

**Department of Computer Engineering, Bilkent University**  
**CS319 Object Oriented Software Engineering**  
**Group 11**  
**NFR, Various Diagrams and Mockups Report - D2**  
**Section 1 - Eray Tüzün**  
**08/04/2025**



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# 1. Non-Functional Requirements

## 1.1 Usability Requirements

**Role-Specific Dashboards:** Each user (TA, Instructor, Secretary, Admin, etc.) will see a role-specific dashboard relevant to their job.

**Responsive UI:** The frontend will support responsive design across a defined set of screen sizes to ensure usability on common devices. Specifically, the system will support:

- Mobile devices: widths from 360px to 480px
- Tablets: widths from 600px to 800px
- Desktops: widths from 1024px to 1920px

The UI will maintain functionality and layout consistency across these screen widths, and will be verified through manual and automated UI testing.

**Real-Time Notifications:** Duty assignment, approval, and swap request notifications will be shown in real-time ( $\leq 2$  seconds) with a visual cue (e.g., badge icon).

**Duty Swap System:** TAs will have an easy-to-use interface to request, accept, or reject proctor duty swaps. All swap interactions will be preceded by confirmation dialogs for clarity.

## 1.2 Security/Safety Requirements

**Authentication:** All users must authenticate via secure login (username/password). Passwords will be securely stored.

**Authorization:** Role-Based Access Control (RBAC) is where users are restricted to seeing only features/data depending on their role.

**Data Protection:** Frontend-backend communications will be encrypted with HTTPS. Sensitive user data (e.g., personal data, logs) will be restricted access.

**Audit Logging:**

Admins can view logs of significant system activities (e.g., duty creation, user management, data imports). Logs are immutable and stored securely with the following guarantees:

- **Write-once, read-many (WORM)** configuration to prevent tampering
- **Access control policies** limiting write access to authorized backend services only
- **Log integrity** is ensured using **SHA-256 hashing** — each log entry is hashed upon creation, and tampering can be detected by verifying the hash chain

These measures will be verified through automated integrity checks, access control tests, and security reviews.

**Account Management:** Only admins allowed to CRUD (create / load / edit /delete) users. Forgotten passwords will be reset securely via email verification and token-based authentication.

## 1.3 Performance Requirements

**API Response Time:** 95% of all backend requests will respond within 2 seconds under normal load conditions.

**Concurrent Users:** The system must be able to handle a minimum of 200 concurrent users without a performance drop.

**Bulk Import Processing:** Excel imports of data (e.g., TA list, classroom data) of 10,000 records or less will be processed within 30 seconds.

**Page Load Time:** All core pages (e.g., dashboard, duty management) will load in under 5 seconds on standard wireless connections.

## 1.4 Reliability Requirements

**System Uptime:** The backend system (Django + MySQL) will have  $\geq 99.5\%$  uptime, if there is no scheduled maintenance work.

**Data Backups:** Routine every-day automated back-ups of core data (responsibilities, users, logs) will be preserved, and the recovery should be possible within 24 hours when data is missing.

**Conflict Prevention:** Scheduling conflicts (concurrent responsibilities, double bookings) will be prevented by checking for them upon assigning responsibilities.

**Failover Handling:** In case of API or database failure, the system will notify users and retry automatically or provide fallbacks.

## 1.5 Maintainability Requirements:

**Modular Architecture:** Django's MTV pattern and React component structure make it possible for code to be easily maintained. Every module (e.g., duty management, logging) is isolated so that updates are made separately.

**Code Documentation:** Backend APIs will be documented using Swagger, while frontend components will be provided with inline comments and JSDoc as and when needed.

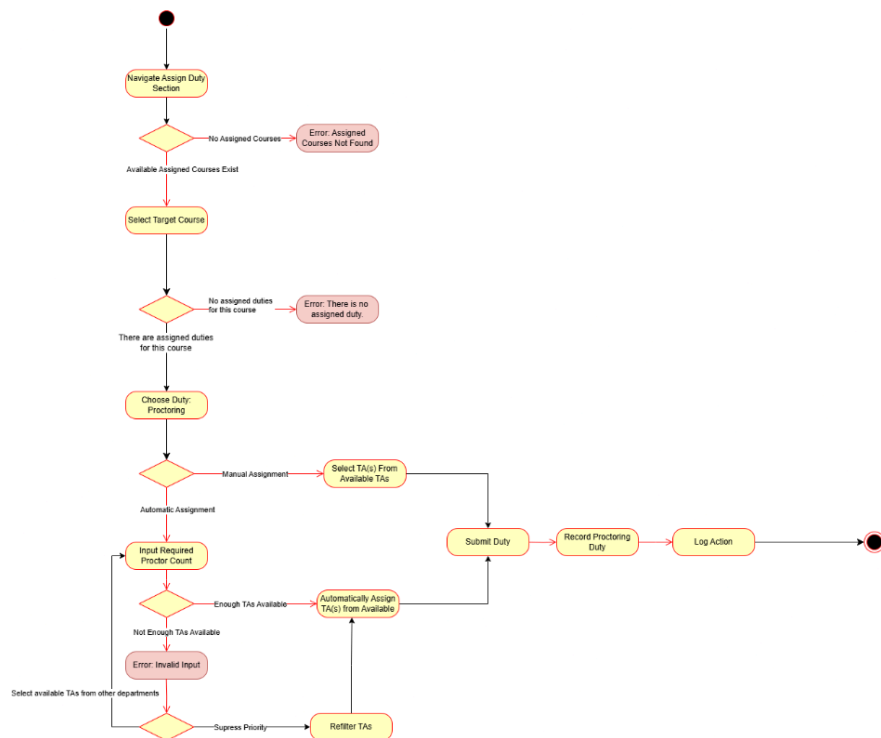
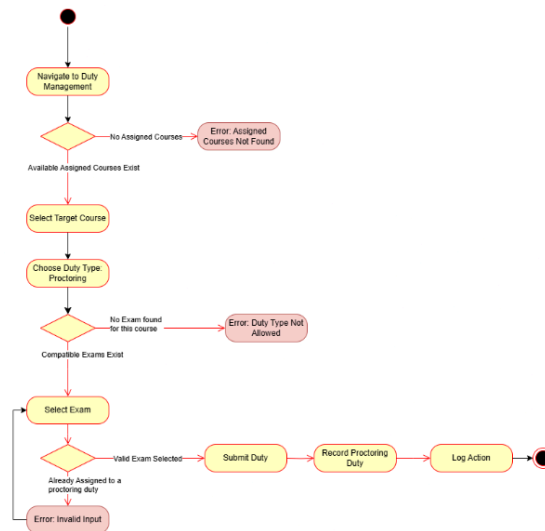
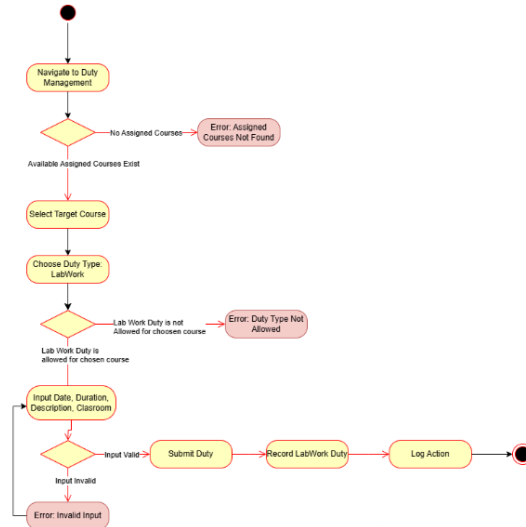
**Version Control:** Source code will be stored on GitHub with branching (development, staging, production) and pull request workflows.

