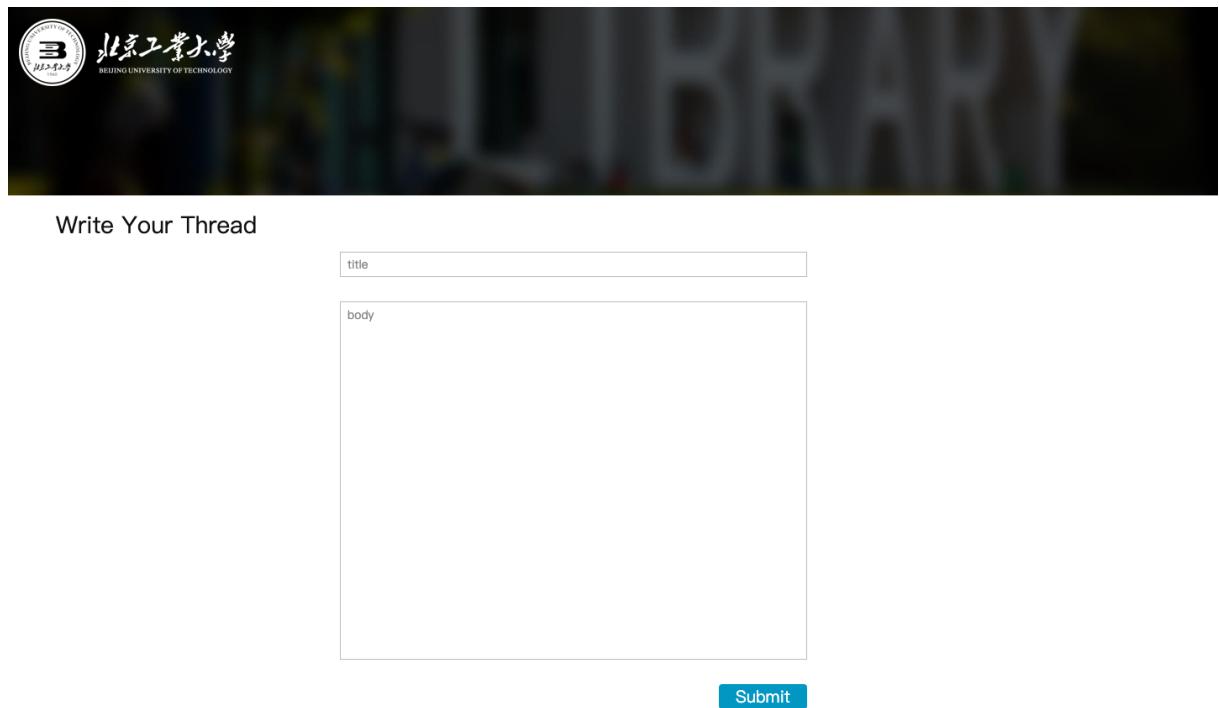


Figure 10: Posting Page

4.3 Mockups for student functions

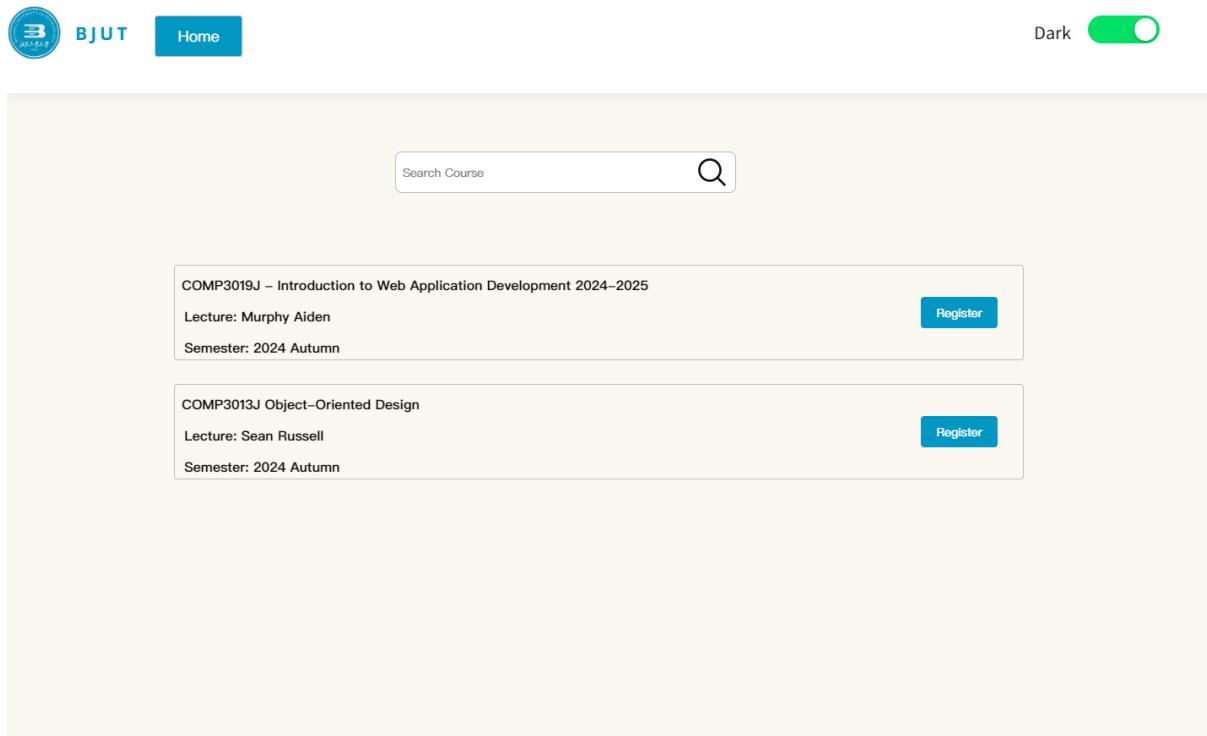


Figure 11: Add Course Page

Results

Major	Stage	Status	Attempted Credits	Earned Credits	Stage GPA	Award	Award Description	Award GPA
Software Engineering (CSS7)	Stage 1	Complete	60	60	3.65	N/A		

