CS 353 COURSE PROJECT

Final Report

Ucollege - Group 7

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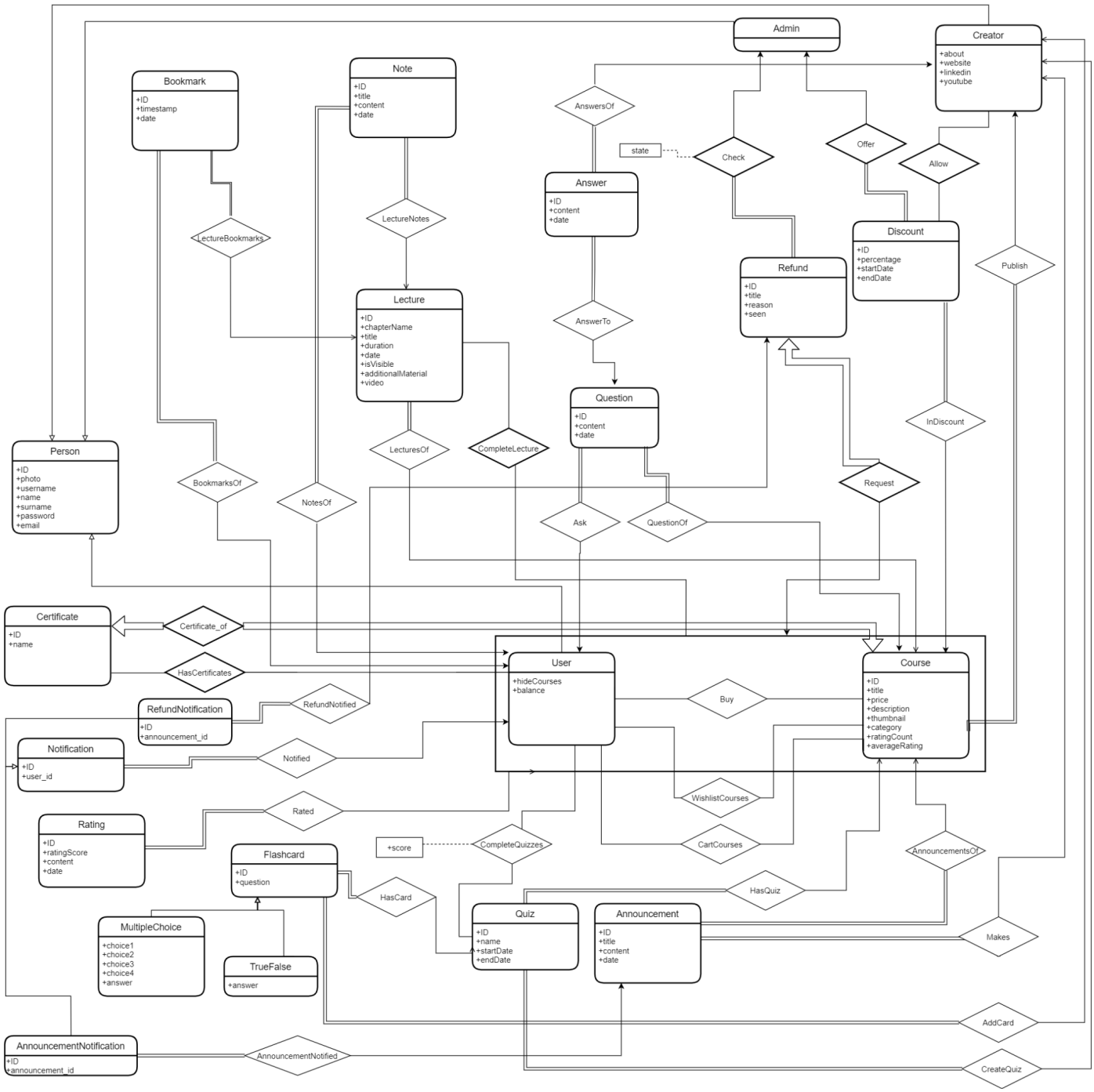
Overview

Ucollege is an online course platform with high emphasis on interactivity and learning by practice. There are three types of members (persons in this context): users, creators, and admins. **Users** can search for different courses with different parameters, buy the course if they have sufficient funds, add courses to their wish lists and carts, rate courses after finishing them. They can also update them. They earn a certificate from their course when they complete the course. A user can participate in quizzes of bought courses, watch its lectures, ask questions, get notified by announcements, and request a refund if the course is not finished. A user can add bookmarks and notes for a lecture, and can look at the additional material related to that lecture, added by the creator. Users can add balance to their courses, can display their certificates. **Creators** can create courses. In these courses, the creator can add or delete lectures, add or delete announcements, answer questions, add quizzes. In terms of lectures, they can add additional material for users, change the lectures visibility, and delete the lecture. In terms of quizzes, they can create new quizzes for a specific course, consisting of multiple choice or true-false questions at the same time. Creators can specify time and put different constraints for the quiz. Users can get feedback on their performance, learning their scores. Creators can allow discounts and disable them, offered by admins. **Admins** can check refund requests made by users, then approve/reject these requests, notifying the users. Moreover, admins can display some in-site statistics and analytics regarding the Ucollege. Admins can offer discounts for a course.

Final E/R Diagram

Only the **Achievement** table is deleted from the table as it was unnecessary. Added three new entities **Notification, RefundNotification, AnnouncementNotification,** and updated **Participate** relation to **CompletedQuizzes** relation**.**



https://drive.google.com/file/d/1bcupApCPPuDwWLaqjYR9JwOexfeRyuxI/view?usp=sharing

Table Schemas

Person(ID, email, password, name, surname, username, photo)

User(ID, hideCourses, balance)

- Foreign key ID references Person(ID)

Creator(ID, about, website, linkedin, youtube)

- Foreign key ID references Person(ID)

Admin(ID)

- Foreign key ID references Person(ID)

Course(ID, title, price, description, thumbnail, category, creator_id, averageRating, ratingCount)

- Foreign key creator_id references Creator(ID)

Buy(user_id, course_id)

- Foreign key user_id references User(ID)
- Foreign key course_id references Course(ID)

Lecture(ID, chapterName, title,duration, date, isVisible, additionalMaterial, video, course_id, lecture_index)

- Foreign key course_id references Course(ID)

Question(ID, content, date, user_id, course_id, parent_id)

- Foreign key user_id references User(ID)
- Foreign key course_id references Course(ID)

Answer(ID, content, date, question_id, creator_id)

- Foreign key question_id references Question(ID)
- Foreign key creator_id references Creator(ID)

Refund(ID, title, reason, user_id, course_id, seen, admin_id, state)

- Foreign key (user_id) references User(id)
- Foreign key (course_id) references Course(id)
- Foreign key admin_id references Admin(ID)

Discount(ID, percentage, startDate, endDate, course_id, admin_id)

- Foreign key course_id references Course(ID)
- Foreign key admin_id references Admin(ID)

Note(ID, title, content, date, user_id, lecture_id)

- Foreign key user_id references User(ID)
- Foreign key lecture_id references Lecture(ID)

Bookmark(ID, videoTimestamp, date, user_id, lecture_id)

- Foreign key user_id references User(ID)
- Foreign key lecture_id references Lecture(ID)

CompleteLecture(lecture_id, user_id, course_id)

- Foreign key lecture_id references Lecture(ID)
- Foreign key (user_id, course_id) references Buy(user_id, course_id)

Allow(creator_id, discount_id)

- Foreign key creator_id references Creator(ID)
- Foreign key discount_id references Discount(ID)

Certificate(ID, name, course_id)

- Foreign key course_id references Course(ID)

HasCertificates(certificate_id, user_id)

- Foreign key certificate_id references Certificate(ID)
- Foreign key user_id references User(ID)

WishlistCourses(user_id, course_id)

- Foreign key user_id references User(ID)
- Foreign key course_id references Course(ID)

CartCourses(user_id, course_id)

- Foreign key user_id references User(ID)
- Foreign key course_id references Course(ID)

Rating(ID, ratingScore, content, date, user_id, course_id)

- Foreign key user_id references User(ID)
- Foreign key course_id references Course(ID)

Announcement(ID, title, content, date, creator_id, course_id)

- Foreign key creator_id references Creator(ID)
- Foreign key course_id references Course(ID)

Quiz(ID, duration, name, creator_id, course_id)

- Foreign key creator_idreferences User(ID)
- Foreign key course_id references Course(ID)

FlashCard(ID, question, quiz_id)

- Foreign key quiz_id references Quiz(ID)

TrueFalse(ID, answer)

- Foreign key ID references Flashcard(ID)

MultipleChoice(ID, choice1, choice2, choice3, choice4, answer)

- Foreign key ID references Flashcard(ID)

Notification(ID, user_id)

- Foreign key user_id references User(ID)

AnnouncementNotification(ID, announcement_id)

- Foreign key ID references Notification(ID)
- Foreign key announcement_id references Announcement(ID)

RefundNotification(ID, refund_id)

- Foreign key ID references Notification(ID)
- Foreign key refund_id references Refund(ID)

CompletedQuizzes(user_id, quiz_id, score)

- Foreign key user_id references User(ID)
- Foreign key quiz_id references Quiz(ID)

Implementation

Tools

We used Node.js, Express.js, and MySQL for the backend of our application. For the frontend, we used React. We did our tests and experiments on a local database, using XAMPP, PHPMyAdmin, Sqlectron, and Postman.