**Extensibility:** The system will accommodate future extensions of new duty types, roles, and reporting functionality with minimal interruption to existing functionality.

## 2. Activity Diagrams

For better quality: [click here](#)

1. Activity Diagram: Creating the lab work duty.
2. Activity Diagram: Creating the proctoring duty.
3. Activity Diagram: Assign proctoring duty.



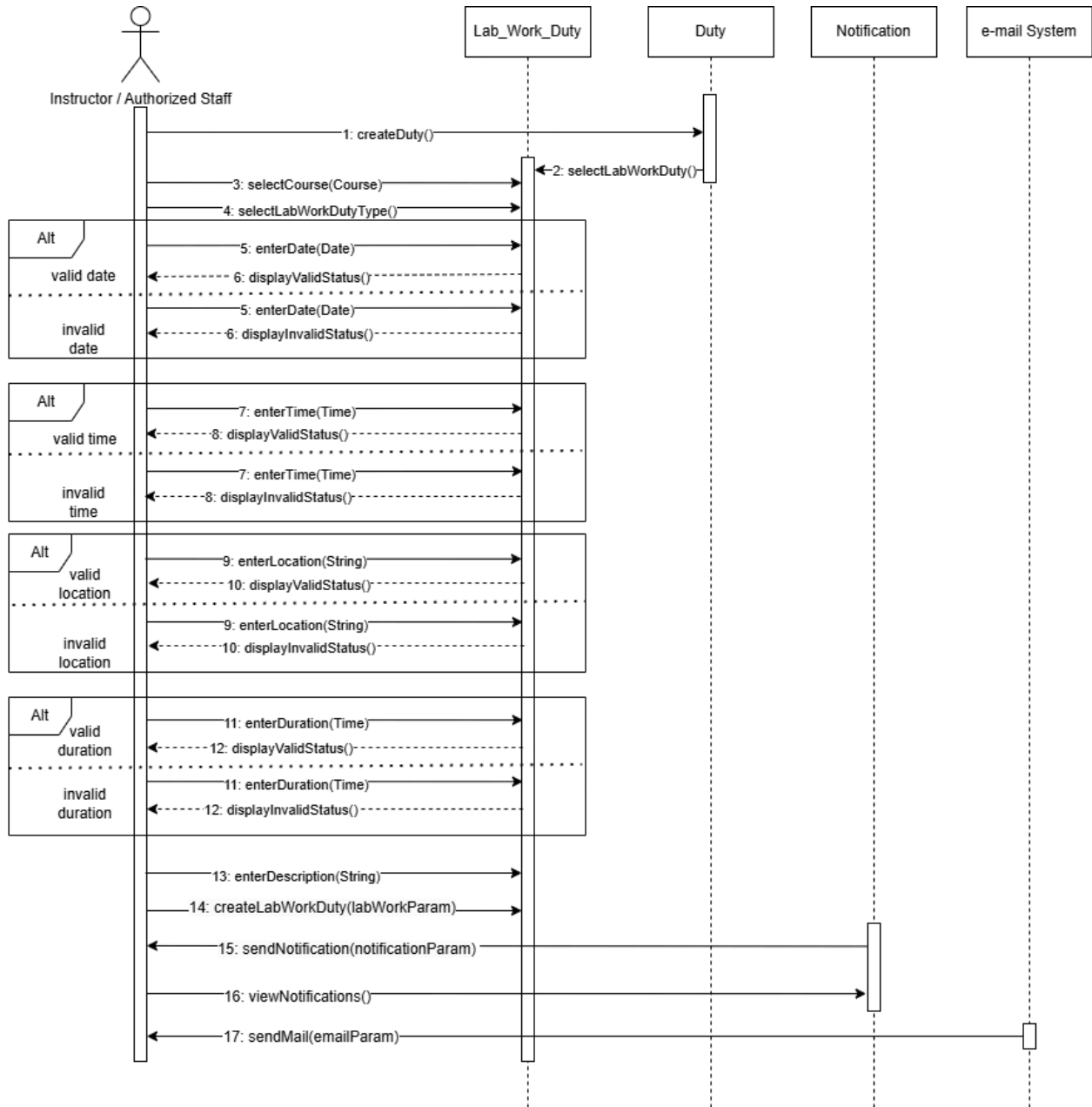
### 3. Sequence Diagrams

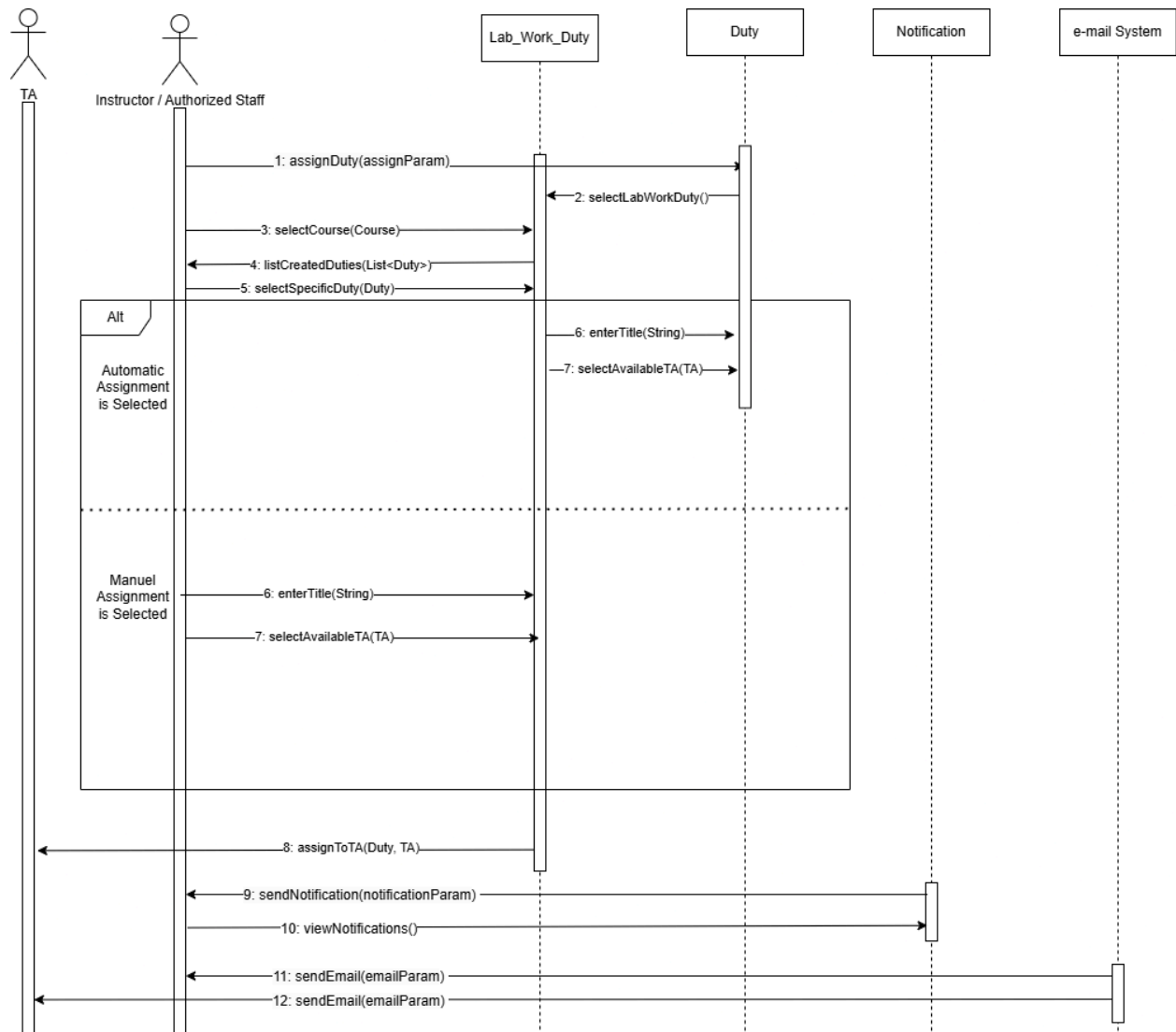
For better quality:

[click here](#) for the Sequence diagram 1

[click here](#) for the Sequence diagram 2

1. Sequence Diagram: Creating the lab work duty
2. Sequence Diagram: Assigning the lab work duty.





**Note:** First sequence diagram illustrates the process of creating a lab work duty, assigning it to a TA, and marking the corresponding workload. Notifications are sent after both creation and assignment of the duty, and are visible to the TA. Once the TA marks the workload, the total workload is fixed and a confirming email is sent. This diagram does not cover cancellation or modification of duties. Second sequence diagram shows the creation, assignment, and subsequent cancellation of a lab work task. Both creation and cancellation operations trigger notifications, which are visible to the TA. After cancellation, an informatory email is sent to the TA. Workload logging procedure is not shown in this diagram.

Authorized Staff means Dean, Department Chair, Secretary besides Instructor.