Course Work

Semester Description	CRN	Module	Module Title	Stage	Credits	Grade	Compensation Available
Spring Trimester	12754	ARCH1001J	Ireland - Landscape, Heritage and Culture	Stage 1	5.00	A+	
Autumn Trimester	13126	BDIC1014J	Linear Algebra (Engineering)	Stage 1	5.00	B	
Spring Trimester	12755	BDIC1015J	University Physics	Stage 1	5.00	A+	
Autumn Trimester	13129	BDIC1029J	Maths (Engineering) 1	Stage 1	5.00	A+	
Autumn Trimester	13130	BDIC1030J	Maths (Engineering) 2	Stage 1	5.00	B+	
Spring Trimester	13123	BDIC1031J	Maths (Engineering) 3	Stage 1	5.00	A-	
Spring Trimester	13124	BDIC1032J	Maths (Engineering) 4	Stage 1	5.00	B	
Autumn Trimester	25408	BDIC1047J	English for University Studies at BDIC	Stage 1	5.00	C+	
Spring Trimester	25409	BDIC1048J	English Gen Academic Purposes at BDIC	Stage 1	5.00	B-	
Spring Trimester	12805	COMP1003J	Introduction to Software (B)	Stage 1	5.00	B+	

Figure 12: Grade Page

My Courses

Search Course Q

COMP3019J – Introduction to Web Application Development 2024–2025	Drop
Lecture: Murphy Aiden	
Semester: 2024 Autumn	

COMP3013J Object–Oriented Design	Drop
Lecture: Sean Russell	
Semester: 2024 Autumn	

COMP3013J Object–Oriented Design	Drop
Lecture: Sean Russell	
Semester: 2024 Autumn	

< 1 2 3 4 5 ... 23 >

Figure 13: My Course Page

The screenshot shows a user profile page. At the top right is a 'Dark' mode toggle switch. Below the header are sections for 'Basic Info' and 'Student Info'. In 'Basic Info', fields include ID (22207256), Name (Bohan Zhang), Email (email), Gender (Male), and Birth (年/月/日). In 'Student Info', fields include College (SE) and Dorm (11-A116). There is also a Major field. A large text area for 'Biography' contains placeholder text '请输入'. A blue 'Save' button is located at the bottom left.

Figure 14: Profile Page

The screenshot shows an 'E-bike Registration' form. It includes fields for Bike Model (dropdown menu with placeholder '请选择'), Color (text input with placeholder '请输入内容'), License Plate Number (text input with placeholder '请输入内容'), Owner ID (text input with placeholder '请输入内容'), and Owner name (text input with placeholder '请输入内容'). At the bottom are 'Submit' and 'Cancel' buttons.

Figure 15: E-bike Registration Page

The screenshot shows the Student Dashboard of a university website. At the top, there is a navigation bar with the BJUT logo, Home, E-bike Registration, Library, Forum, and a Dark mode toggle switch. The main content area includes:

- User Profile:** Shows Bohan Zhang, Student. Includes a profile picture, a "Login Out" button, and two buttons: "My Loan" and "Grade".
- Profile Information:** A table with columns for ID, Name, Gender, Birth, Email, Office Hour, College, Major, and Dorm Information.
- Timetable:** A grid showing a weekly schedule from Monday to Friday across 10 periods.
- Biography:** A section for entering personal details.
- Courses:** A list of courses taken this semester, with "My Course" being the active tab. The list includes: COMP3019J – Introduction to Web Application Development 2024–2025, and COMP3019J – Introduction to Web Application Development 2024–2025.

Figure 16: Student Dashboard

4.4 Mockups for teacher functions

The screenshot shows a web page titled "Add Courses". At the top left is the BJUT logo. To its right is a "Home" button. The main form area has the following fields:

Course Name	<input type="text"/>
Course Code	<input type="text"/>
Year	<input type="text"/>
Semester	<input type="text"/>
day of week	<input type="text"/> Week 1-16 Monday(1-2) Friday(3-4)
start_period	<input type="text"/>
end_period	<input type="text"/>
teacher_id	<input type="text"/>
description	<input type="text"/> 请输入

At the bottom left of the form area is a blue "Create" button.

Figure 17: Add Course Page (Teacher)

