

# Bilkent University

# Department of Computer Engineering

# CS 319 Term Project

**ErasmusNET** 

Group 3F

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Analysis Report November 6, 2022

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**ErasmusNET** 

### 1 Introduction

Our project's purpose is to create a web based Erasmus manager for outgoing and incoming students, department and Erasmus coordinators to use. Our main goal is to make every part of this procedure easier by just making our project the only platform for students to apply for Erasmus and for coordinators to deal with every problem in one place. With this project, students can make an appointment with the coordinators, coordinators can easily see and approve all the outgoing students' pre approval form in one place, without the risk of having the pre approval forms being lost in the hundreds of mails sent to coordinators.

# 2 Current System

Currently Bilkent University and the partner university's staff are using the https://app.erasmus.bilkent.edu.tr/ website for the Erasmus and Exchange application process. Each Bilkent student has their Erasmus grade based on their cGPA and their ENG 101-102 grades which they can see on the website. Outgoing students can apply to Erasmus or Exchange by first uploading their documents which include their CV, application form and statement of purpose. They also need to upload their contact information. After that, students make a list of a maximum of five universities that they prefer to study in, also considering their Erasmus grade. At this stage the students also should state their preferred semester (fall/spring) and duration (one or two semesters). After this, students wait for the announcement of the placements. The placements are made according to each student's Erasmus grades; the student with the highest grade is placed first, the second highest graded student is placed second etc. Currently, this process is done manually by department exchange coordinators. After the placement is done, the information of whether the student's application is accepted or rejected is uploaded to the system. After that, if the student is accepted to one of his/her preferences and wants to go, he/she looks at the partner university's offered courses to see whether there are similar courses corresponding to the courses at Bilkent University. If the student finds such courses, he discusses with the instructors in Bilkent to see whether the courses he/she wants to take in the partner university actually correspond to the courses he/she would normally take in Bilkent. All these discussions are done without the use of the website; either by email or face-to-face. When the discussions are done, the student makes a pre-approval form and sends them to the departmental coordinators and the coordinators approve or reject the form. The website is not used throughout the pre-approval form process or the rest of the application process.

### 3 Proposed System

### 3.1 Overview

The proposed system ErasmusNET will be used as the main application for managing the application process of exchange programs. ErasmusNET will help students, coordinators and the international office by reducing the need for paper forms. Application, placement and pre-approval stages will be handled inside our application. In addition, the students, coordinators and international office workers can create appointments inside our application without using email. In the Proposed System section of our report, we will be presenting the functional requirement, non-functional requirements, pseudo requirements and the system models.

### 3.2 Functional Requirements

# 3.2.1. Incoming Students

- **Registration Lists:** Incoming students can list the courses they would like to take during that semester.
- **Registration Appointment:** Incoming students can meet with coordinators to discuss their registration lists.

### 3.2.2. Outgoing Students

- Application: Outgoing students can apply for either the Exchange or the Erasmus program. The students can upload the required files into their application, such as their cv, application forms, and statement of purpose. The student can view the application process as a timeline with checkpoints, and the students can see the status of their application, such as academic coordinator inspection and approval. Students will also provide the semester/s that they intend to study abroad. Students will be able to cancel their applications.
- Syllabus Database: A course that will be taken in Erasmus must be approved by Bilkent instructors. To make this job easier, students can find and upload the syllabus of a relevant course to the database and book an appointment with the appropriate course instructor. If the instructor approves a class, it is added to the database. The students can browse the database for previously approved courses.
- **Appointments:** Outgoing students can book appointments with coordinators to evaluate their application process or get their curriculum approved.
- Course Counting: Rather than e-mailing or submitting a form, outgoing students can match the courses in the Bilkent curriculum and the courses in their Erasmus schools with the help of the syllabus database.
- **Profile:** The profile page will include contact information for the student. If a student views their page, they can see the application status of their ongoing Exchange or Erasmus applications.

- Quiz: Outgoing students can take a quiz and answer questions about their cGPA, ENG101-102 scores, and preferred school locations. This quiz will then provide suggestions for which universities to apply to.
- Calendar: Outgoing students can view upcoming due dates for Erasmus applications and their appointments on a calendar.

### 3.2.3. Internal Coordinator

- Applications: Bilkent coordinators have several tasks in the application process. They can view the list of students who applied to the Erasmus program, sort students based on their points, and review or download the documents a student has uploaded.
- **Selecting Students:** The internal coordinators have the authority to approve or reject student applications.
- Interview Tool: Coordinators can send out face-to-face, or online interview invites to selected students as well as cancel or change the time and the date of the interview. They can also give feedback on the student's application during the interview.
- To-Do List: Coordinators can see a "to-do list" for the tasks they are supposed
  to complete, such as approving or disapproving applications and sending
  emails to external coordinators.
- **Student View:** Bilkent coordinators can see the list of all students who applied to Erasmus before and the list of students currently studying abroad.
- **E-mail tool:** Coordinators can create email templates for the target school's coordinator for selected students.

### 3.2.4. External Coordinator

• **Student Information:** External coordinators can upload student information to the website and view other data for coordinators.

### 3.3 Non-functional Requirements

- **Performance:** Performance of the system should be relatively close to the majority of the websites. However, the system's performance shouldn't be expected to be at millisecond scale.
- **Usability:** Front-end of the system should have relatively intuitive UI and UX since target actors are mostly non-technical.
- Reliability: System should work as expected at all times on all axes. This is an essential requirement since reliability issues may cause significant delays or issues.
- **Security:** System must be secure and well-protected. System will contain sensitive user data such as national identity details, passport and visa details, cv, transcript, and bank account details.
- **Scalability:** This is not a strict requirement most of the time since user count will be relatively small. However, the system should be able to handle large application submissions especially near application deadlines.
- **Maintainability:** System should be easy to maintain with minimal effort.

- **Deployability:** System should be easy to deploy since the customer is not the developer of the system.
- Extensibility: System should allow trivial changes with minimal effort.

# 3.4 Pseudo Requirements

- 1. React will be used in the frontend since it is a well-known and well-documented framework.
- 2. Google Firebase will be used as a database to store user data.
- 3. Git will be used as a version control system. Github will store the codebase.