Challenges

One of the main challenges we faced was making SQL queries on the Node.js with MySQL. We had little to zero experience with Node.js/SQL combinated programming, therefore some queries were throwing unexpected exceptions.

Another problem is ending discounts for allowed courses. As discounts have certain start and end dates, we had to make a timed query on the server. We could not use triggers; we have adopted a **cron** based approach. We created a **cronjob**, a time-based job scheduler, invoked at the end of each day. This approach deletes discounts and the respective **Allow** tuples.

Another problem is limiting the access of different user types to each other's pages. For example, we had to limit users' access to the course and lecture pages that they have not bought yet. Then, we have created different route components that wrap the React **Router** library. By giving each route a set of roles, we have achieved the expected access security.

Implementation of Features

Osman Batur İnce:

- Selecting a course and seeing its features**,** buying a course
- Watching a lecture, moving to next course
- Get certificate, creating notes and bookmarks
- Commenting on and rating course
- Publish a course, create lectures
- Make announcements, some UI screens

Murat Angın:

- Listing all available courses and applying filters
- Asking questions, answering questions
- Request refund on a course
- Check refund requests and approve/reject them
- Offer discount for a course, some UI screens

Ümit Yiğit Başaran:

- Create quizzes
- Creating flashcards, multiple choice/true-false questions
- Solve quizzes, some UI screens

Muhammed Emre Yıldız:

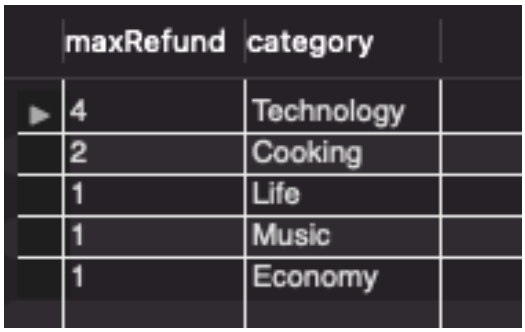
- Wishlist and Cart a course
- Wishlist and Cart Page
- Creating My course page, some UI screens

Advanced Database Components

Reports

- Most refunded courses in their categories

```
WITH RefundCounts(id, cnt) AS
(SELECT c1.id AS id, COUNT(*) AS cnt
FROM Course c1, Refund r
WHERE c1.id = r.course_id AND r.state = 'ALLOWED'
GROUP BY c1. id)
SELECT MAX(rc.cnt) AS maxRefund, c.category
FROM RefundCounts rc NATURAL JOIN Course c
GROUP BY c.category
```



maxRefund	category
4	Technology
2	Cooking
1	Life
1	Music
1	Economy

```
ORDER BY maxRefund DESC;
```

- Best-selling 10 courses in all categories

```
SELECT c.id, c.title, t.user_count
FROM Course c, (SELECT b.course_id AS id, COUNT(user_id) AS user_count
                FROM Buy b
                GROUP BY b.course_id) AS t
WHERE t.id = c.id
ORDER BY user_count DESC
LIMIT 10
```

id	title	user_count	category
3	JavaScript: Understanding the Weird Parts	4	Technology
10	Microeconomy	3	Economy
2	Bakery Course	2	Cooking
4	Guitar Course	2	Music
7	Life in Liverpool	2	Life
8	Etiquette Course	2	Life
9	How to talk with others	2	Life
1	Python Course	1	Technology
5	Game Theory Course	1	Economy
6	Socialize with Jurgen Klopp	1	Social

Views

This view gets the allowed discounts on a course with the courses if any. If there is no discount, the discount percentage is 0. This view is used in the **Homepage** while filtering the courses.

```
CREATE VIEW DiscountedCourse AS
SELECT Course.*, IFNULL(DisPrice.percentage, 0) AS discount
FROM Course LEFT JOIN (SELECT d.course_id AS course_id, d.percentage AS percentage
                       FROM Allow a, Discount d
                        WHERE a.discount_id = d.id) AS DisPrice
                       ON Course.id = DisPrice.course_id
```

Triggers

- After a user rates a course, the average rating of the course is updated.
- After a user updates his/her rating, the average of the course is updated.
- After a user buys a course, if he/she has that course in his/her wishlist, the course is deleted from the wishlist.
- After a user buys a course, if he/she has that course in his/her cart, the course is deleted from the cart.
- After a course is created, the respective certificate for the course is created.
- After a user finishes all of the lectures, the certificate is given to the user.
- When an announcement is created, all users that have bought the course are notified.
- When a refund request is concluded, the user that requested a refund is notified.

Constraints

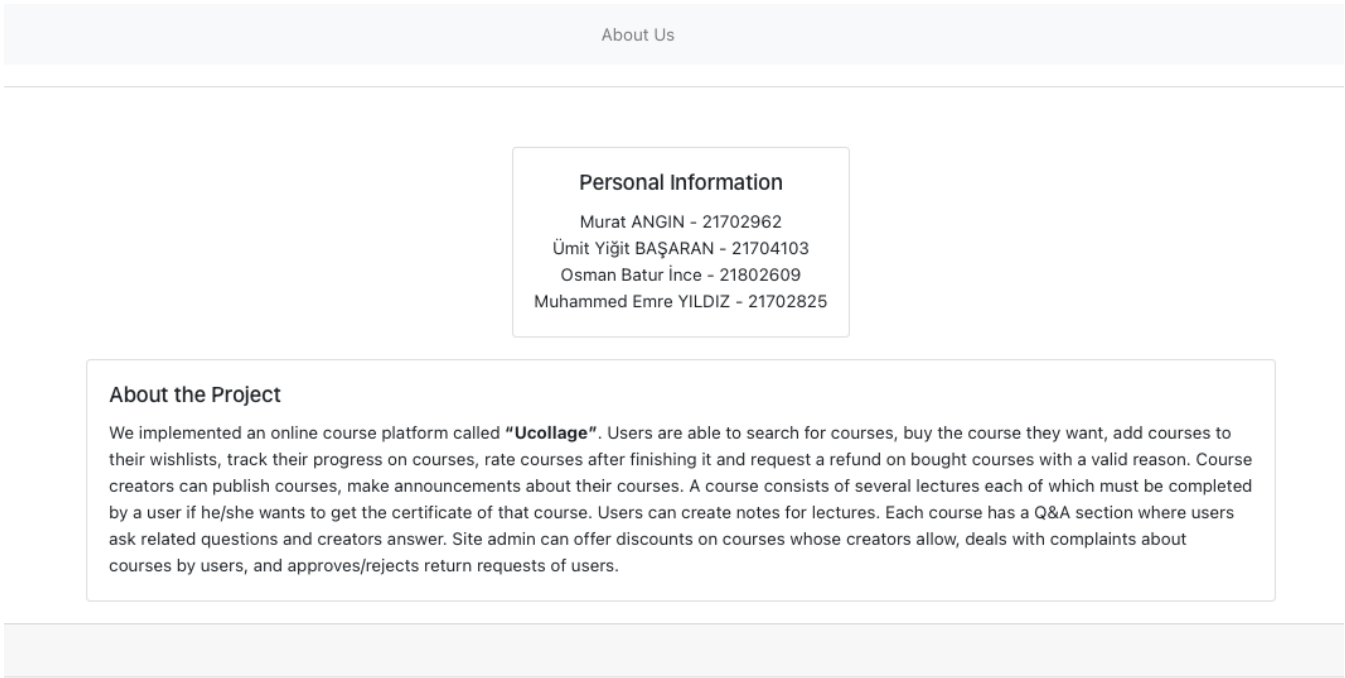
- The state column of Refund table can only have three different values:
    - “PENDING”, “ALLOWED”, or “REJECTED”
- The ratingScore column of Rating table can only have five different values:
    - 1, 2, 3, 4 or 5
- The user can rate a course only once.
- Same username or email cannot be used twice or more.
- A flashcard is unique for a question in a specific quiz.
- A certificate can only be a certificate of a single course.