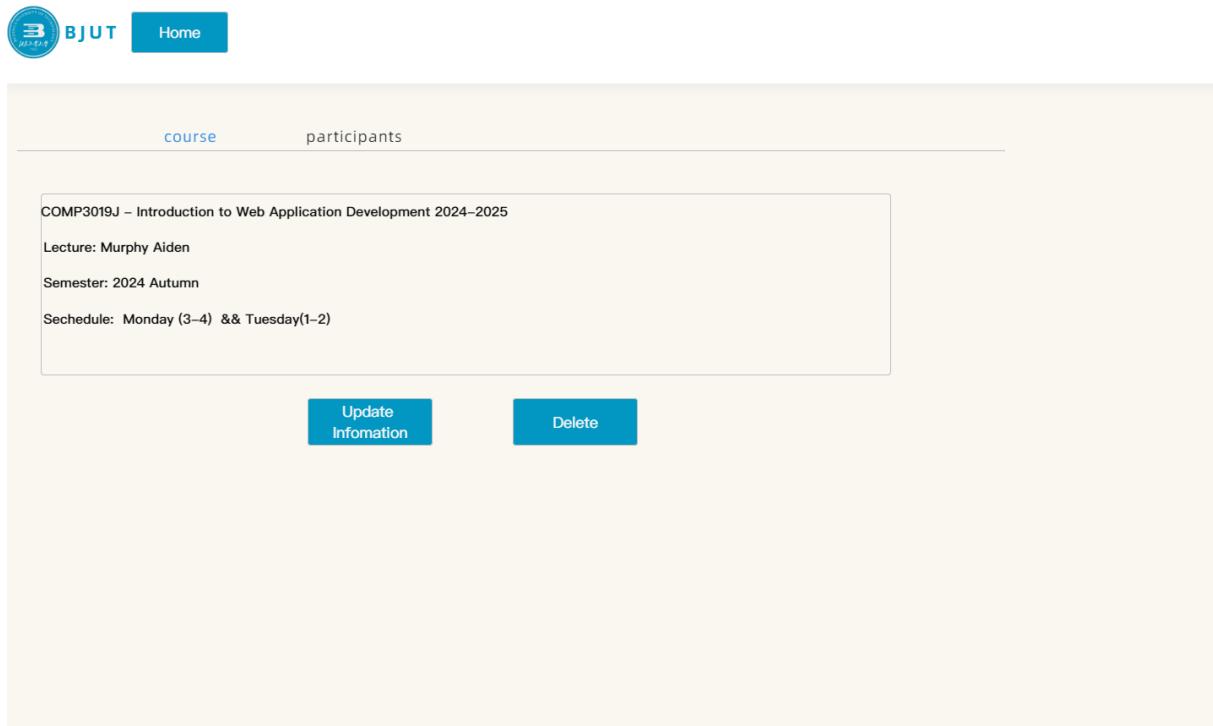


Figure 18: Course Detail Page

Name	Role	Operation
Bohan Zhang	Student	Grade Delete
Yunhan Gao	Student	Grade Delete
Le Liu	Student	Grade Delete