# 3.5 System Models

### 3.5.1 Use-Case Model

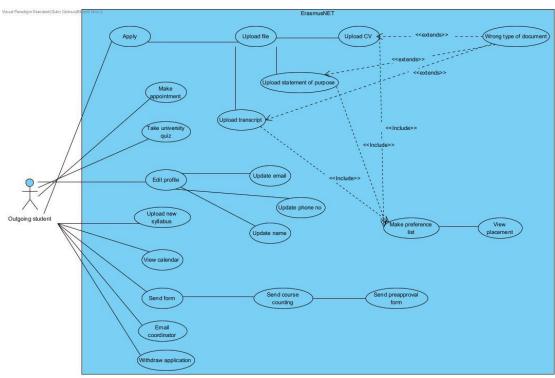


Figure 1: OutgoingStudent Use Case Diagram

Use Case #1

Use Case: Apply

Actors: Outgoing student

# **Entry Condition:**

Outgoing student has at least 2.50 cGPA out of 4.00.

### **Exit Condition:**

• Outgoing student successfully applies to Erasmus.

### **Flow of Events:**

- 1. Outgoing student selects "Complete application" button
- 2. Outgoing student uploads CV, statement of purpose, and transcript
- 3. Outgoing student creates a university preference list with at least 1, at most 5 places.
- 4. Outgoing student waits for the application status to end
- 5. Outgoing student can see what university they got accepted into for Erasmus

### Use Case #2

Use Case: Send form

Actors: Outgoing student

# **Entry Condition:**

• Outgoing student has successfully got accepted into a university.

### **Exit Condition:**

• Forms are approved by the department coordinator

### **Flow of Events:**

- 1. Outgoing student send the course counting form for approval to department coordinator
- 2. Outgoing student waits for the department coordinator to send feedback
- 3. After receiving the feedback from the department coordinator, outgoing student sends the preapproval form to the department coordinator according to the feedback

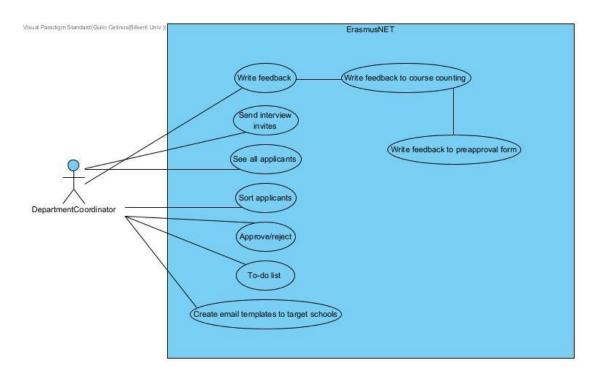


Figure 2: DepartmentCoordinator Use Case Diagram

### Use Case #3

Use Case: Write feedback

**Actors:** Department Coordinator

# **Entry Condition:**

• Outgoing students' application time has ended.

### **Exit Condition:**

• Department coordinator approves or rejects all outgoing students' preapproval forms

# Flow of Events:

- 1. Department coordinator gets all the outgoing students' course counting forms
- 2. Department coordinator sends every student feedback about their course counting form
- 3. Department coordinator waits for all the outgoing students to send their preapproval form
- 4. After the reserved time for sending preapproval form has ended, department coordinator rejects or approves all the preapproval forms.

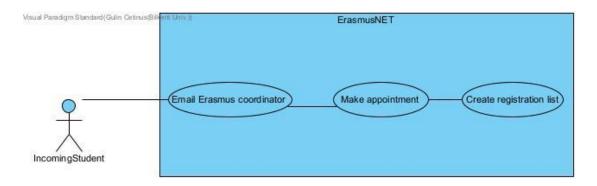


Figure 3: IncomingStudent Use Case Diagram

### Use Case #4

Use Case: Create registration list

Actors: Incoming student

# **Entry Condition:**

• Incoming student must have been approved from their home university

# **Exit Condition:**

• Incoming student successfully creates a registration list

# Flow of Events:

- 1. Incoming student informs the department coordinator via email
- 2. Incoming student makes an appointment with the department coordinator to create a registration list
- 3. Incoming student and department coordinator creates a registration list for that semester of the incoming student

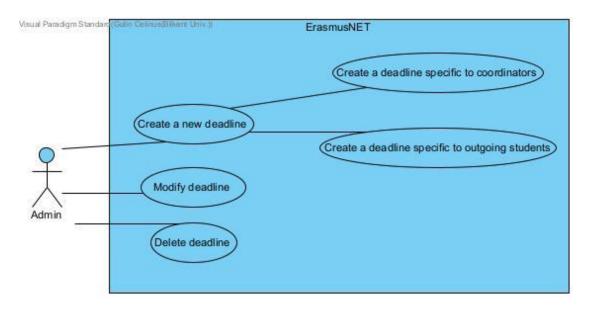


Figure 4: Admin Use Case Diagram

### Use Case #5

Use Case: Create new deadline

**Actors:** Admin

# **Entry Condition:**

### **Exit Condition:**

• Admin successfully creates a deadline

### **Flow of Events:**

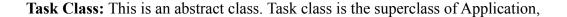
- 1. Admin creates a deadline with name and time
- 2. Admin specifies which actor the deadline affects

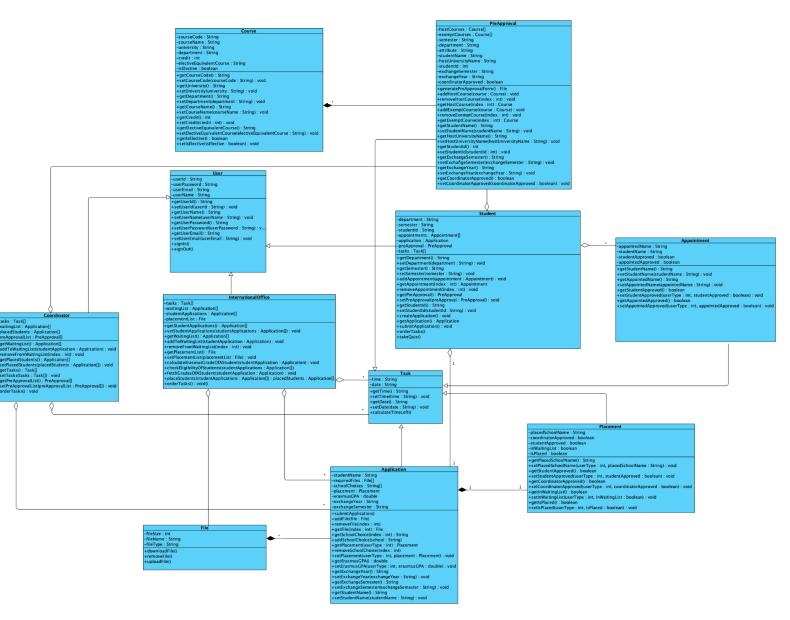
# 3.5.2 Object and Class Model

Figure 5: The Class Diagram

The class diagram of ErasmusNET is given in the figure above. In our class diagram there are 11 classes. In this UML class diagram, the relationship between actor classes and event item classes are modeled.