Secondary Indices

- ‘announcement_cid’ as a secondary index in the table Announcement
- ‘answer_qid’ as a secondary index in the table Answer
- ‘discount_cid’ as a secondary index in the table Discount
- ‘lecture_cid’ as a secondary index in the table Lecture
- ‘note_uid’ as a secondary index in the table Note
- ‘Notification_uid’ as a secondary index in the table Notification
- ‘question_cid’ as a secondary index in the table Question
- ‘person_email’ as a secondary index in the table Person
- ‘refund_uid’ as a secondary index in the table Refund
- ‘complete_uid’ as a secondary index in the table CompleteLecture

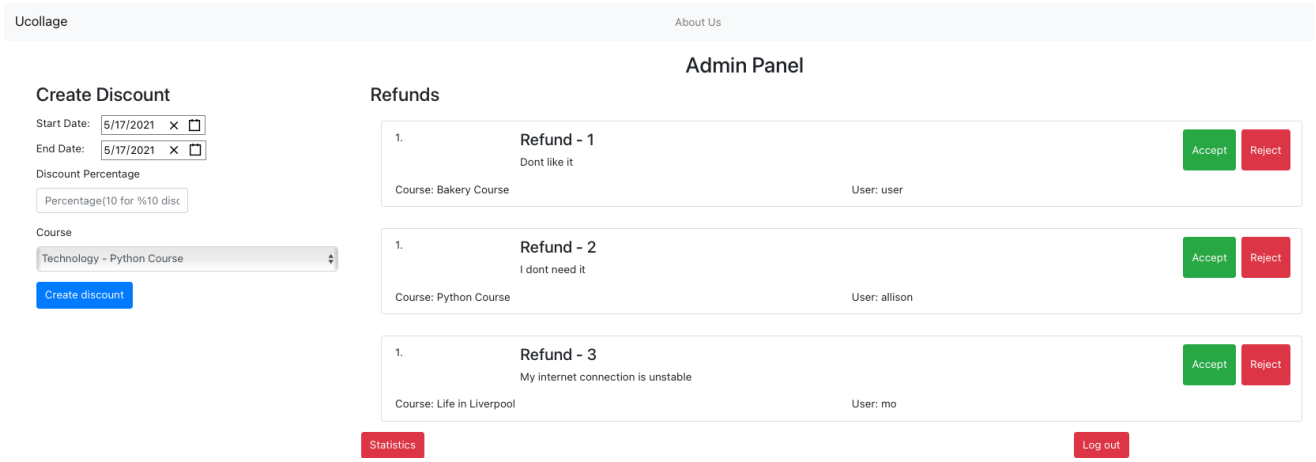
User’s Manual

About Page



This is the About Us page. The information about the members of the project and a brief summary of the project is included in this page.

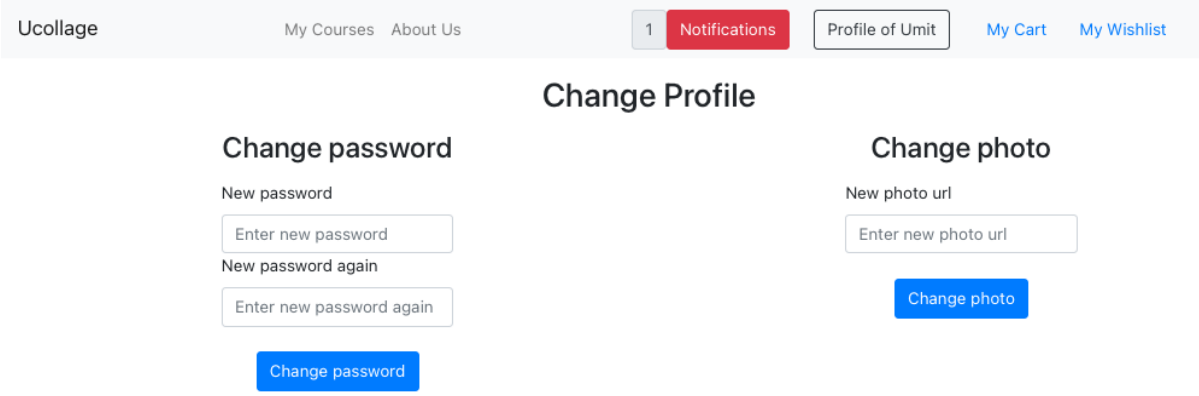
Admin Page



This above page is the admin page where only admins can see. While in this page, admin can create discounts by using the left side of the admin page. In order to create a discount, admin needs to select a start date and end date from the date pickers; insert a discount percentage and select the course from the select box. Also, admins can see the all refund requests from the

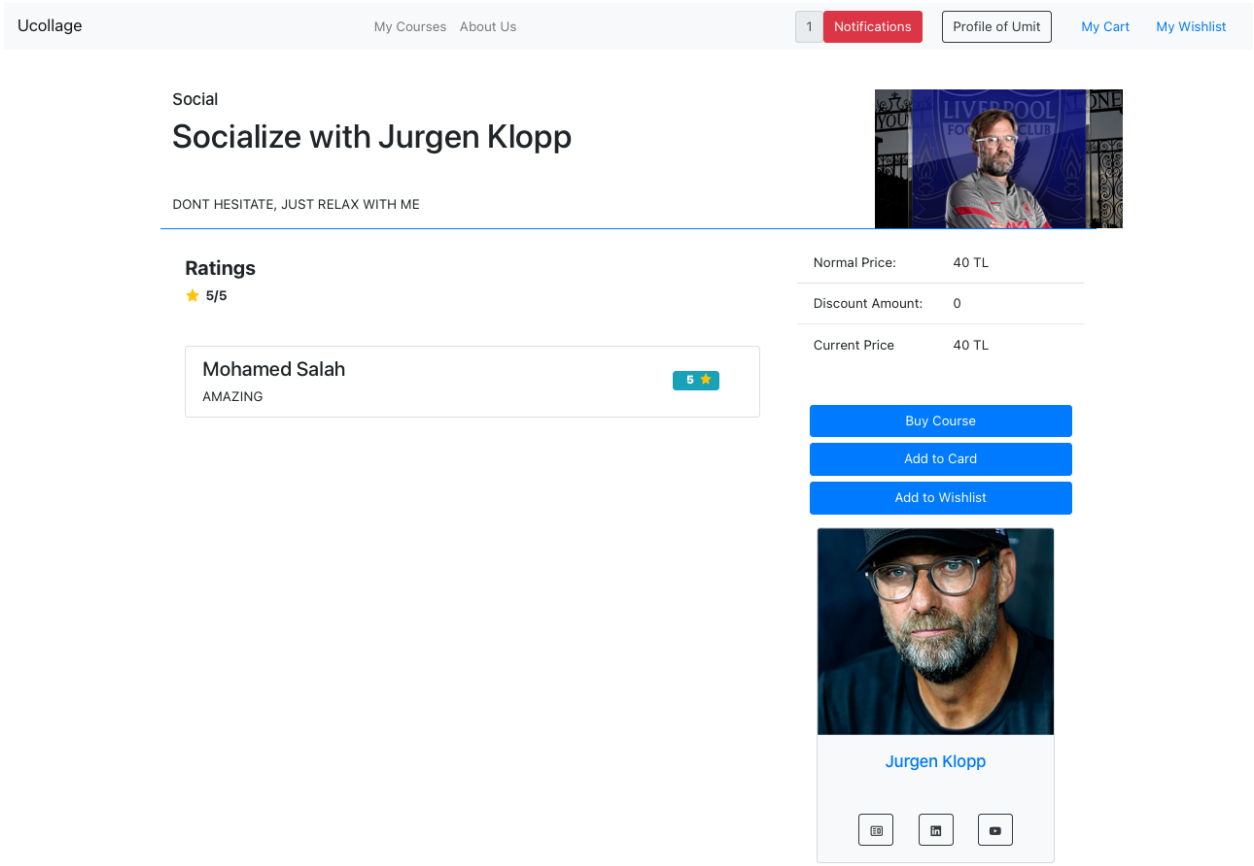
right side of the screen under “Refunds” title. By using this section, admins can accept or reject the refund request and see the details of the refunds. By clicking the “Statistic” button, admins can see the statistics of the whole project. By pressing the “Log out” button, admins can log out from the system.