< 1 ... 50 51 52 53 54 ... 90 >

Figure 19: Grade Page

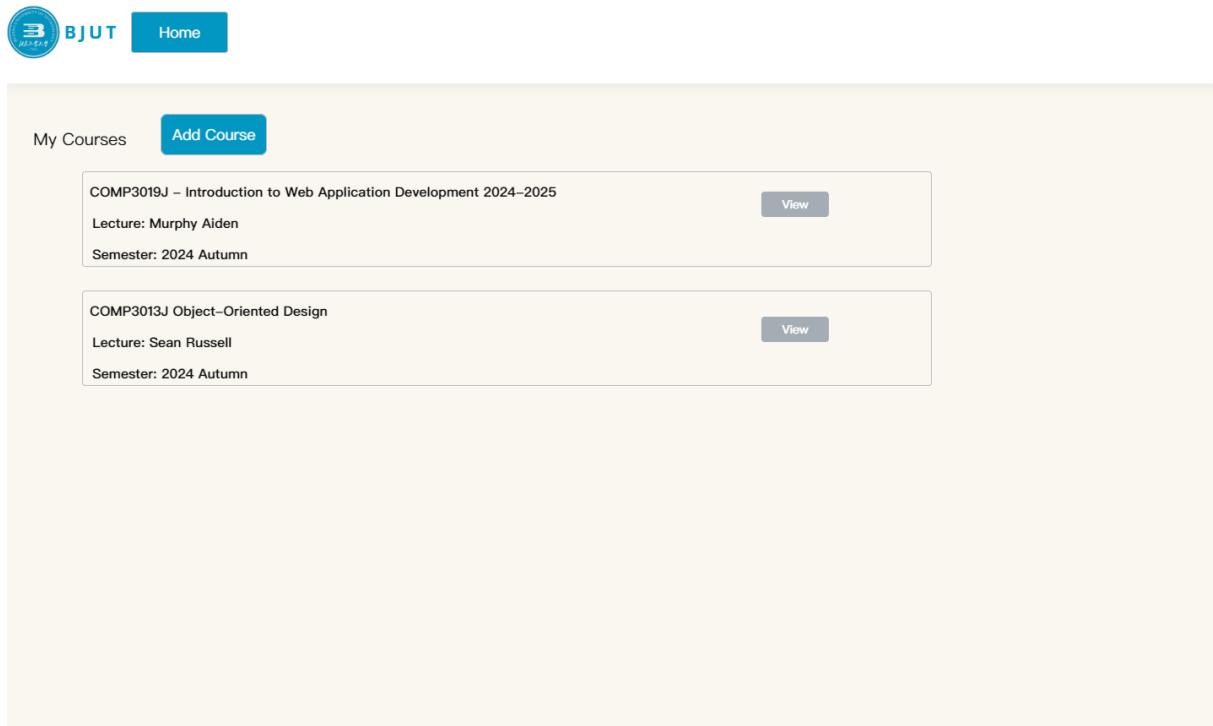


Figure 20: My Courses Page

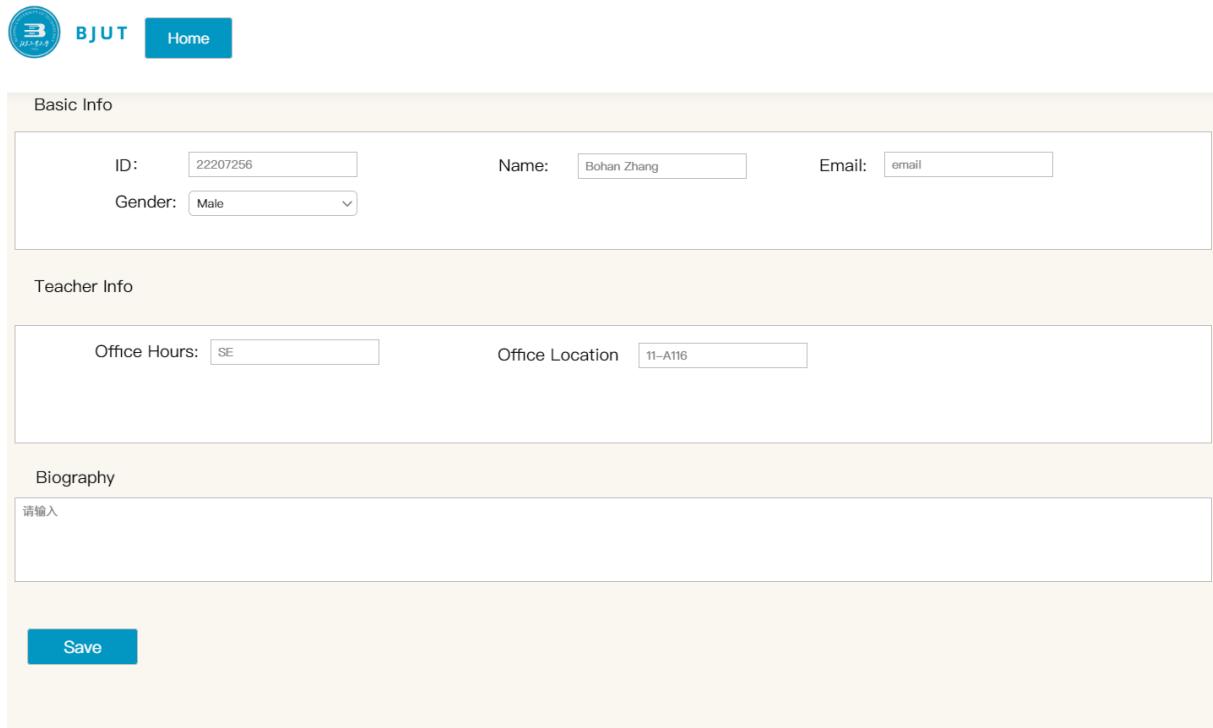
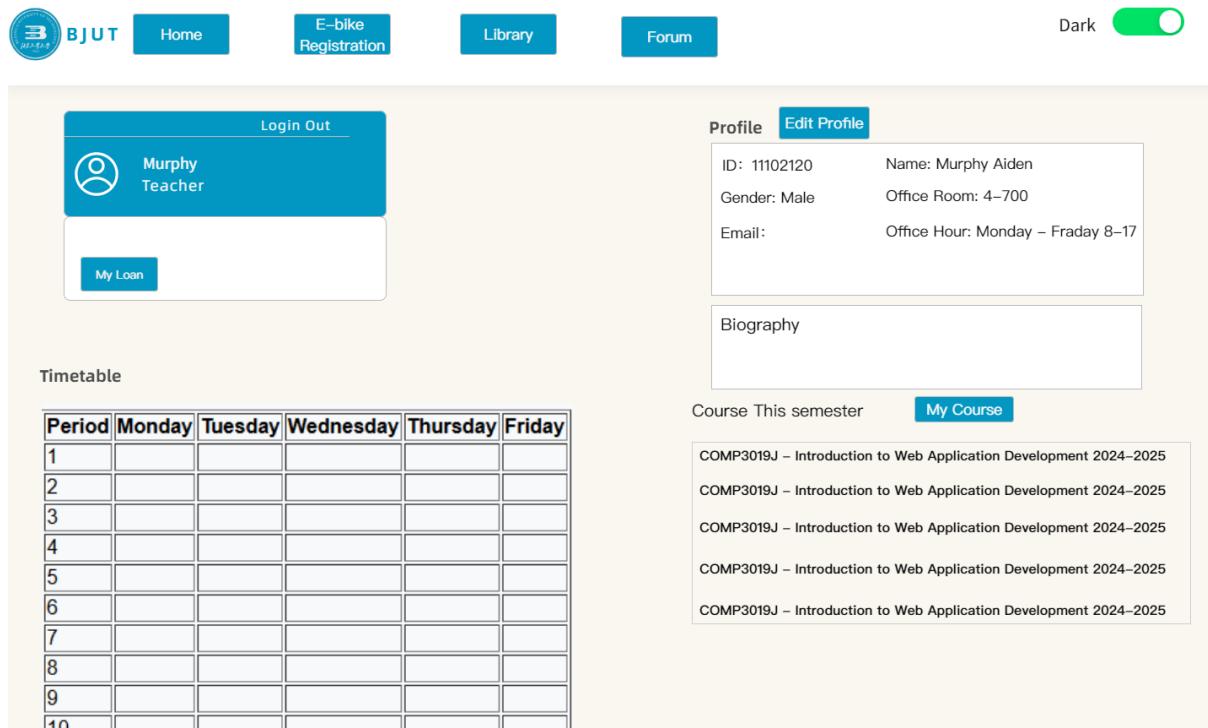


Figure 21: Profile Page



The screenshot shows a teacher dashboard with a dark mode toggle at the top right. The header includes the BJUT logo, a navigation bar with Home, E-bike Registration, Library, and Forum buttons, and a dark mode toggle. On the left, there's a sidebar with a login/out button, a user profile for Murphy (Teacher), and a My Loan button. The main content area has tabs for Profile (selected) and Edit Profile. It displays personal information: ID: 11102120, Name: Murphy Aiden, Gender: Male, Office Room: 4-700, Email: (redacted), and Office Hour: Monday – Friday 8–17. Below this is a Biography section. Further down, there are tabs for Course (selected) and My Course. Under Course, it lists five courses: COMP3019J – Introduction to Web Application Development 2024–2025, repeated four times.

Figure 22: Teacher Dashboard

4.5 Mockups for library staff functions

The screenshot shows a web application interface for inputting loan records. At the top left is the BJUT logo. To its right are navigation links for 'Home' and a 'Dark' mode toggle switch. The main content area has a light beige background. At the top center are two buttons: 'Input Loan Records' on the left and 'Loan History' on the right. Below these buttons is a form for entering loan details. The form consists of five input fields arranged vertically: 'Loan ID' (value: 000012), 'User ID' (value: 22207256), 'resource Id' (value: 22207256), 'Checkout Date' (placeholder: 年/月/日, with a calendar icon), and 'Due Date' (placeholder: 年/月/日, with a calendar icon). A blue 'Save' button is located at the bottom of the form.