**User Class:** This is an abstract class. User class is the superclass of Coordinator, Student and InternationalOffice.





Placement and Appointment. This class is used for listing tasks for the Coordinator and International Office class.

**Student Class:** This class is the subclass of the User class. A Student class has 1 to many Appointment classes. A Student class has only one Application class and only one PreApproval class.

**InternationalOffice Class:** This class is the subclass of User class. An InternationalOffice class has 1 to many Application classes and 1 to many Task classes. The Application classes represent each student's application to the exchange

program. The Task classes are for listing each task the international office worker needs to do according to their due dates.

**Coordinator Class:** This class is the subclass of User class. A Coordinator class has 1 to many Application classes, 1 to many PreApproval classes and 1 to many Task classes. The Application classes represent each student's application to the exchange program. PreApproval classes represent the PreApproval forms students used to submit. The Task classes are for listing each task the coordinator needs to do according to their due dates.

**Application Class:** This class is the subclass of Task class. This class is for uploading necessary forms and making an application for exchange programs. An Application class has only one Placement class. An Application class has 1 to many File classes.

**Placement Class:** This class is the subclass of Task class. This class is for announcing the placed University to the student and handling the approval/disapproval procedures.

**PreApproval Class:** This class is the subclass of Task class. This class is for handling the PreApproval stage and course counting. A PreApproval class has 1 to many Course classes.

**Course Class:** This class is for representing the courses that will be counted in PreApproval class.

**File Class:** This class is for representing the files that are uploaded or generated inside the application, These files can be the application form, the cv of the student, statement of purpose or the pre-approval form.

**Appointment Class:** This class is the subclass of Task class. Appointment classes are for arranging appointments between a student and a coordinators or a students and an international office worker.

### 3.5.3 Dynamic Models

### 3.5.3.1 Activity Diagram

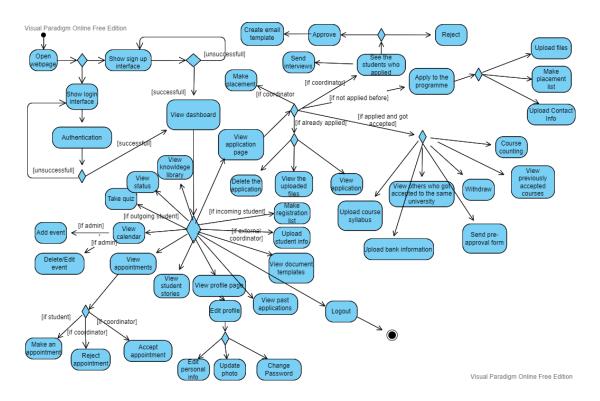


Figure 6: Activity diagram for Erasmus/Exchange application process

# 3.5.3.2 Sequence Diagrams

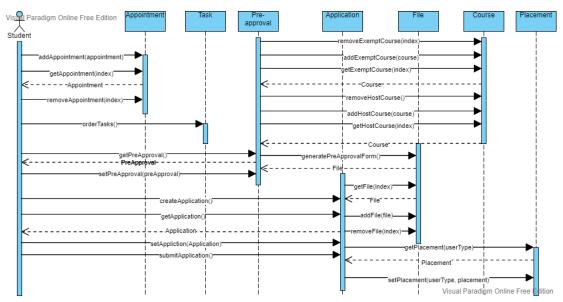


Figure 7: Sequence diagram for a student

The sequence diagram for a student depicts what methods can be called from an instance of Student class. The Student class interacts with Appointment, Task, Pre-approval, Application, File, Course and Placement classes. The Student object can add, get and remove appointments by the methods of the Appointment class. It can order tasks by the Task class and it can also get and set pre approvals using methods of the PreApproval class. PreApproval class also interacts with the course class to remove, add and get host and exempt courses. The Student object can create, get, set and submit applications using the Application class. The Application class also interacts with the File class by its get, add and remove file methods and with Placement class using its set and get placement methods.

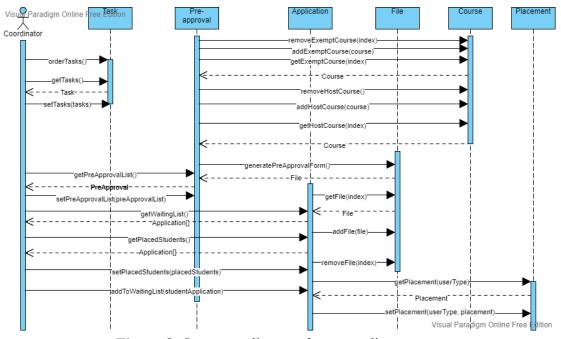


Figure 8: Sequence diagram for a coordinator

The Coordinator class interacts with similar methods and classes with the Student class. What differs them is that the Coordinator can get and set the placed student, can get and set the pre approval lists and add students to the waiting list.

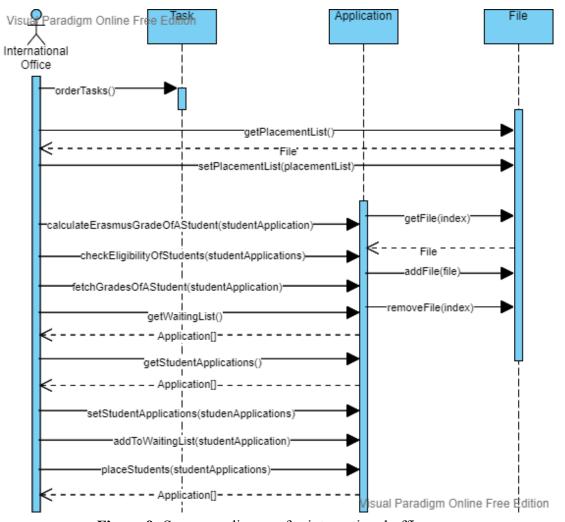
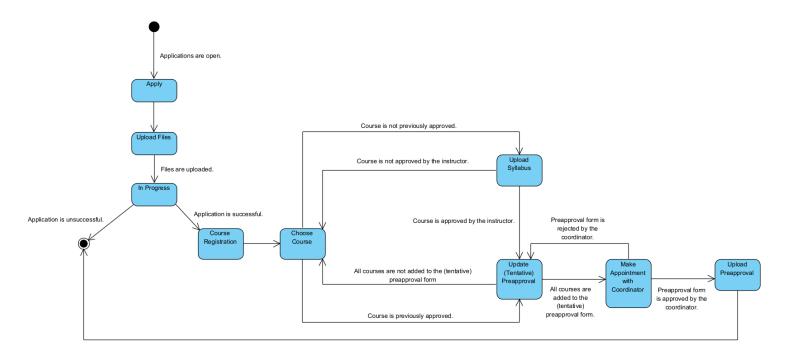


Figure 9: Sequence diagram for international office

The international office actor interacts with Task, Application and File classes. It can order tasks by the orderTask method of the Task class. It can get and set placements lists using the methods of File class. The international office can also use methods of the Application class to calculate the Erasmus grade of a student, check eligibility of students, fetch grades of a student etc. The Application class can add and get files.