Change Profile Page



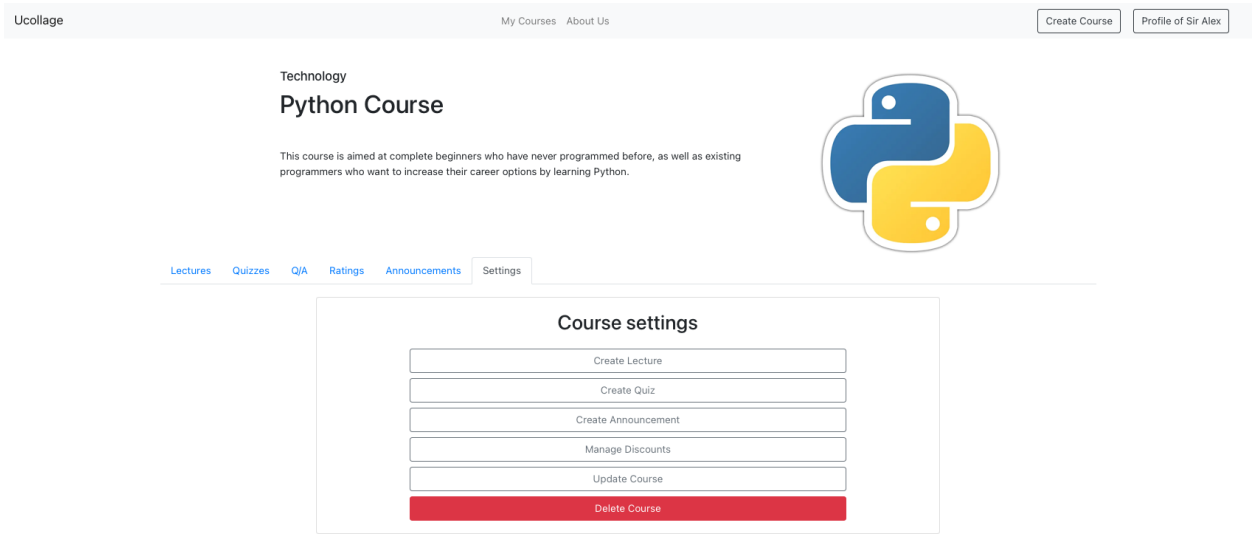
In the Change Profile screen, a user can change their photo url or password. In order to change password, users must enter the new password multiple times in order to prevent issues with writing problems.

Course Description Page



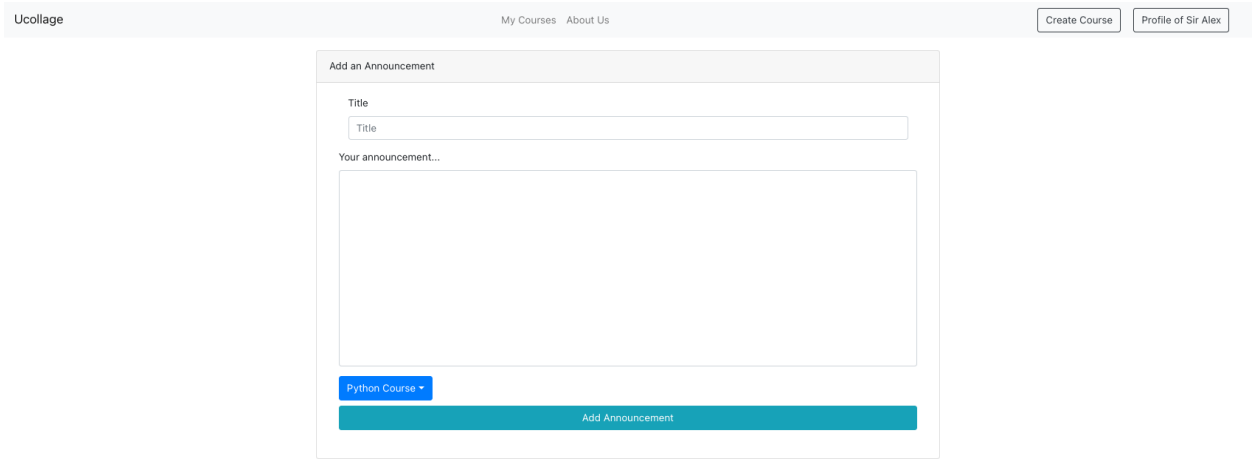
Course Description Page can be visited by both users, creators and admins. However only regular users can buy, or add their courses to cart and wishlist. Besides from this limitation, all kinds of users can see different information about a specific course such as description, average rating, rating contents and current price of the course.

Course Manage Page



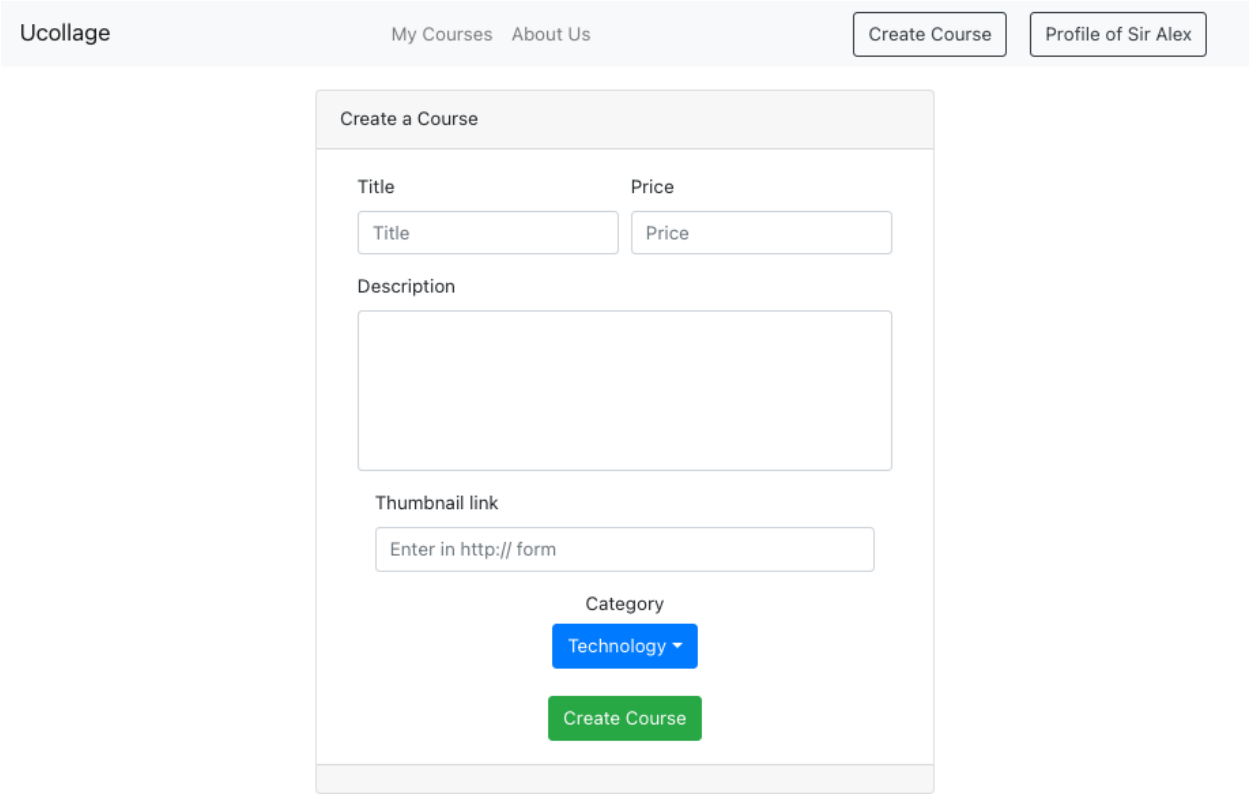
This page is only visible to the creator of the course. If the user is not the creator, the Settings tab will disappear from the screen. In this tab, a creator can handle different operations about his/her course such as create lecture, quiz, announcement, manage discounts and update course information. Each of these buttons go to a new page in order to improve UX of the design.