Figure 23: Add Loan Page

Add Resource

Resource ID:	000012
Title:	Web
Author:	22207256
Publication Year	2000
Availability Status	available

Save

Figure 24: Add Resource Page

Login Out

Lee
Librarian

Resource Management

User Loan Records

Profile

ID: 33307256	Name: Lee
Gender: Male	Work Schedule: Monday–Friday 9:00– 17:00

Biography

Lee is a dedicated librarian with 10 years of experience in managing library resources and assisting users. Passionate about making the library a welcoming place, he strives to support learning and discovery for all patrons.

Edit Profile

Figure 25: Library Dashboard

The screenshot shows a web application interface for managing library loans. At the top, there is a navigation bar with the BJUT logo, a 'Home' button, and a 'Dark' toggle switch. The main content area is titled 'Input Loan Records' and 'Loan History'. It displays three entries for the book 'Computer Network' by Gongyi Wu:

- The first two entries show the book has been 'Returned'.
- The third entry shows the book was checked out on 04/10/2024 and is due on 04/11/2024. It includes a 'Check in' button.

At the bottom, there is a pagination control with buttons for 1, 2, 3, 4, 5, ..., 23, and >.

Figure 26: Loan History Page

The screenshot shows a web application interface for managing resources. At the top, there is a navigation bar with the BJUT logo, a 'Home' button, and a 'Dark' toggle switch. The main content area features a search bar with a magnifying glass icon and a button labeled 'Add Resources'. Below the search bar, there are three resource entries:

Image	Resource Details	Actions
	Using Oracle Web Application Server 3 author	Edit Resources Delete Resources
	Using Oracle Web Application Server 3 author	Edit Resources Delete Resources
	Using Oracle Web Application Server 3 author	Edit Resources Delete Resources

At the bottom, there is a pagination control with buttons for 1, 2, 3, 4, 5, ..., 23, and >.

Figure 27: Manage Resource Page

The screenshot shows a user profile page for a student named Bohan Zhang. At the top, there is a navigation bar with the BJUT logo, a 'Home' button, and a 'Dark' toggle switch which is currently turned on. Below the navigation bar, the page has a light beige background. The first section is titled 'Basic Info' and contains four input fields: 'ID' (22207256), 'Name' (Bohan Zhang), 'Gender' (Male), and 'Work Schedule' (Working Day 9-17). The next section is titled 'Biography' and features a large text input field with placeholder text '请输入'. A blue 'Save' button is located at the bottom left of this section.

Figure 28: Profile Page

4.6 Mockups for security personnel functions

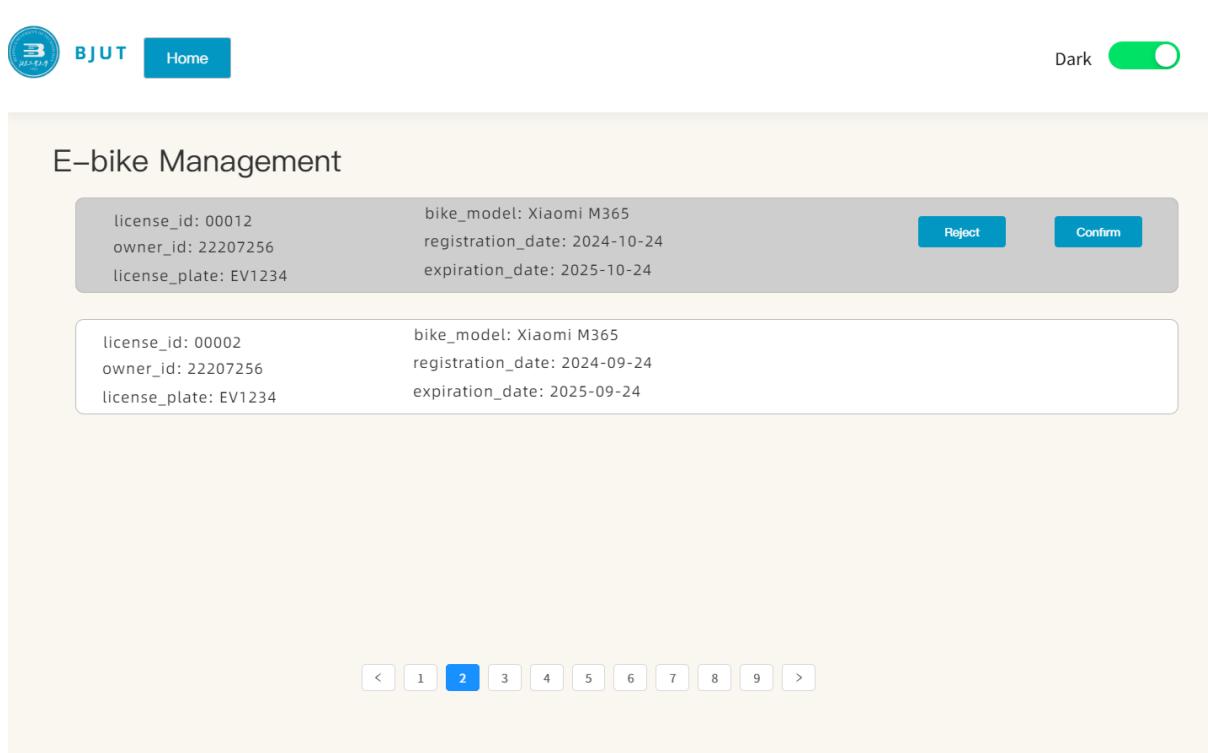
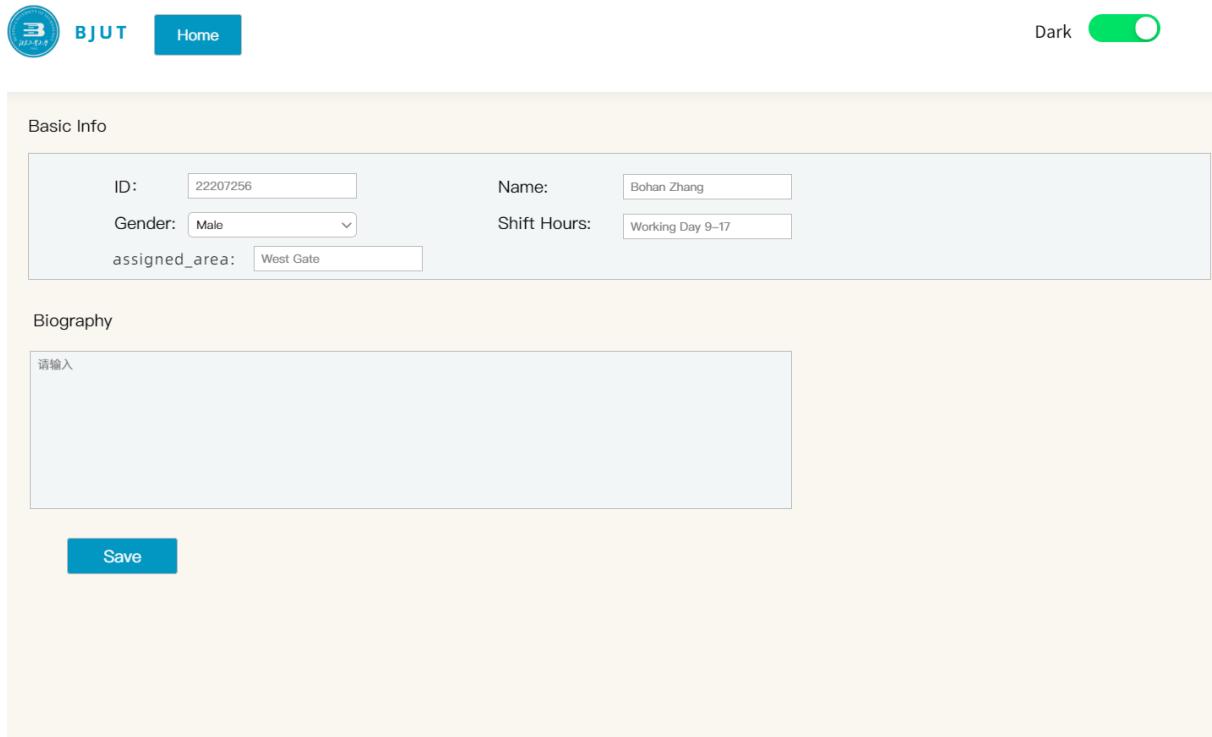