### 3.5.3.3 State Chart

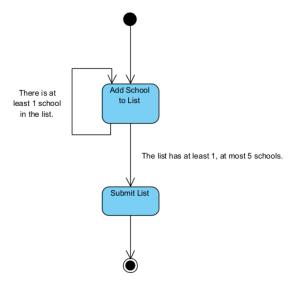
# 3.5.3.3.1. State Chart for Outgoing Students' Application



**Figure 10:** State Diagram Demonstrating the Application Process for Outgoing Students

This state diagram describes the Erasmus Program application process for outgoing students. Once the applications are open, the students can apply to the program. To complete their applications, they have to upload the required files and wait to see whether their application has been approved or not. If their application is accepted, they must prepare for the courses they will take during the semester they study abroad. However, Bilkent instructors must approve all the courses a student will take. Therefore, if a class has never been approved, the student must share its syllabus with the related instructor. If the instructor approves the syllabus or the syllabus exists in the database, the student can register for that course. After choosing the courses, the student has to talk with the department Erasmus coordinator and get feedback on their pre approval form. If the coordinator accepts it, the student can upload their pre approval form. If the coordinator asks the student to revise, the student must update the report and talk to the coordinator until they can upload their preapproval.

### 3.5.3.3.2. State Chart for Preference List



**Figure 11:** State Diagram Demonstrating the Creation Process for a Student's School Preference List

Outgoing students have to make a list of their preferred Erasmus schools. This list must contain at least one and at most five schools. After the list is completed, the student has to submit it to be placed into one of their preferences. This state list describes this action.

# 3.5.3.3.3. State Chart for Students' Appointment System

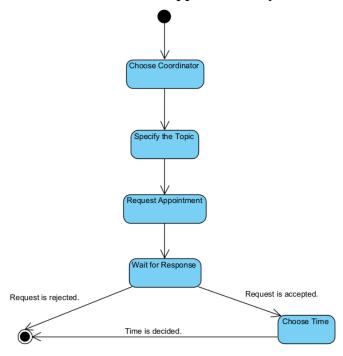


Figure 12: State Diagram Demonstrating the Appointment System for Students

This state diagram demonstrates the system for students to make appointments with coordinators. First, the student specifies the coordinator and the topic concerning the meeting. Then, they wait for a response from the coordinator. If the coordinator accepts their request for a session, the student has to pick a time from the three options the coordinator has specified.

# 3.5.3.3.4. State Chart for Students' Email System

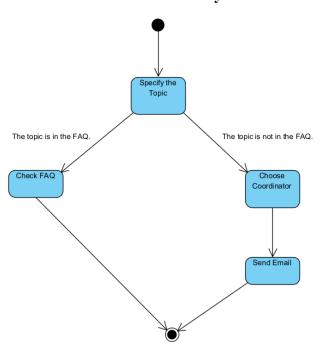
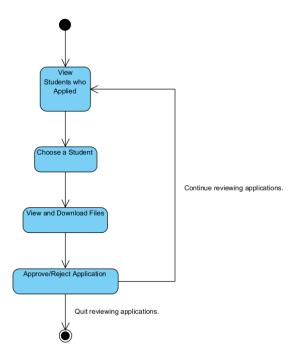


Figure 13: State Diagram Demonstrating the Email System for Students

The students can reach out to the coordinators if they have unresolved problems. They have to specify their struggles. If there is no answer on the Frequently Asked Questions (FAQ) page, they can choose a coordinator and send an e-mail using the provided template. The student is directed to that page if the answer can be found on the FAQ.

# 3.5.3.3.5. State Chart for International Office Coordinators' Application Process



**Figure 14:** State Diagram Demonstrating the Application Process for International Office Coordinators at Bilkent University

International Coordinators at Bilkent University have access to review applications. First, they choose a student who has applied to the Erasmus program. Then they can view and download the files uploaded by the selected student. International Coordinators have the authority to approve or reject applications.

# 3.5.3.3.6. State Chart for Coordinators' Appointment System

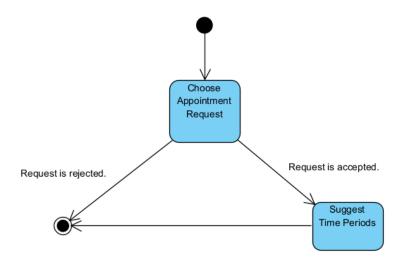


Figure 15: State Diagram Demonstrating the Appointment System for Coordinators

The coordinator is notified when a student requests an appointment from a coordinator. If the coordinator accepts the request, they must specify three dates for the student to select.

# 3.5.4 User Interface

# 3.5.4.1 Landing Page



Figure 16: Landing Page

This is the landing page of the website. It lets users learn more about the site or continue using it through the login button.

# 3.5.4.2 Register and Login Page

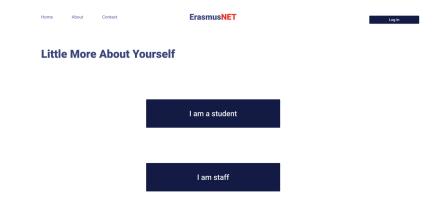


Figure 17: Register and Login Page

In this page, users will select whether they are a student or a staff member. They will be redirected to the relevant page after selecting.

# 3.5.4.3 Student Dashboard 3.5.4.4.1 Dashboard

The Dashboard will be the most important part of the website for students. They can see the timeline of the application process, upcoming deadlines and action items for the next step.