Create Announcement Page



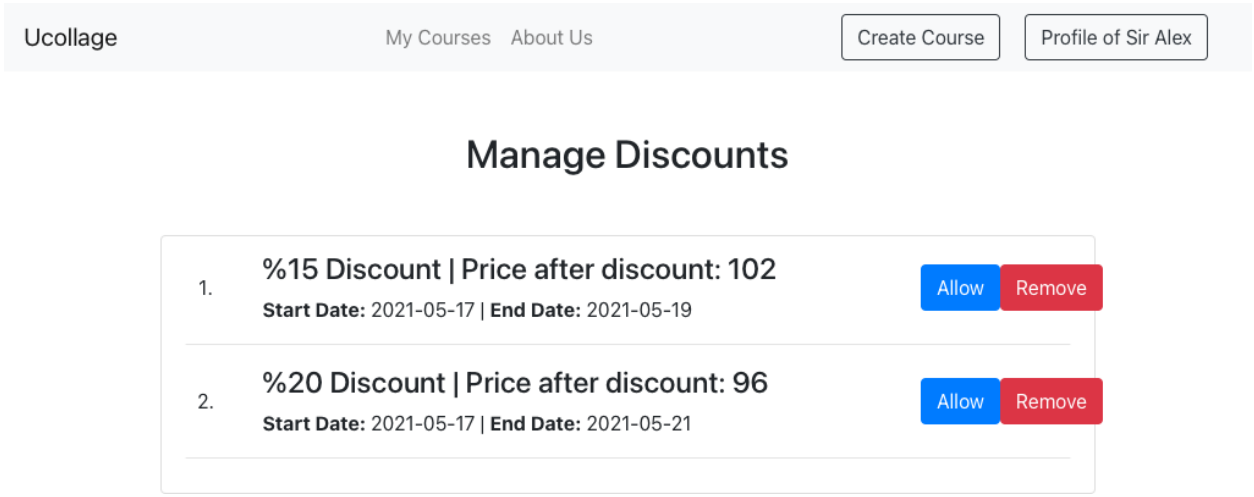
In the Create Announcement Page a course creator can create a new announcement to his/her courses. There are two required fields for the announcement entity. Creator must enter a title and announcement content in the given form.

Create Course Page



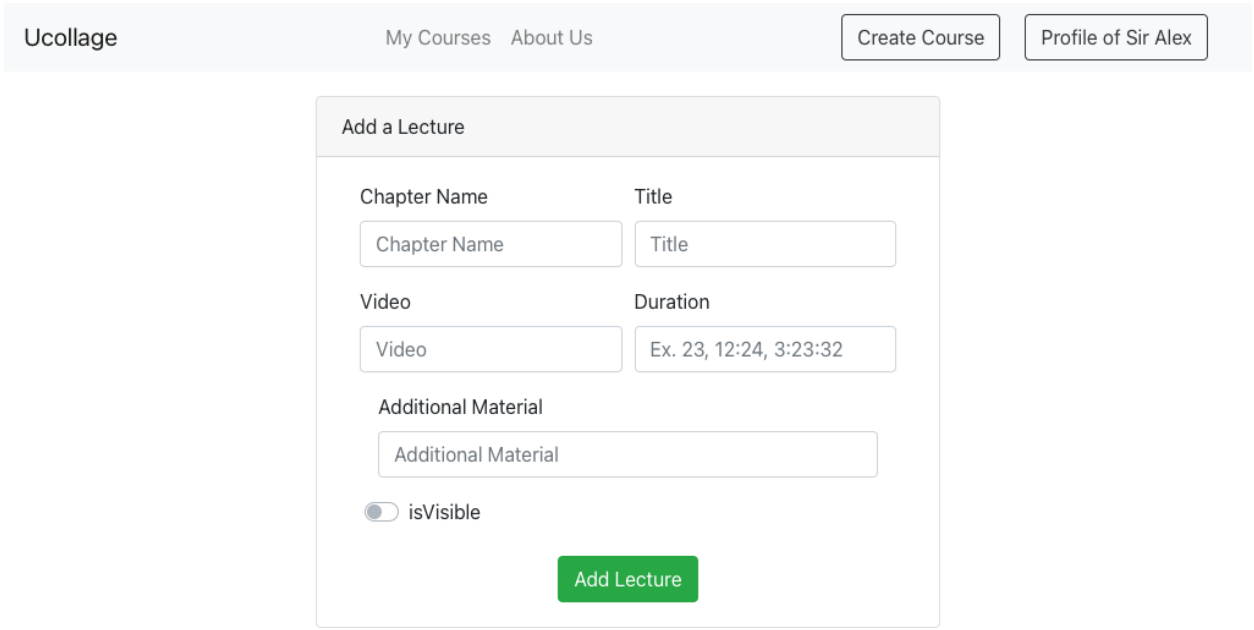
The Create Course button will be only visible to creator accounts in the Navbar component. When a creator enters this screen, he/she must fill a form with course title, price, description, thumbnail and category in order to continue without any issue.

Manage Discount Page



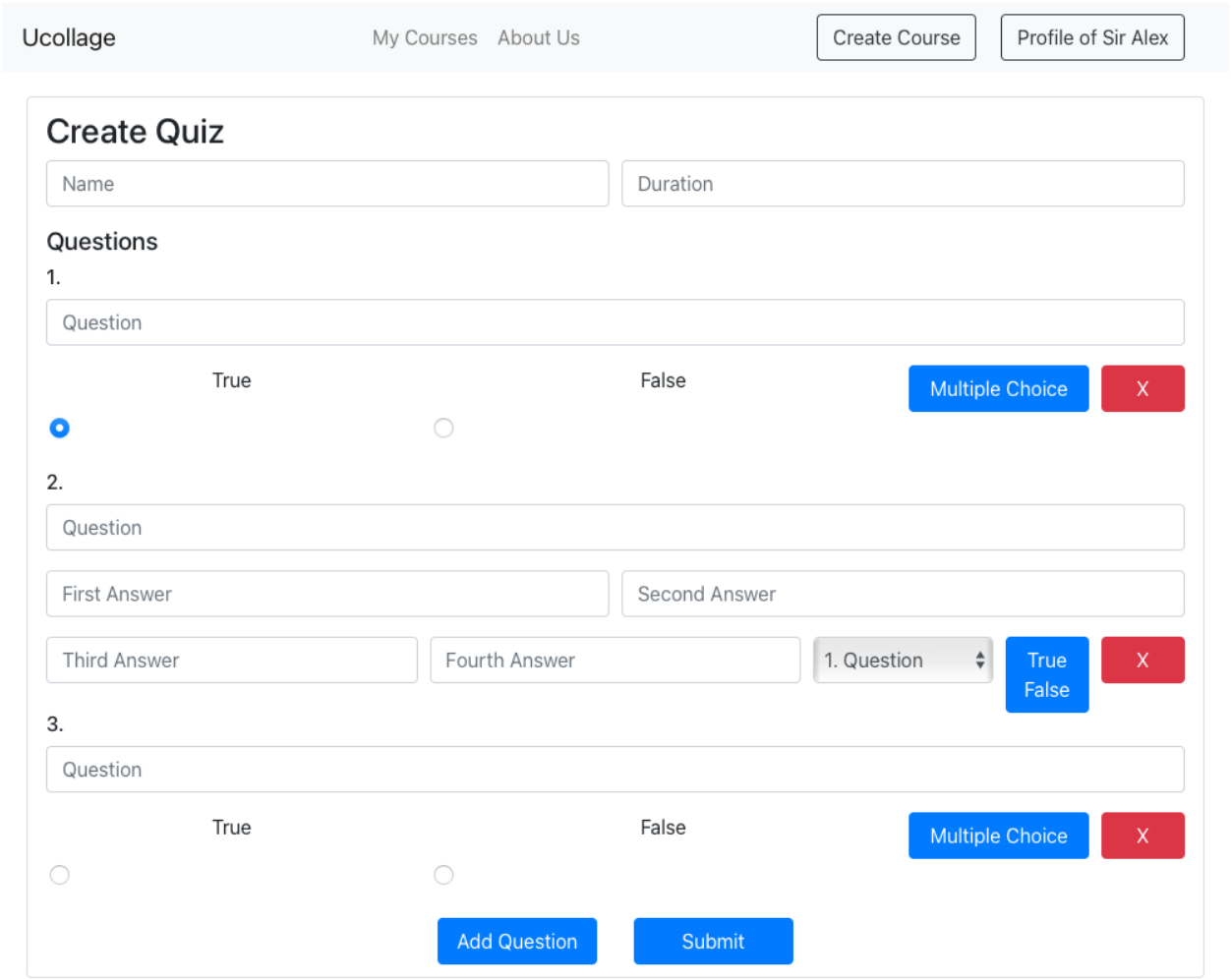
Manage Discounts page will be only visible to course creators via the Course Management tab of a specific course. In this page, a user can allow or remove a discount created by an admin. Only one of the discounts can stay allowed at the same time.