Figure 29: E-bike Management Page

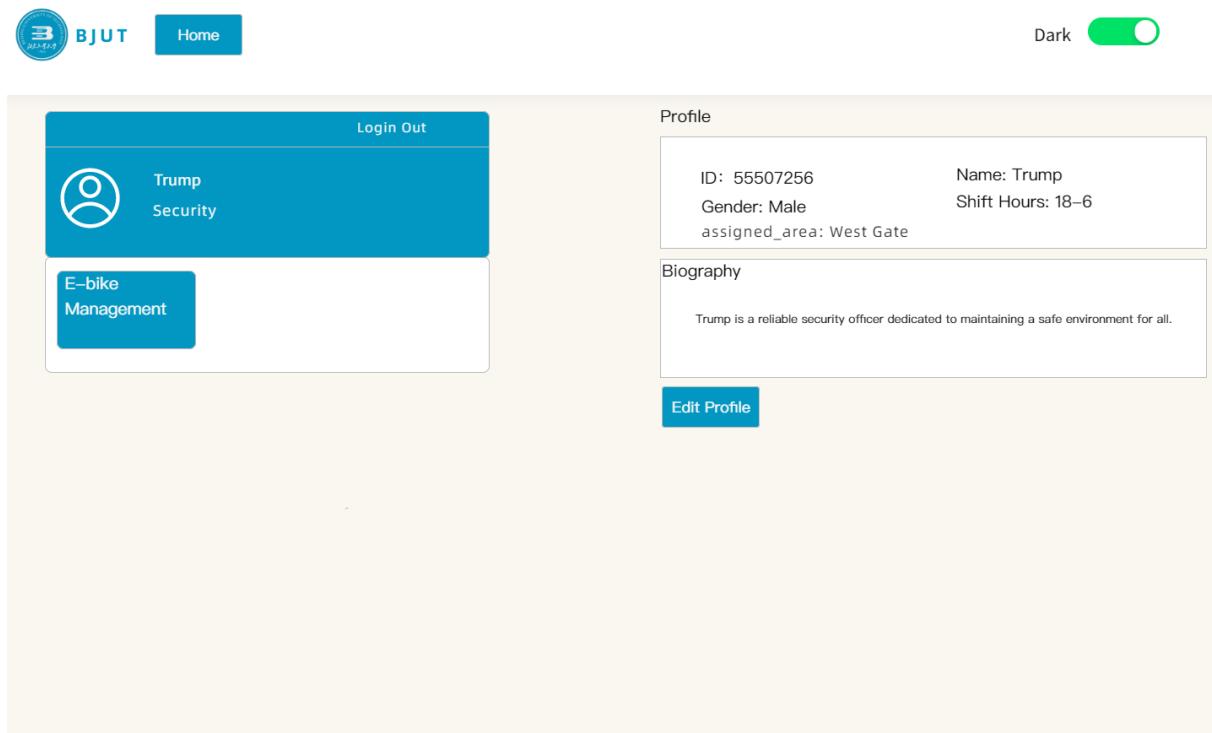


The screenshot shows the profile page for a security personnel member. At the top, there is a BJUT logo, a 'Home' button, and a 'Dark' toggle switch. The main content area is titled 'Basic Info' and contains the following fields:

ID:	22207256	Name:	Bohan Zhang
Gender:	Male	Shift Hours:	Working Day 9-17
assigned_area:	West Gate		

Below this is a 'Biography' section with a text input field containing placeholder text '请输入'. A 'Save' button is located at the bottom left of the profile section.