# Status Status Status Complete Application Complete Application Complete Application Can Alkan calkan@cs.bilkent.edu.tr

**3.5.4.4.1.1 Application** 

Figure 18: Application Stage

In this stage, students will complete their application and finalize it before the deadline. Application pages are demonstrated with following figures.

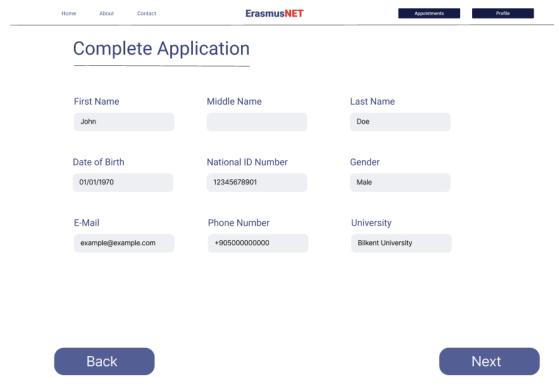


Figure 19: Application Form Step 1

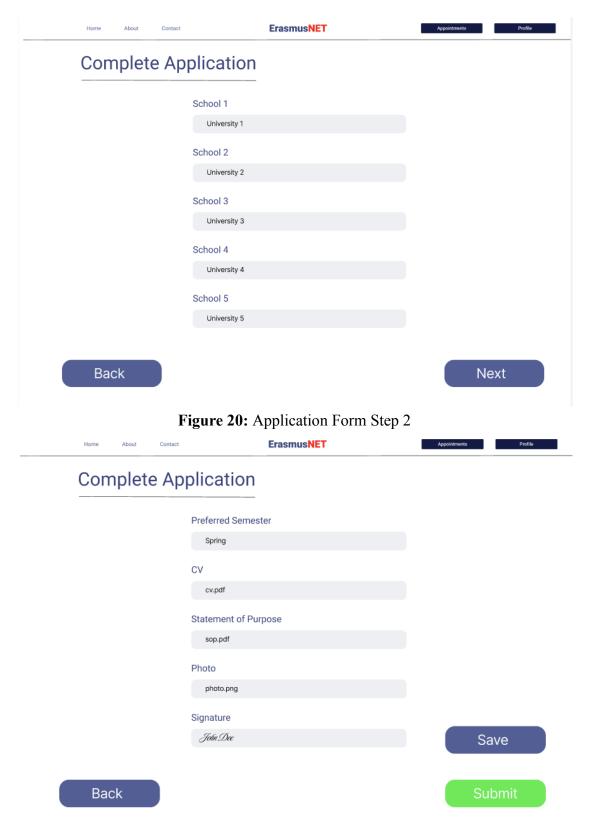


Figure 21: Application Form Step 3

# 3.5.4.4.1.2 Placement

No action is required from the student until placement results are announced.

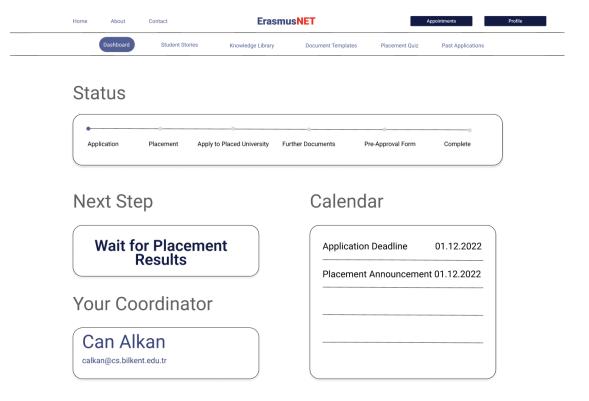


Figure 22: Waiting Placement

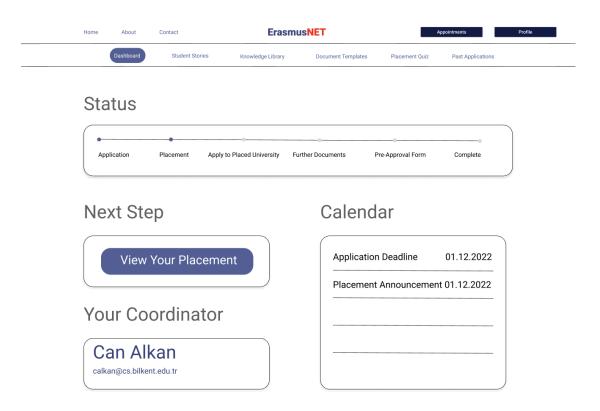


Figure 23: View Placement

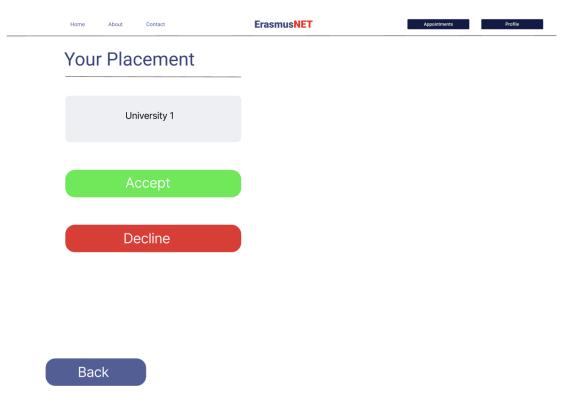


Figure 24: Accept/Decline Placement

Students will need to accept or decline their placements at this stage. If they decline, they will be removed from the process and the next person in the waiting list will take their place.

3.5.4.4.1.3 Apply to Placed University

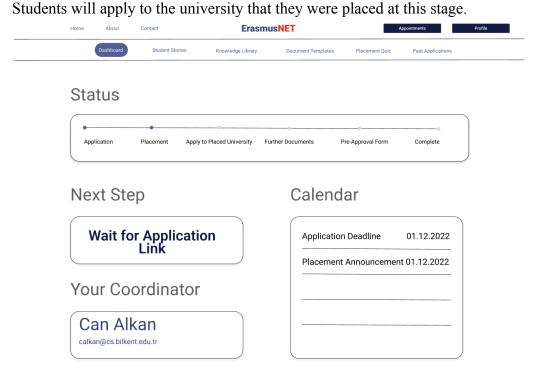


Figure 25: Waiting Application Link

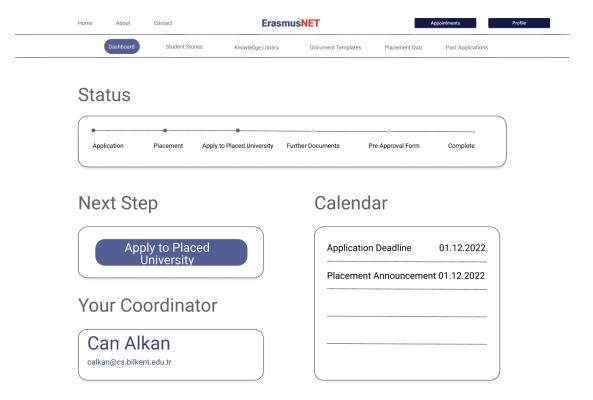


Figure 26: Application Link

The button on the above figure will redirect the student to the application page of their university.