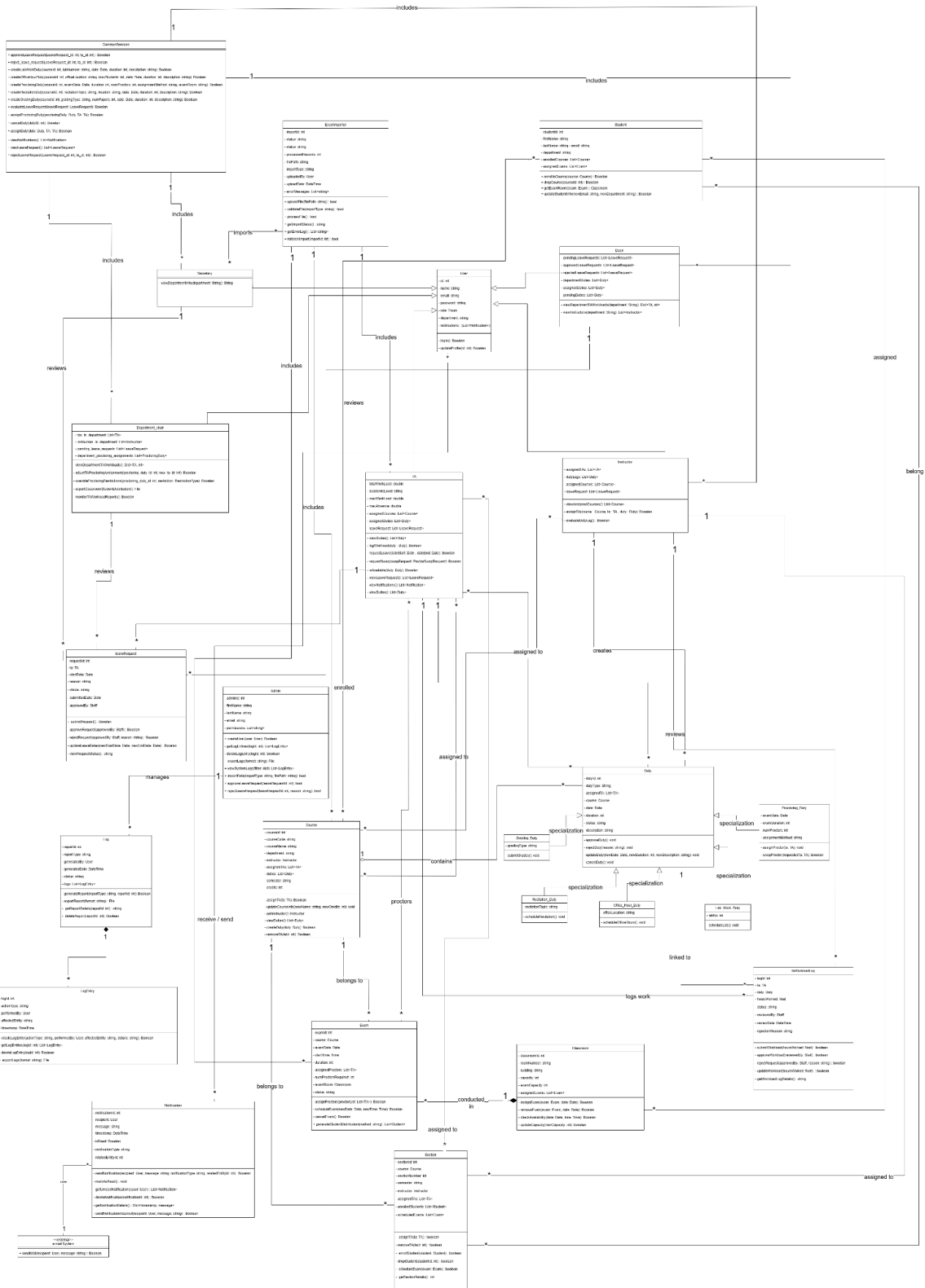


### Parameters in the Sequence Diagram:

- **labWorkParam:** courseId: int, labNumber: string, date: Date, duration: int, description: string
- **assignParam:** duty: Duty, TA: TA
- **notificationParam:** recipient: User, message: string, notificationType: string, relatedEntityId: int
- **logWorkLoadParam:** duty: Duty
- **emailParam:** receiver: String, sender: String, message: String, attachment: File
- **cancelParam:** dutyID: int

## 4. Class Diagram

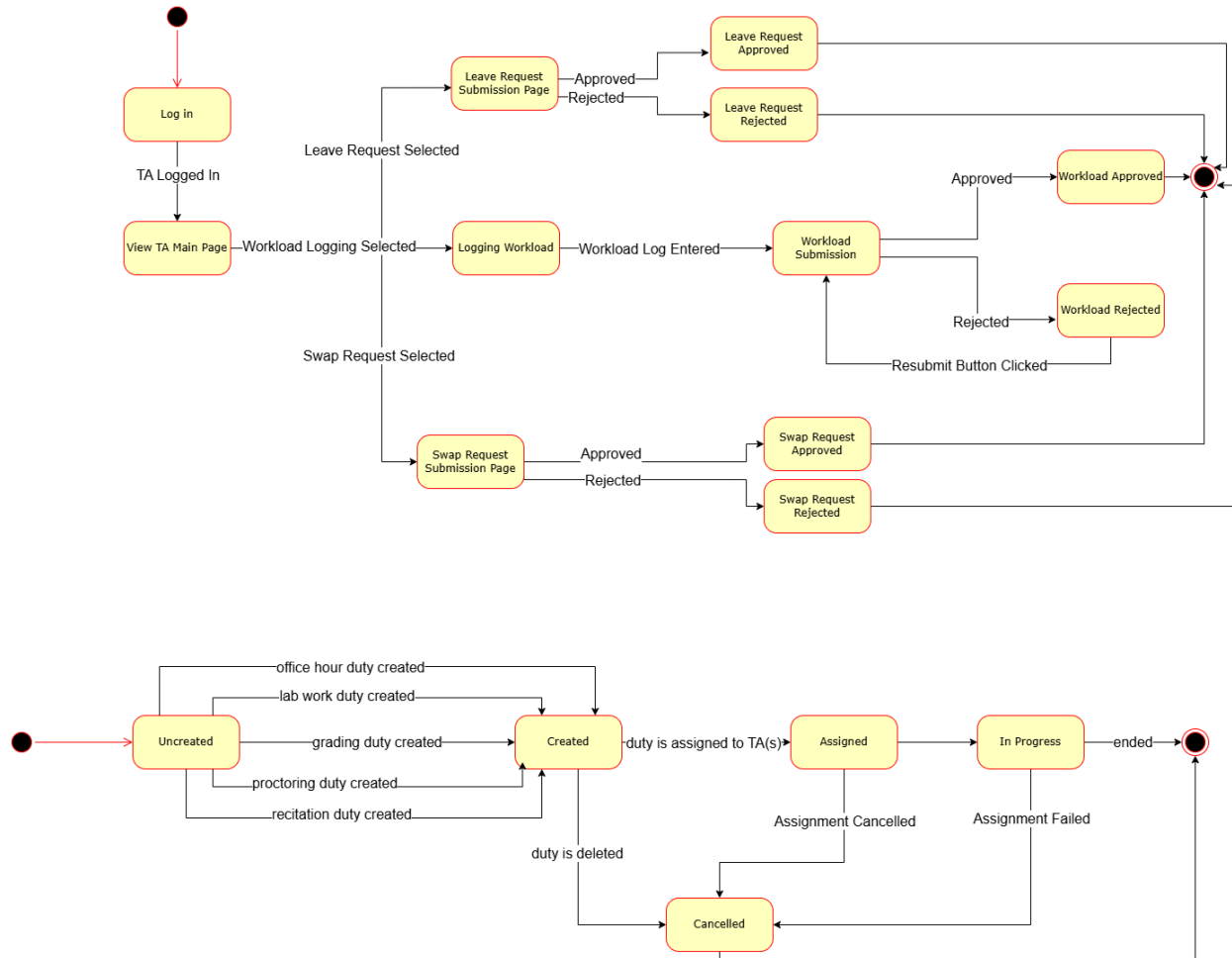
For better quality: [click here](#)



## 5. State Diagrams

For better quality: [click here](#)

1. State Diagram: All states of the user TA.
2. State Diagram: All states of a duty.



**Note:** First diagram shows the workflow available to a TA when logged into the system. The TA can visit the main page and select one of three options: leave request, workload logging, or swap request. Each of these requests gets approved or denied, leading to respective end states. If the workload log gets denied, the TA can submit the log again. Second diagram illustrates the lifecycle of different responsibilities like office hour, lab work, grading, proctoring, and recitation. Responsibilities get uncreated before becoming created, then afterwards either assigned to TAs or canceled. Assigned responsibilities get in progress before waiting for workload submission. Submitted workloads are approved or denied. Canceled responsibilities do not proceed to workload submission and are therefore eliminated from the lifecycle. This chart does not have duty editing or reassignment after being created.