Figure 30: Profile Page (Security Personnel)



The screenshot shows the security dashboard. At the top, there is a BJUT logo, a 'Home' button, and a 'Dark' toggle switch. The dashboard features a sidebar on the left with a user icon, the name 'Trump', and the title 'Security'. Below the sidebar is a button labeled 'E-bike Management'. The main content area is divided into two sections: 'Profile' and 'Biography'.

Profile

ID: 55507256	Name: Trump
Gender: Male	Shift Hours: 18-6
assigned_area: West Gate	

Biography

Trump is a reliable security officer dedicated to maintaining a safe environment for all.

A 'Edit Profile' button is located at the bottom of the biography section.

Figure 31: Security Dashboard

4.7 Mockups for administrator functions

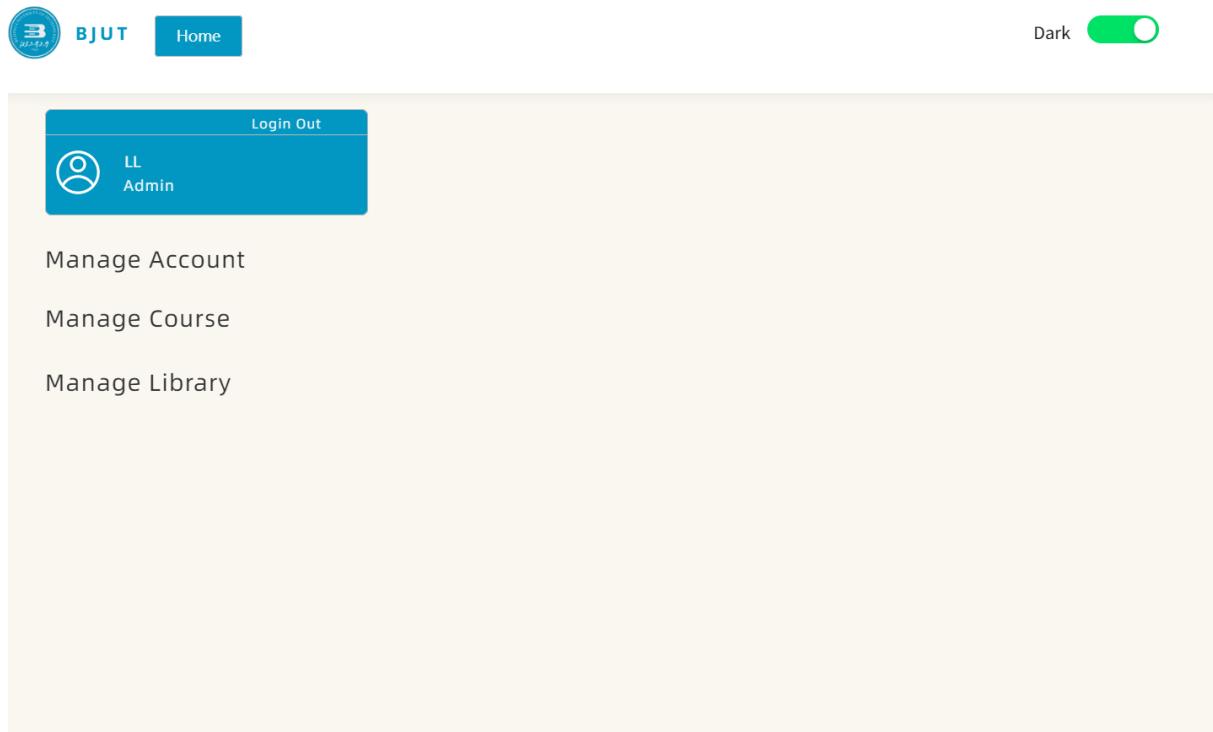


Figure 32: Admin Dashboard

The screenshot shows a web application interface for managing courses. At the top left is the BJUT logo. To its right are 'Home' and 'Dark' mode toggle buttons. Below the header is a section titled 'Manage Courses' with a 'Add Course' button. Two course entries are listed in a table:

COMP3019J – Introduction to Web Application Development 2024–2025	View
Lecture: Murphy Aiden	Delete
Semester: 2024 Autumn	

COMP3013J Object–Oriented Design	View
Lecture: Sean Russell	Delete
Semester: 2024 Autumn	

At the bottom of the page is a navigation bar with numbered buttons from 1 to 9, with the number 2 highlighted in blue.

Figure 33: Course List Page

The screenshot shows a web application interface for managing user accounts. At the top left is the BJUT logo. To its right are 'Home' and 'Dark' mode toggle buttons. Below the header is a section titled 'Manage Account' with a 'Create account' button. Three account entries are listed in a table:

Bohan Zhang	Edit	Det
Role: Student		

Bohan Zhang	Edit	Det
Role: Student		

Bohan Zhang	Edit	Det
Role: Student		

At the bottom of the page is a navigation bar with numbered buttons from 1 to 9, with the number 2 highlighted in blue.