# 3.5.4.4.1.4 Further Documents

Students will provide additional documents and propose their courses at this stage.

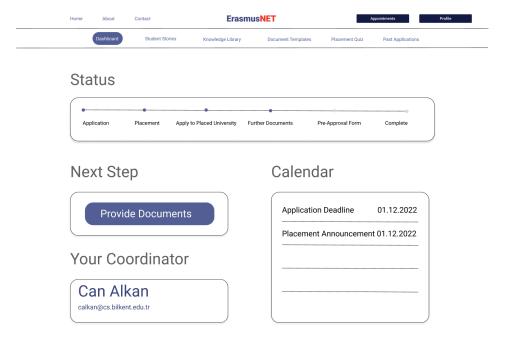


Figure 27: Provide Documents

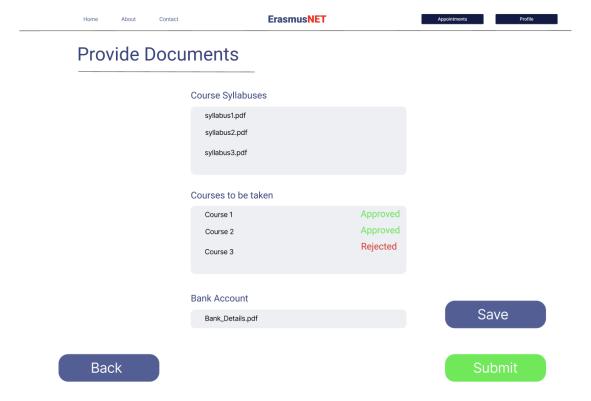


Figure 28: Providing Documents

Students can propose new courses and see the status of their proposals.

# 3.5.4.4.1.5 Pre-Approval Form

Students will upload their pre-approval form in this stage.

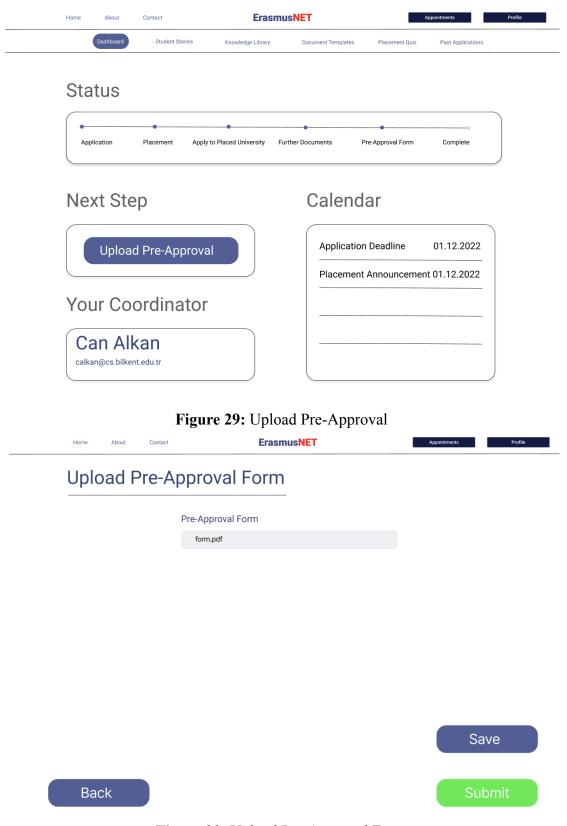


Figure 30: Upload Pre-Approval Form

Students will upload their pre-approval form on this page.

# **3.5.4.4.1.6** Complete

Process is complete and no further action is required from the student.

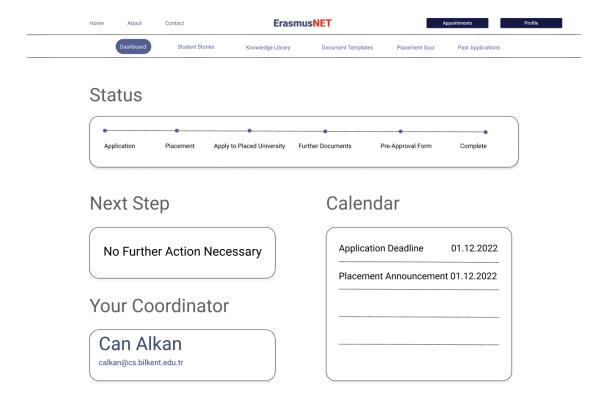


Figure 31: Process Completed

# 3.5.4.4.2 Student Stories

This section provides a story written by a former erasmus/exchange student. They will provide their experience and challenges that they've faced during the mobility.

# John Doe

University 1

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nullam vel gravida lacus, et semper massa. Aenean dapibus ligula nec sapien pretium, et mattis nisl mattis. Morbi leo metus, pulvinar ut blandit a, maximus non tellus. Integer placerat eros et eros mollis volutpat. Aliquam vel quam at nibh consequat lacinia. Mauris faucibus ornare orci sed vulputate. Curabitur euismod, libero ac rutrum pulvinar, neque nunc fermentum mauris, nec semper eros eros ac nunc. Nunc ut nunc eu diam fringilla condimentum. Sed ornare id quam id rhoncus. Praesent id nisi feuglat, malesuada dolor ut, luctus ante. Fusce ac finibus justo, a hendrerit mi.

Pellentesque tincidunt ut velit ut fermentum. Quisque ullamcorper metus nunc, vitae feugiat libero faucibus vitae. Phasellus tempus ipsum eu ipsum vehicula tincidunt. Curabitur et magna eget lectus portitior hendreirit sed id diam. Integer at viverra dolor, ut dapibus diam. Sed non dapibus libero, ut rhoncus risus. Fusce ultricies felis diam, at tincidunt augue scelerisque non. Morbi eu risus quam. In malesuada maximus diam. Mauris condimentum eros orci, et maximus totro posuere sed.