## 6. Mockups

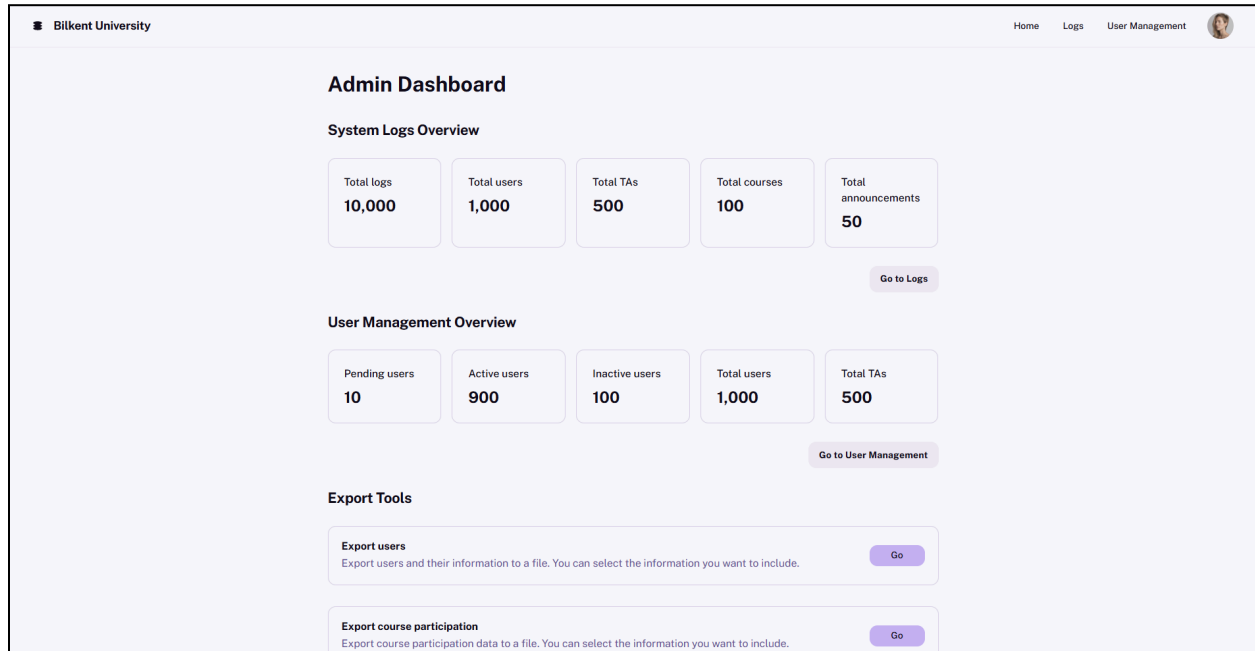


Figure 1: Admin Home Page

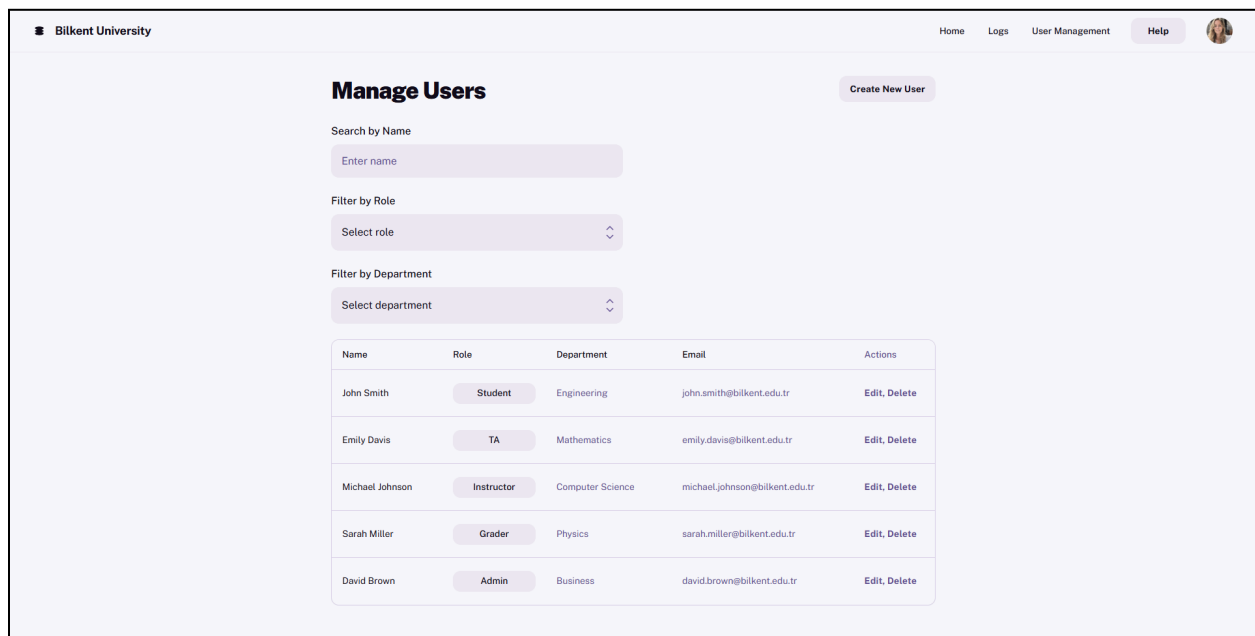


Figure 2: Admin Manage User Page

Bilkent University

[Home](#)[Manage Duties](#)[Review Workload Requests](#)[Review Leave of Absence Requests](#)[Export Document](#)[Profile](#)[Help](#)

Assign TAs to Duties

Next

Step 1: Select a course

Course

Step 2: Select unassigned duties

Select	Duty	Time	Location	Unassigned TAs
<input checked="" type="checkbox"/>	CS101 Lab	Monday 13:40-15:30	EA-502	0
<input type="checkbox"/>	CS319 Recitation	Wednesday 15:40-17:30	EB-102	1
<input type="checkbox"/>	CS315 Homework Grading	Flexible	Remote	2
<input type="checkbox"/>	CS224 Project Mentoring	By Appointment	EA-409	0

Figure 3: Instructor Assign Non-Proctoring Duty Page

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[Home](#)[Manage Duties](#)[Review Workload Requests](#)[Review Leave of Absence Requests](#)[Export Document](#)[Profile](#)[Help](#)

Assign TAs to Duties

Step 1: Select a course

Course

Step 2: Select unassigned duties

Select	Duty	Time	Location	Unassigned TAs
<input type="checkbox"/>	CS101 Lab	Monday 13:40-15:30	EA-502	0
<input type="checkbox"/>	CS319 Recitation	Wednesday 15:40-17:30	EB-102	1
<input type="checkbox"/>	CS315 Homework Grading	Flexible	Remote	2
<input type="checkbox"/>	CS224 Project Mentoring	By Appointment	EA-409	0
<input checked="" type="checkbox"/>	CS202 Exam Proctoring	Friday 09:30-12:30	B2-05, B2-06	3