Figure 34: User Account Management Page

4.8 Mockups for visitor functions



CONTACT

International Office

Phone: 86-10-6739-2071 (Office of International Affairs)

86-10-6739-1859 (Office of International Faculty and Foreign Expert Affairs)

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internationalfaculty@bjut.edu.cn (Office of International Faculty and Foreign Expert Affairs)

hkmctw@bjut.edu.cn (Office of Hong Kong, Macao and Taiwan Affairs)

Figure 35: Contact Page

4.9 Color Schemes and Style Guidelines

The interface uses a consistent blue and white color scheme aligned with the university's branding. Interactive elements are highlighted with accent colors for clarity, and fonts are chosen for readability and accessibility.

4.10 User Experience Considerations

The design focuses on intuitive navigation, mobile responsiveness, and accessibility. Key elements like search, forum, and loan records are easy to locate, and feedback is provided for user actions to enhance usability.

5 Technical Details

5.1 File and Directory Structure

The project is organized in the following file and directory structure:

- **web-application/**: Root directory containing the main application, virtual environment, and project files.
 - **app/**: Contains the main application logic and related files.
 - * **admin/**: Contains administrative functionality and management scripts.
 - * **api/**: Contains API endpoints and functions related to interactions between the web application and other services.
 - * **static/**: Stores static resources such as CSS files, JavaScript, and images.
 - * **templates/**: Contains the HTML files for rendering the front-end views.
 - * **__init__.py**: Initializes the application and its modules.
 - * **forms.py**: Contains the form classes used in the application, such as RegisterForm, LoginForm, TeacherProfileForm, StudentProfileForm, CreateCourseForm, and RegisterCourseForm.
 - * **models.py**: Defines the database models including User, Course, TeacherProfile, StudentProfile, and CourseRegistration.
 - * **routes.py**: Defines the routes (endpoints) for the web application, including login, logout, user profile, course creation, editing, and deletion.
 - **Project Document/**: Contains project documentation files, including design documents and technical reports.
 - **tests/**: Directory for storing test cases for different modules.
 - * **test.py**: Contains unit and functional tests to validate the application features.
 - **.gitignore**: Specifies files and directories for Git to ignore.
 - **config.py**: Contains the configuration settings for the application, including the MySQL database URI and secret keys.
 - **README.md**: Readme file that provides an overview of the project, setup instructions, and other relevant information.
 - **run.py**: The entry point for running the web application. This script starts the Flask server.

5.2 Code Components and Dependencies

The application is built using Flask, a lightweight web framework for Python. The key components and their dependencies are:

- **Flask Framework**: Provides the web framework for handling HTTP requests, routing, and rendering templates.

- **Flask-SQLAlchemy**: ORM for handling database interactions, providing seamless integration with MySQL for data persistence.
- **Flask-Login**: Manages user authentication and session management.
- **pymysql**: Used as the MySQL database driver for connecting to the remote database.
- **Werkzeug**: Provides password hashing and security utilities.
- **WTForms**: Provides form handling, validation, and CSRF protection.
- **Flask-Limiter**: Implements rate limiting to prevent abuse and ensure security.

5.3 Database Interaction

The application utilizes a remote MySQL database managed through SQLAlchemy, which acts as the Object Relational Mapper (ORM). The ORM abstracts the database operations into high-level Python objects, allowing the software framework to interact with the database seamlessly. CRUD (Create, Read, Update, Delete) operations are performed using model classes, which represent tables in the database.

The database is remotely connected, with connection settings specified in the configuration file. The database connection is established during application initialization, ensuring a stable and secure interaction with the database throughout the application lifecycle. Below is the database host information:

User	Database Host	Database Name
root	39.105.0.202:3306	WebApp

Table 1: Database Host Information

5.4 Version Control and Repository Details

The project uses Git for version control. The repository is hosted on GitLab, providing collaborative features such as pull requests, issue tracking, and version management. The main branch is used for stable releases, while development is done in separate feature branches. Commits are documented with clear messages, ensuring that changes are traceable, and the development workflow follows a feature-based branching model for effective collaboration.

The repository can be accessed at: <https://csgitlab.ucd.ie/webApplication/web-application>

6 Conclusion

6.1 Summary of Features

The university website project offers a range of functionalities to meet the needs of diverse user groups, including students, teachers, library staff, security personnel, administrative staff, and external visitors. Key features include:

- **Student Dashboard:** Students can manage course registrations, check grades, view personal profiles, and register electric bikes.
- **Teacher Dashboard:** Teachers can manage courses, including creating, editing, and deleting courses, and handling student enrollments and grade entries.
- **Library Management:** Library staff can manage resources, process borrowing records, and monitor library inventory.
- **E-bike and Campus Security:** Security personnel can manage electric bike registrations and ensure compliance with campus regulations.
- **Administrative Controls:** Administrators can handle user management, system configurations, and ensure the proper functioning of the platform.
- **Forum and Customization Features:** Students and teachers can participate in forums for academic discussions, while all users can customize their interface preferences for an improved user experience.

The project successfully integrates personalized role-based dashboards, secure user authentication, and effective database management, offering a streamlined user experience for all stakeholders.

6.2 Future Development Plans

Future development plans for the university website project include:

- **Enhanced User Experience:** Improving the user interface and experience by implementing more dynamic and responsive designs, optimizing navigation, and integrating user feedback mechanisms.
- **Advanced Role-Based Access Control:** Expanding role-based access control to facilitate more granular permission levels, including more administrative and library management features.
- **Automated Notifications and Alerts:** Adding features such as automated email notifications for course registration updates, grade availability, library due dates, and other user-specific events.
- **Analytics Dashboard:** Providing teachers and administrators with dashboards to monitor student engagement, analyze course registration trends, and track library resource usage.

- **Integration with External Systems:** Exploring integrations with learning management systems (LMS) and other external services to enhance the platform's capabilities.
- **Mobile Application Development:** Developing a mobile version of the platform to extend accessibility and usability on smartphones and tablets.

These future enhancements aim to improve functionality, provide deeper insights through analytics, and create a more connected and integrated educational environment. The ongoing development will continue to focus on user needs and adopting best practices to enhance performance and usability.