Figure 32: Student Story

# 3.5.4.4.3 Knowledge Library

This section is essentially an FAQ. Students will try to find an answer to their questions here first. If they cannot find help, they will have an option to email one of the coordinators or university staff. The Contact Us button will redirect to a different email address for each question to ensure that only relevant faculty members will be pinged for the question.

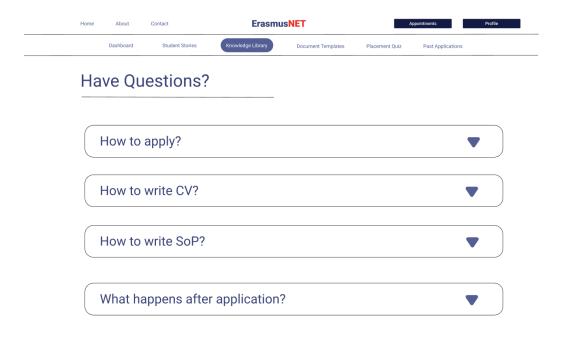


Figure 33: Knowledge Library

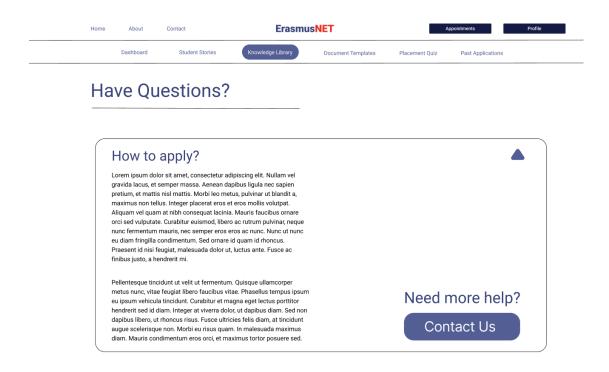


Figure 34: Question Expanded

# **3.5.4.4.4 Document Templates**

In this section, students will find templates for CV, Statement of Purpose and photo (example).

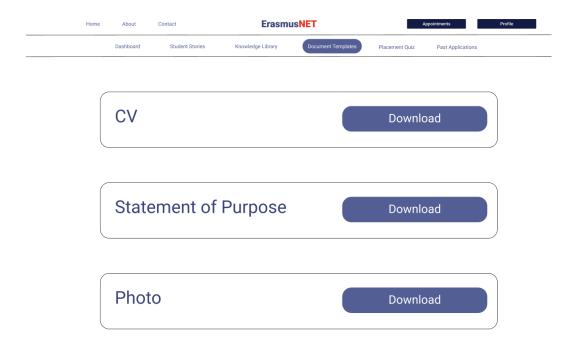


Figure 35: Document Templates

# 3.5.4.4.5 Placement Quiz

In this page, students can take a placement quiz to get a realistic list of universities that they should apply to. This will be based on their score and the scores of previous students that went to a certain university.

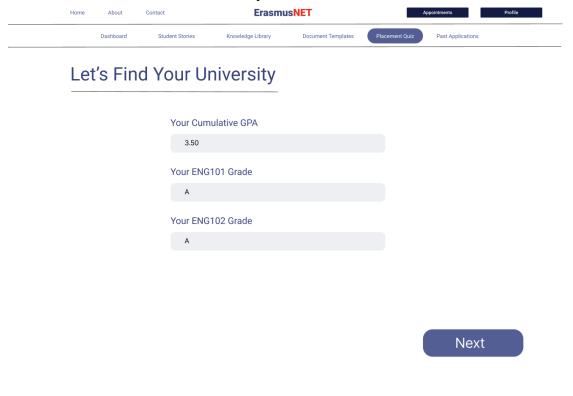


Figure 36: Placement Quiz 1

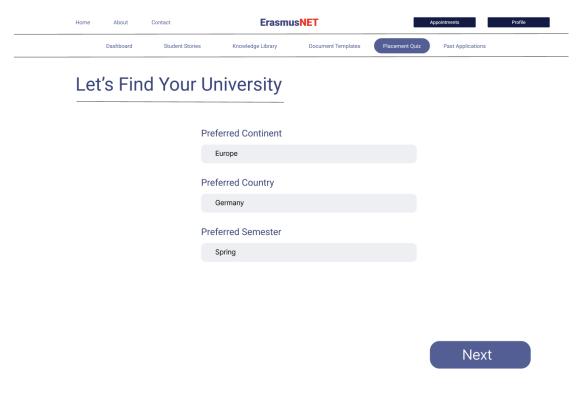


Figure 37: Placement Quiz 2

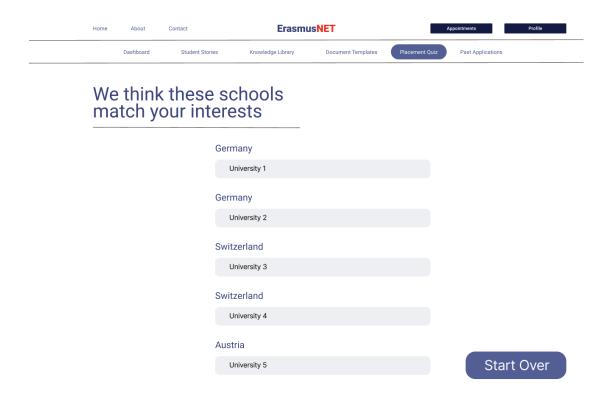


Figure 38: Placement Quiz Result

# 3.5.4.4.6 Past Applications

On this page, students can view their past applications.

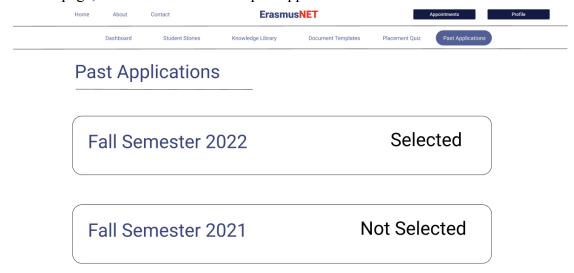


Figure 39: Past Applications

# 3.5.4.4.7 **Profile**

Students can access and view their personal information on this page. This page is accessible via the button on top right.