Step 3: Choose assignment method

☒ Automatic Assignment

☐ Manual Assignment

Next

Figure 4: Instructor Assign Proctoring Duty Page

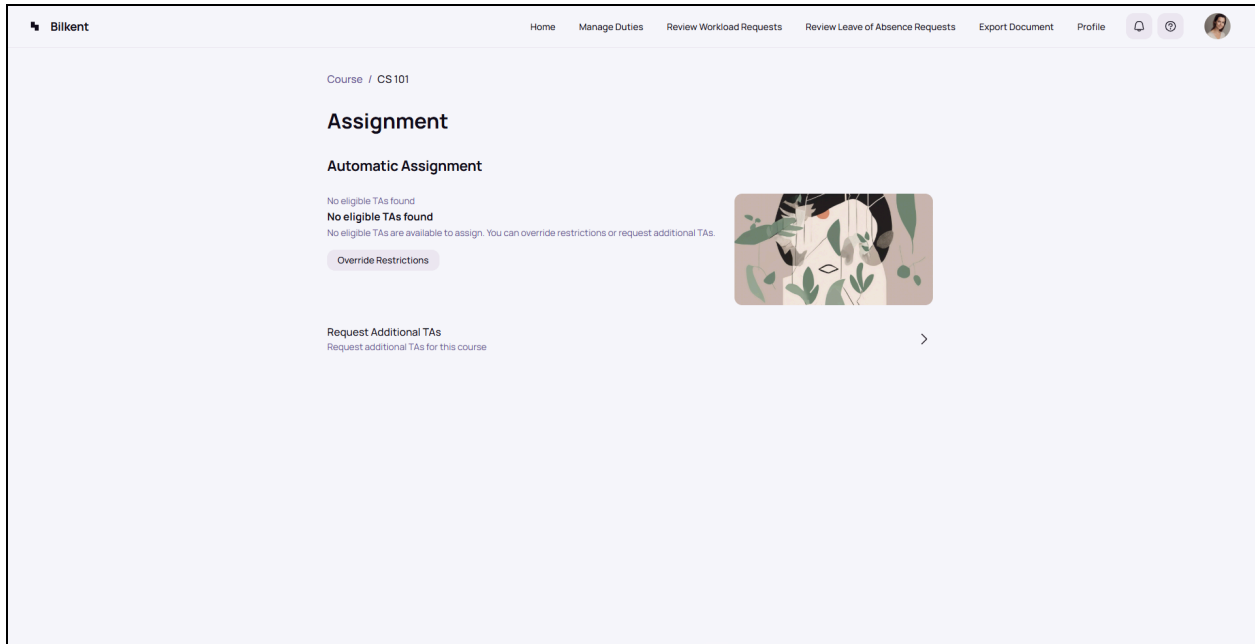


Figure 5: Instructor Automatic Assignment Fail Page

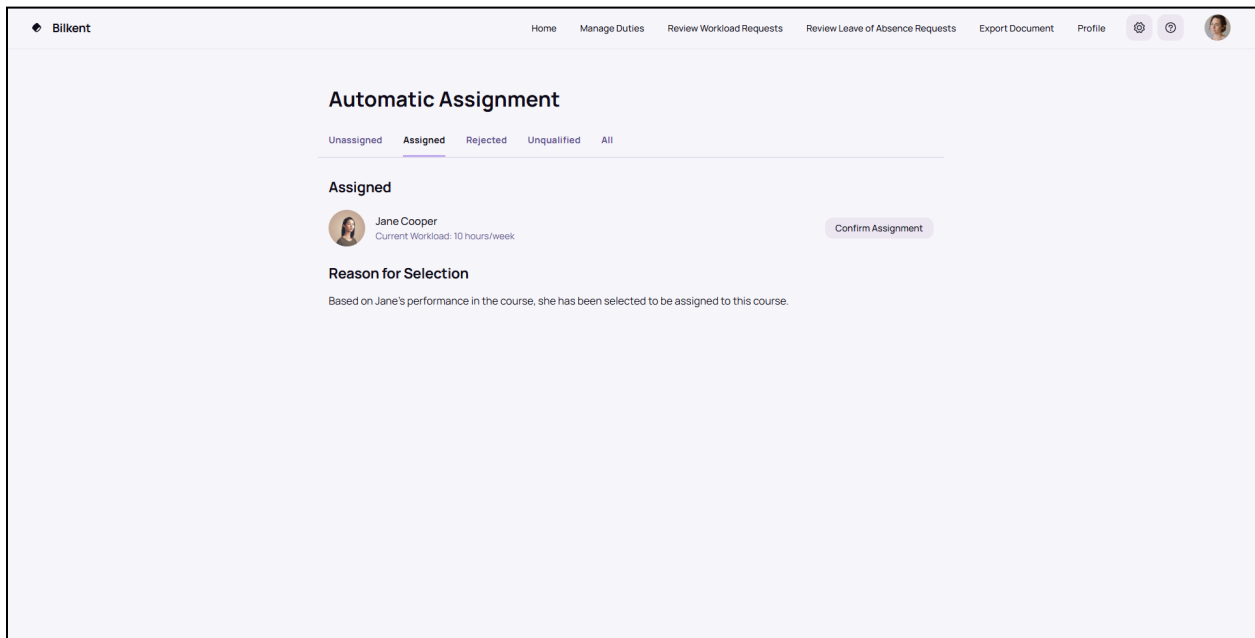


Figure 6: Instructor Automatic Assignment Success Page

Bilkent University

Home

Manage Duties

Review Workload Requests

Review Leave of Absence Requests

Export Document

Profile

Create New Duty

Select Course

Course

Duty type

Lab Work

Proctoring

Office Hour

Recitation

Grading

Date

MM/DD/YY

Time

12:00 PM

Duration

1 hour

Location

Zoom link

Description

Write a description of the duty...

Create Duty

Figure 7: Instructor Create Duty Page

Bilkent University

Home

Manage Duties

Review Workload Requests

Review Leave of Absence Requests

Export Document

Profile

Select Course

Course

Duty type

Lab Work

Proctoring

Office Hour

Recitation

Grading

Date

MM/DD/YY

Time

12:00 PM

Duration

1 hour

Location

Zoom link

Grading Method

Rubric, Feedback Form, etc.

Description

Write a description of the duty...