Create Lecture Page



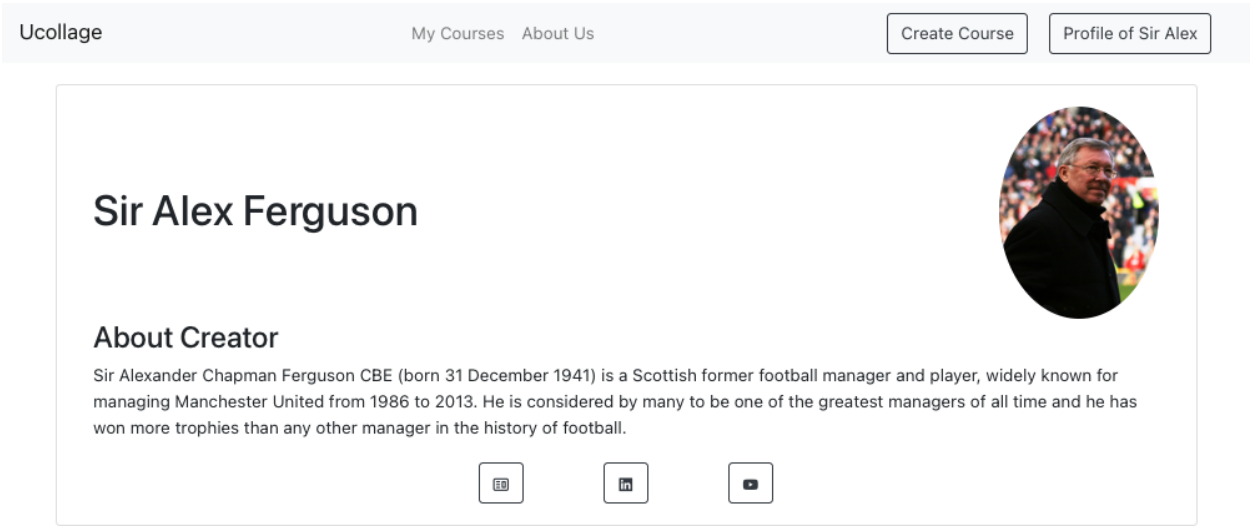
The Create Lecture page will be only visible to course creators via the Course Management tab of a specific course. In this page a creator can create a new lecture for his/her course. In order to successfully continue in this process, the creator must enter a valid chapter name, title, video url, duration and additional material(default empty). If the user selects isVisible disabled, current users of the course cannot see the newly added lecture. A creator can toggle this option later.

Create Quiz Page



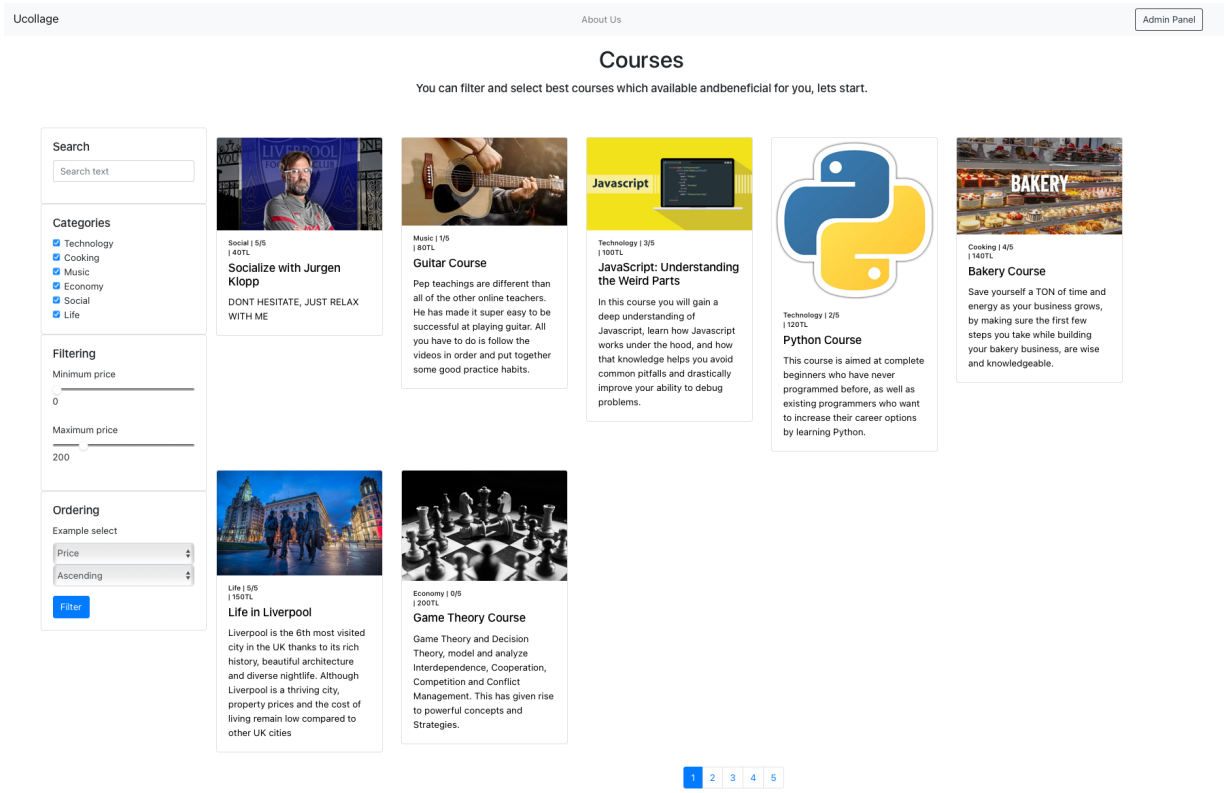
The Create Quiz page will be only visible to course creators via the Course Management tab of a specific course. In this page a creator can add new quizzes via the form. There is no question limit for a quiz, therefore a creator can add new questions via the “Add Question” button and can switch between true, false and multiple answer question types via type buttons.

Creator Profile Page



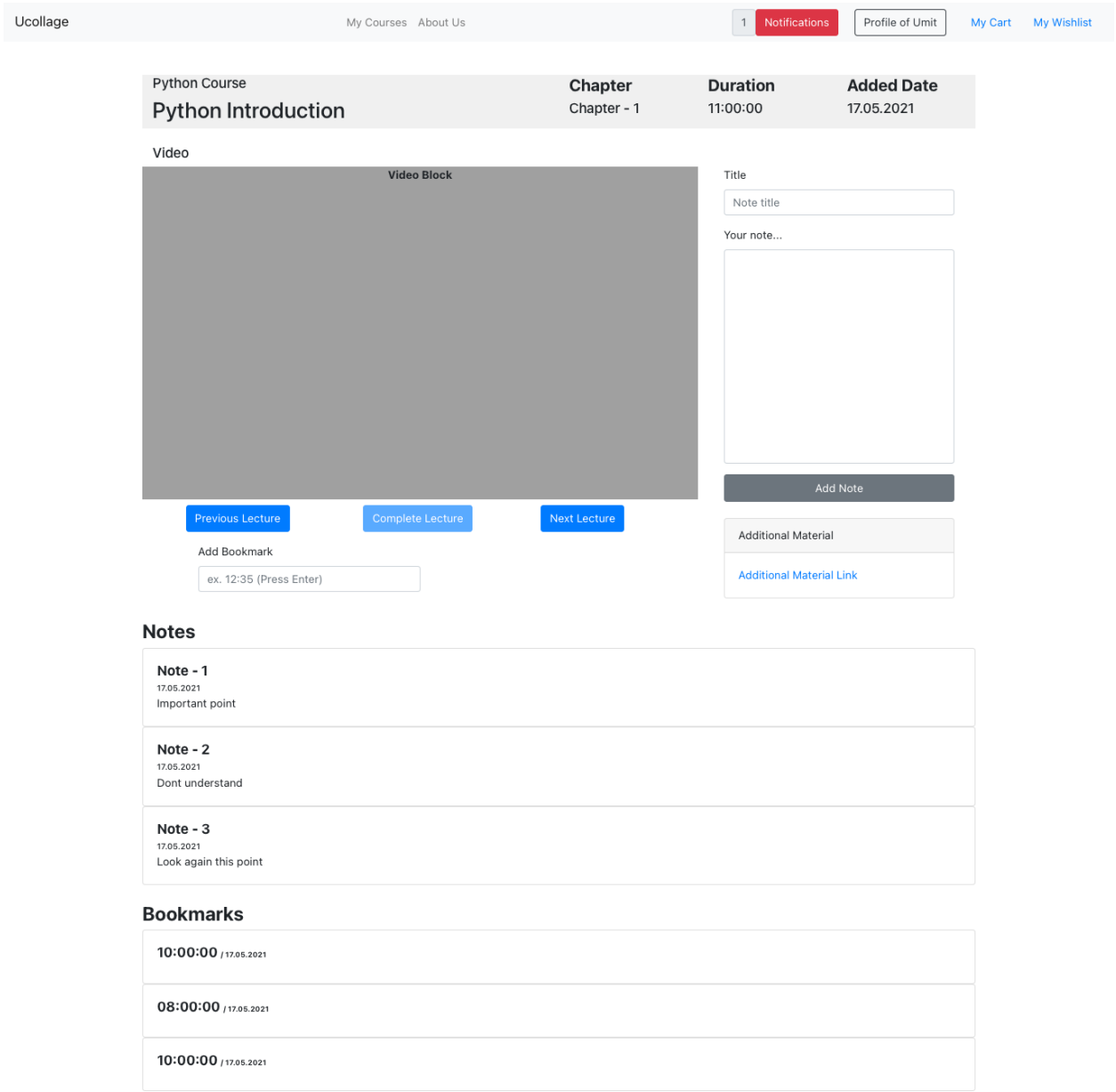
Users can see information about the creator of the course from the creator profile page. In this page, there is an about creator section which is filled by the creator himself/herself. Also, creators can add website, linkedin, and youtube links to this page.