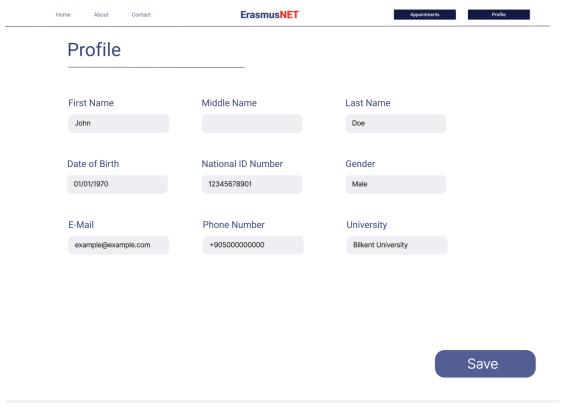


Figure 40: Profile

# 3.5.4.4.8 Appointments

Students can send appointment requests to coordinators here. Coordinator will set the time and date for the appointment.

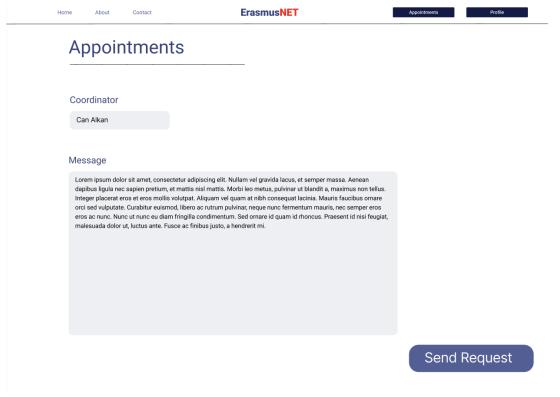


Figure 41: Appointment Request

### 3.5.4.4 Coordinator Dashboard

### **3.5.4.4.1 Dashboard**

# 3.5.4.4.1.1 Student Applications

Coordinator will start the placement process at this stage. Placement will be done automatically.

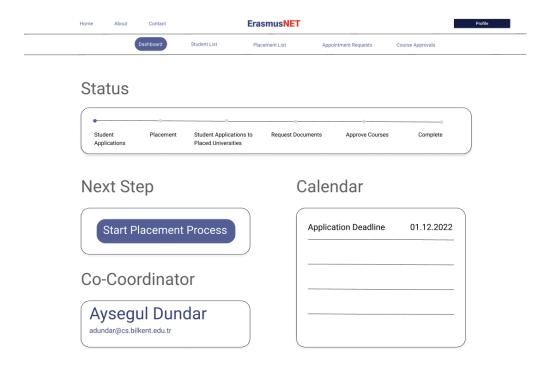


Figure 42: Starting Placement Process

### 3.5.4.4.1.2 Placement

This will be done automatically. No action is required from the coordinator.

# 3.5.4.4.1.3 Student Applications to Placed Universities

Coordinator will send an application link to students that were placed. These links will be provided to the system and will be automatically sent after they click to the button below.

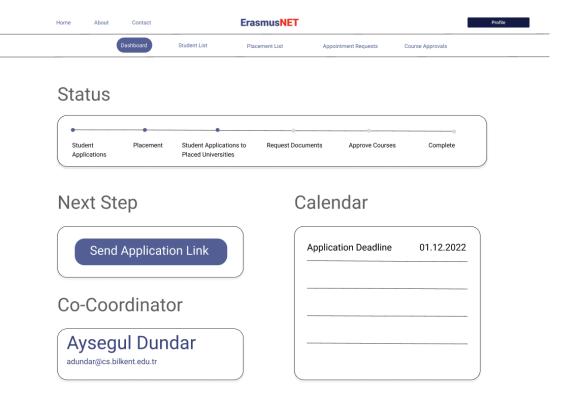


Figure 43: Sending Application Link

# 3.5.4.4.1.4 Request Documents

Coordinator will start the document request stage here.

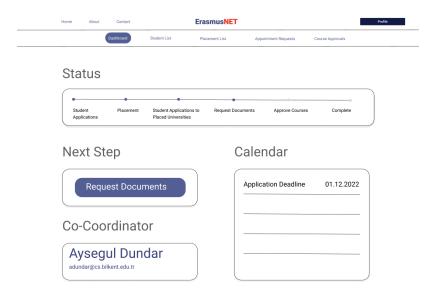


Figure 44: Requesting further documents from students

# **3.5.4.4.1.5 Approve Courses**

Coordinator will approve courses that students send at this stage. Button on this page will take the coordinator to the Course Approvals page.

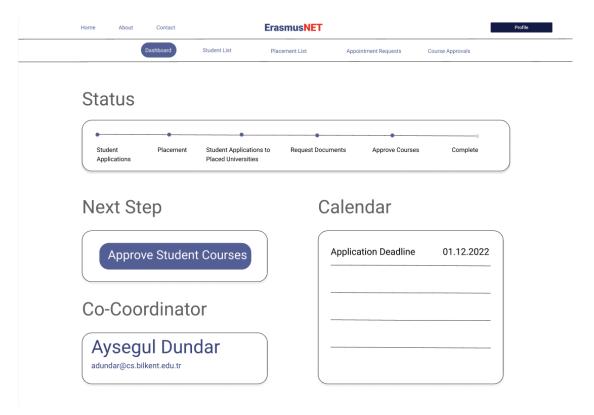


Figure 45: Start approving courses process

# **3.5.4.4.1.6** Complete

Coordinators will approve pre-approval forms at this stage which will lead to the process being complete.

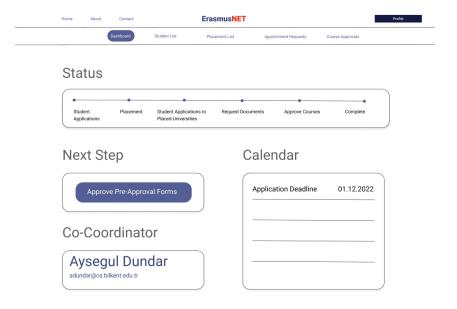


Figure 46: Start approving Pre-Approval Forms

### **3.5.4.4.2** Student List

Coordinators can view all information about students here.



Figure 47: Student list

# 3.5.4.4.3 Placement List

Coordinators will see the students that were placed and their placement university.



Figure 48: Placement List

# 3.5.4.4.4 Appointment Requests

Coordinators will see appointment requests sent by students here.



Figure 49: Appointment Requests

# 3.5.4.4.5 Course Approvals

Coordinators will see the courses that were proposed by students and approve or reject them here.



Figure 50: Course Approvals

# 4 Glossary

Glossary for any domain-specific terms you use in your report.

# 5 References

[1] Object-Oriented Software Engineering, Using UML, Patterns, and Java, 2nd Edition, by Bernd Bruegge and Allen H. Dutoit, Prentice-Hall, 2004, ISBN: 0-13-047110-0.