Create Duty

Figure 8: Instructor Create Grading Session Page

Blkent University

Home

Manage Duties

Review Workload Requests

Review Leave of Absence Requests

Export Document

Profile

Select Course

Course

Duty type

Lab Work

Proctoring

Office Hour

Recitation

Grading

Office Hour Type

TA Office Hour

Instructor Office Hour

Date

Time

MM/DD/YY

12:00 PM

Duration

Location

1 hour

Zoom link

Student Count

Expected Questions

10

General or Specific

Description

Write a description of the duty...

Create Duty

Course

⌵

Duty type

Lab Work

Proctoring

Office Hour

Recitation

Grading

Date

MM/DD/YY

Time

12:00 PM

Duration

1 hour

Location

Zoom link

Description

Write a description of the proctoring duty...

Exam Type

Midterm, Final, etc.

Number of Students

100

Max Duration

3 hours

Proctoring Software

Select Software

⌵

Create Proctoring Duty



Bilkent University

[Home](#)[Manage Duties](#)[Review Workload Requests](#)[Review Leave of Absence Requests](#)[Export Document](#)[Profile](#)

Select Course

Course

Duty type

Lab Work

Proctoring

Office Hour

Recitation

Grading

Date

MM/DD/YY

Time

12:00 PM

Duration

1 hour

Location

Zoom link

Number of Students

Enter the number of students

Topics to Cover




Enter the topics to cover

Create Recitation Duty

Figure 11: Instructor Create Recitation Page

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Export Classroom Distribution

Select an exam/course

Midterm Exam in CS101, Fall 2022

Generate

Summary

Course	CS101, Fall 2022
Date	Oct 13, 2022
Number of Students	150
Classrooms Used	3

Export as Excel

Export as PDF

Figure 12: Instructor Export Distribution Page

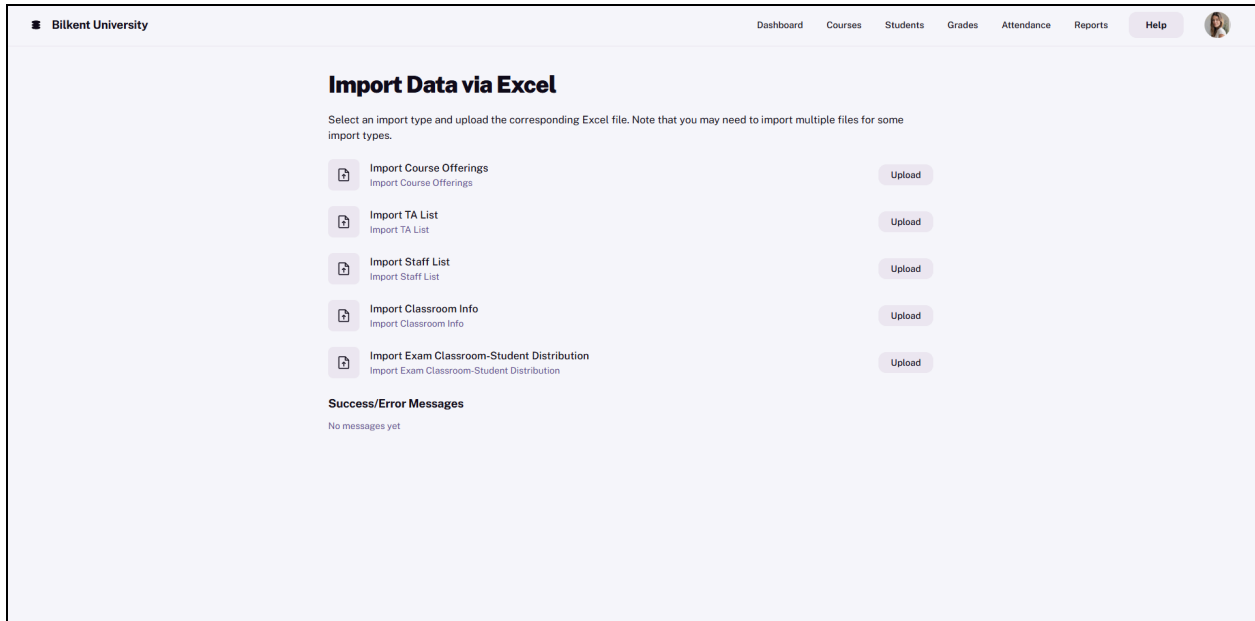


Figure 13: Staff Import Excel Page

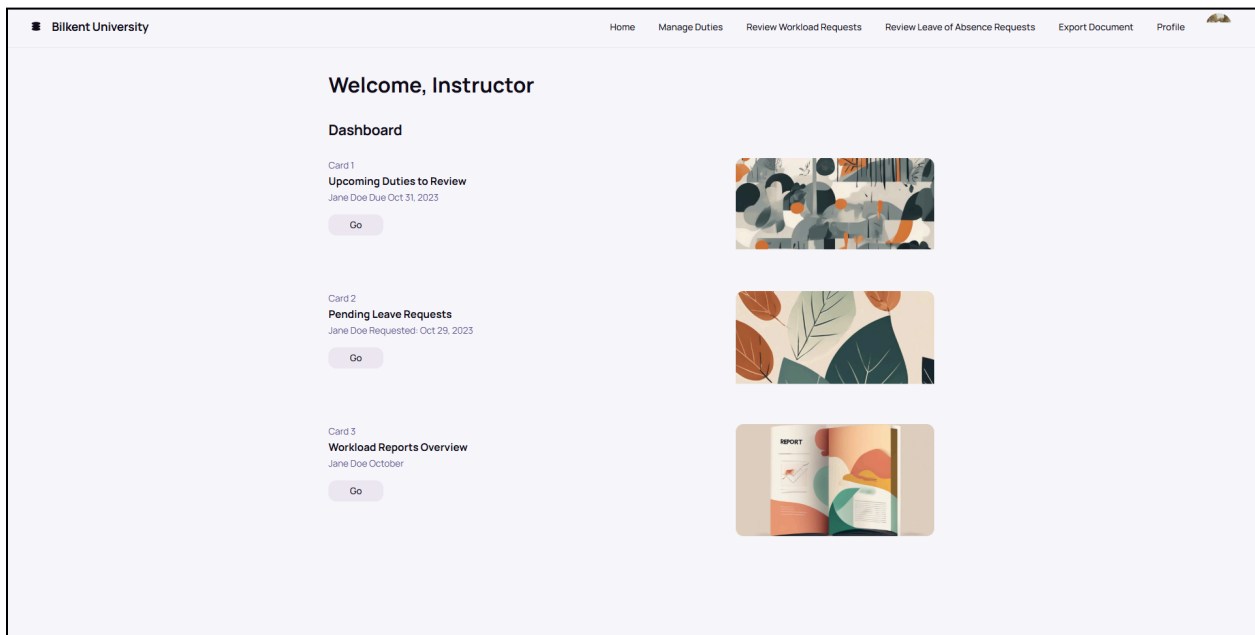


Figure 14: Instructor Home Page

Bilkent University

[Home](#)[Manage Duties](#)[Review Workload Requests](#)[Review Leave of Absence Requests](#)[Export Document](#)[Profile](#)