Homepage



This is the starting page of the project. In this page, persons can see all available courses. By using the left side of the screen, persons can filter, search, and order courses. By typing the “Search” text box, anyone can search for a course. By selecting course categories using select boxes, persons can filter courses by category. By sliding the price bars, persons can adjust maximum and minimum price. Also, by selecting ordering options from select boxes, persons can adjust the order of the page. One page can display 12 courses, if the number of courses is greater than 12 then other courses are displayed in the other pages. Persons can switch display pages by clicking the page numbers.

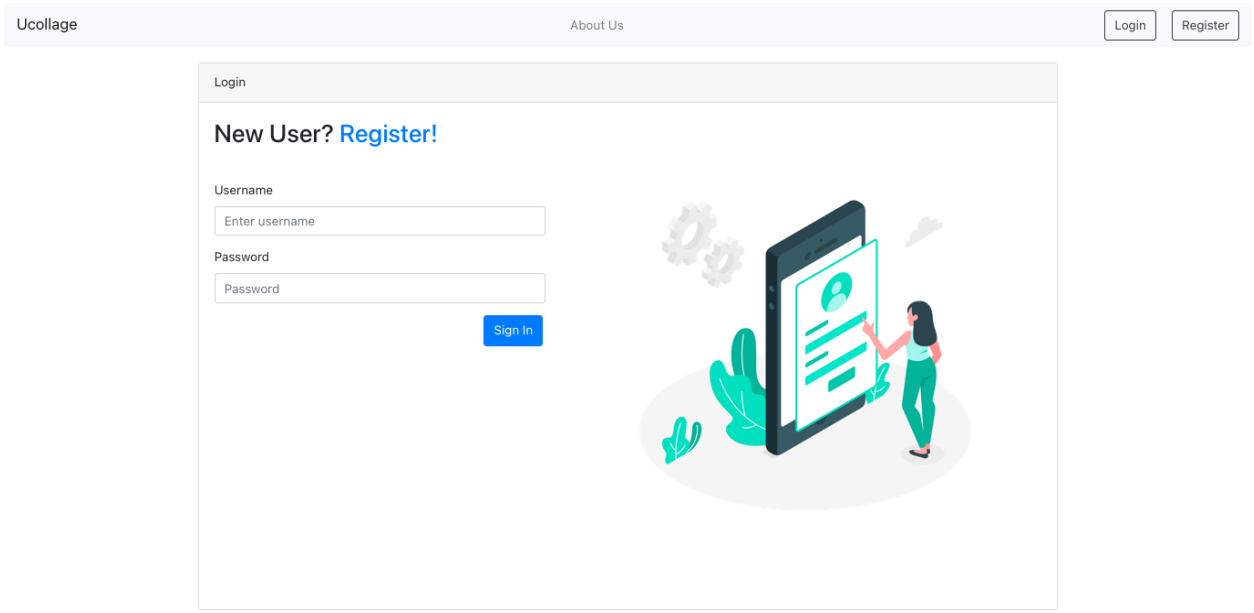
Lecture Page



The above screenshot represents the lecture page of the project. On this page, users can complete lectures, switch between lectures, add notes, add bookmarks, see and “Next Lecture” users can switch between lectures. By selecting the “Complete Lecture” page, users can complete the current course. After completing a course, the system directly redirects to the next lecture. Also, if a user completes all the lectures of a course, the database triggers the certificate entry to add the current user a certificate of the course. By using the right side of the screen, users can add notes to the lecture for themselves. In order to do that, users need to fill the title of the note and the note itself, and then press the add note button. The date of the note is taken by the database automatically. In order to add a bookmark to the lecture, users need to write the time to the text box located under the video, and press enter to submit it. The date of

the bookmark is automatically taken, too. Also, at the end of the page users can see their notes and bookmarks. Under the “Add Note” section, users can reach additional materials of the lecture via a link.

Login Page

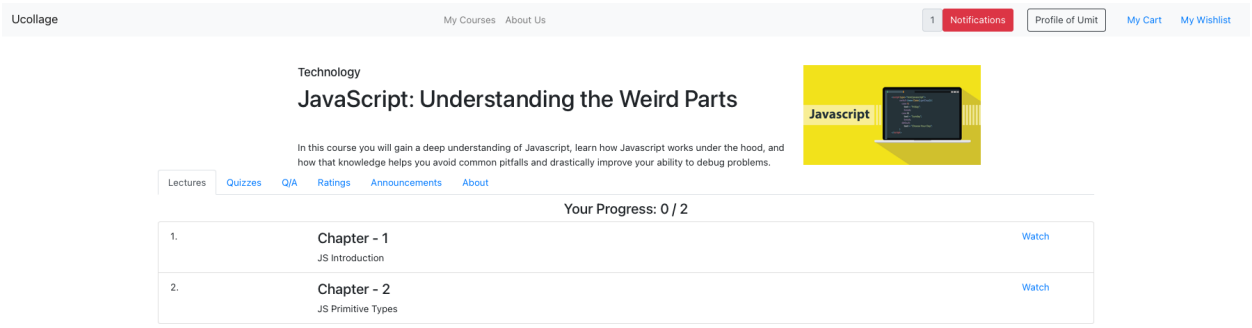


In order to get into the system, persons need to enter their username and password to the login page. On this page, persons need to enter their usernames to the username text box and their passwords to the password textbox. The password is encrypted with md5 and the encrypted string is holded in the database. If the persons enter the wrong information, then the system sends a notification to the user. If the current person is not registered to the system, yet, then the user needs to register to the system by using the register link located at the beginning of the page and highlighted with blue color.

Main Course Page

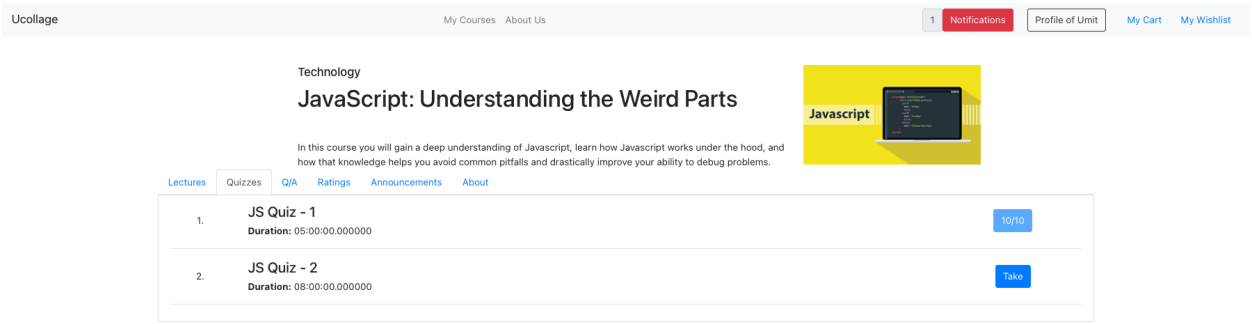
The main course page, divided into subpages. The following pages are the child pages of the main course page. Users can see that page, if the course is boughted by the current user. Also, creators can see the main course pages of courses that are created by themselves. Users and creators can switch between subpages by pressing the tabs located under the course description and highlighted.