### Leave of Absence Requests


Name	Department	Requested Dates	Reason for Leave	Status	Actions
Ece Kaya	Computer Science	Aug 15 - Aug 20	Personal	Pending	Approve/Reject
Berk Aksoy	Business Administration	Aug 25 - Aug 28	Family Emergency	Approved	
Elif Yılmaz	Mechanical Engineering	Sep 5 - Sep 10	Vacation	Pending	Approve/Reject
Mert Demir	Mathematics	Sep 12 - Sep 18	Health Issues	Rejected	
Duygu Çetin	Economics	Oct 1 - Oct 5	Conference Presentation	Approved	

Figure 15: Instructor Leave of Absence Review Page

Bilkent University

[For students](#)[For instructors](#)

Sign up



### Welcome to Bilkent University TA Management System

Bilkent ID

Password

☐ Remember me

Sign in

[Forgot your password?](#)

Figure 16: Login Page


Bilkent University

HomeSwap DutiesLog WorkloadLeave of AbsenceExport DocumentProfile

TA Management System

Kerem Goktas  
kerem@bilkent.edu

Upload Photo



Full Name

Email

Password

Save Changes

Figure 17: Manage Profile Page

Bilkent University

HomeManage DutiesReview Workload RequestsReview Leave of Absence RequestsExport DocumentProfile

Manual Assignment

Duty details

Course

CS 61B

Title

Lab 1 (Mon 11:00)

Start date

01/01/2023

End date

01/01/2023

Time

11:00-12:00

Available TAs

Name	Department	Current Workload Hours	Eligibility Notes	
Alice	CS	20	Eligible	Assign
Bob	Economics	18	Eligible	Assign
Eve	Math	22	On Leave	Assign
Grace	Physics	19	Eligible	Assign
Ivan	Chemistry	25	Workload Limit Exceeded	Assign

Figure 18: Instructor Manual Assign Page

Bilkent

Home

Manage Duties

Review Workload Requests

Review Leave of Absence Requests

Export Document

Profile

Modify Existing Duty

Currently Editing:

Duty Type

Course

Date

Time

Assigned TA

Grading

CS103

Sep 3, 2023

6:00 PM

Alice Johnson

Duty Type	Course	Date	Time	Assigned TA	Actions
Lab	CS101	Sep 1, 2023	6:00 PM	Jane Smith	Edit
Recitation	CS102	Sep 2, 2023	6:00 PM	John Doe	Edit
Grading	CS103	Sep 3, 2023	6:00 PM	Alice Johnson	Edit
Lab	CS104	Sep 4, 2023	6:00 PM	Bob Brown	Edit
Grading	CS105	Sep 5, 2023	6:00 PM	Eve Davis	Edit

Edit Duty

Date

Time

Sep 3, 2023

6:00 PM

Duration

Description

3 hours

Grading midterm exams

Update Duty

Figure 19: Instructor Modify Duty Page

Bilkent

Home

Manage Duties

Review Workload Requests

Review Leave of Absence Requests

Export Document

Profile

Review Duty Log Requests

TA Name	Duty Type	Course	Date	Duration	Description	Status
Megan Lee	Office Hours	CS101	Sep 14	60 min	Help students with homework	In Review
John Smith	Lab	BIO201	Sep 15	120 min	Grade lab reports	Completed
Emily Davis	Grading	ENG301	Sep 16	90 min	Present on a topic	To Review
David Johnson	Exam Proctoring	MATH101	Sep 17	45 min	Supervise a midterm	In Progress
Sophia Brown	Grading	CHEM201	Sep 18	75 min	Grade assignments	Rejected
Michael Wilson	Recitation	PHYS301	Sep 19	105 min	Recitation session	Completed
Emma Rodriguez	Recitation	ART401	Sep 20	50 min	Provide guidance on a project	To Review

Figure 20: Instructor Review Duty Logs Page

Bilkent University

Home

Swap Duties

Log Workload

Leave of Absence

Export Document

Profile

Request Leave of Absence

Start Date

End Date

Reason

Submit Request

Your request has been submitted.

Figure 21: TA Create Leave of Absence Request Page



Bilkent University

Dashboard

Courses

Students

Instructors

Duties

Reports

Help

Lena Paul

Teaching Assistant

All

Approved

Pending

Rejected

Duty Log Form

Log Completed Duty

Course

Select a course

Duty Type

Select a duty type

Minutes Worked

Enter minutes worked

Submit Duty Log

Your duty log has been submitted and is pending approval from the instructor.

Figure 24: TA Create Log Duty Request Page

Bilkent University

Dashboard

Courses

Students

Instructors

Duties

Reports

Help

Lena Paul

Teaching Assistant

All

Approved

Pending

Rejected

Duty Log Form

Course	Duty	Minutes Worked	Status
CS101	Grading	120	Approved
CS102	Teaching Lab	180	Pending
CS103	Office Hours	60	Rejected
CS104	Exam Proctoring	240	Approved


Figure 25: TA Monitor Duty Log Requests Page



Bilkent University

HomeSwap DutiesLog WorkloadLeave of AbsenceExport DocumentProfile

Profile Information



Jessica R. Thompson


Computer Engineering

jessica@bilkent.edu.tr MS Student Proctoring eligible

Edit Info

Change Password


Email



jessica@bilkent.edu.tr

jessica@bilkent.edu.tr


Username



jessica

jessica

Password



\*\*\*\*\*

Figure 26: TA Profile Info Page

Bilkent University

HomeSwap DutiesLog WorkloadLeave of AbsenceExport DocumentProfile

Review Duty Swap Requests

Requesting TA	Their Duty Details	Your Duty Details	Requested Swap Date	Actions
Alina	CS 101, Lab 1, Wed 09:00	CS 101, Lab 1, Wed 09:00	Jan 5, 2023	Approve, Reject
John	CS 102, Lab 2, Fri 13:00	CS 102, Lab 2, Fri 13:00	Jan 7, 2023	Approve, Reject

Figure 27: TA Review Duty Swap Requests Page