Lectures Page



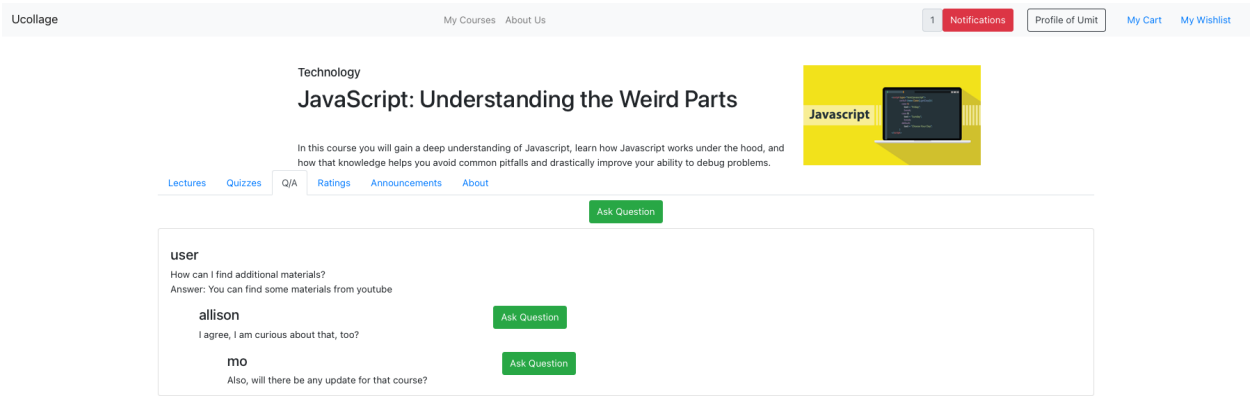
On the lecture page, users can see the lectures of the current course. Also by pressing the “Watch” links that are located in the left part of the screen, they can go to the lecture page of the selected lecture.

Quizzes Page



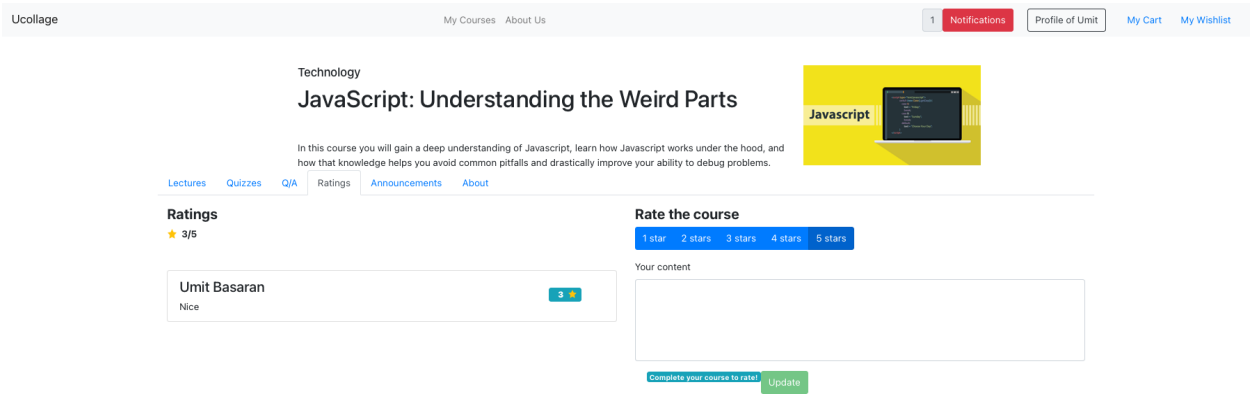
Users can enter the quizzes of the course from this sub page. If the current user takes the course before the “Take” button disabled and the score of the quiz is displayed on this button. By pressing the “Take” button located on the right side of the screen, users can enter the quiz. If the current person is a creator, then the statistics of the quizzes are displayed on the screen (the average score of the quiz and the number of attendees to the quiz).

Answer Question Page



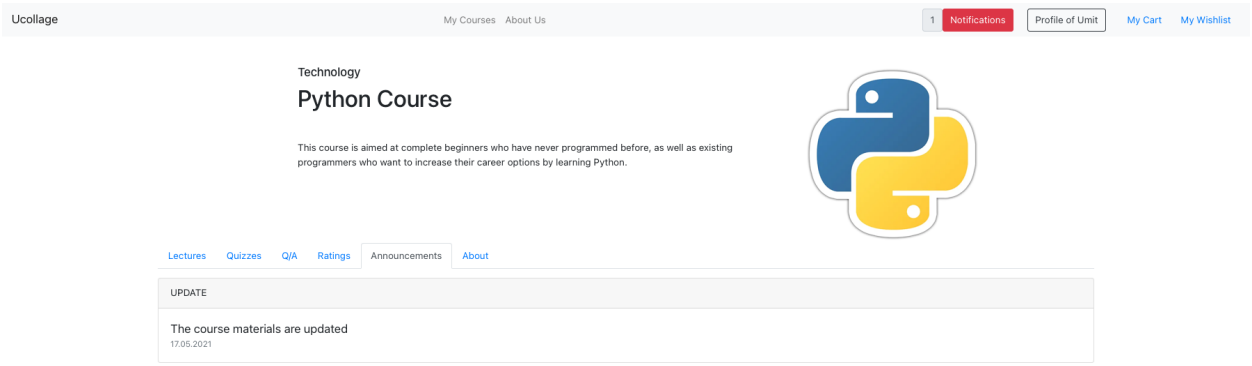
If the current person is a user, on the screen there are “Ask Question” buttons. In our system, users can ask nested questions by clicking the “Ask Question” button located on the right side of the question and colored with green. If the current person is a creator, on the screen there are “Answer Question” buttons and by pressing them creators can answer the selected questions.

Ratings Page



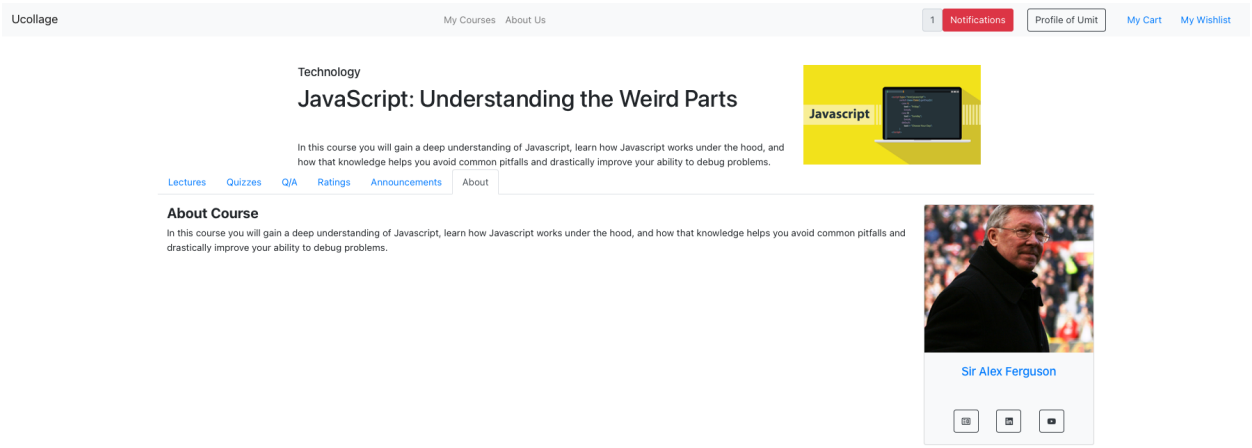
Users can rate the current course from this page. Users need to select the number of stars from the linked buttons located under the “Rate the course” title and colored with blue, then they need to type the content of their ratings using the text area under the linked buttons in order to rate the course. Users can update their rating scores and the contents of those ratings by clicking the “Update” button located at the end of the page and colored with green. On the left side of the screen the average rating is displayed under the “Ratings” title. Also, anyone can see whole rating points and contents from this screen.

Announcements Page



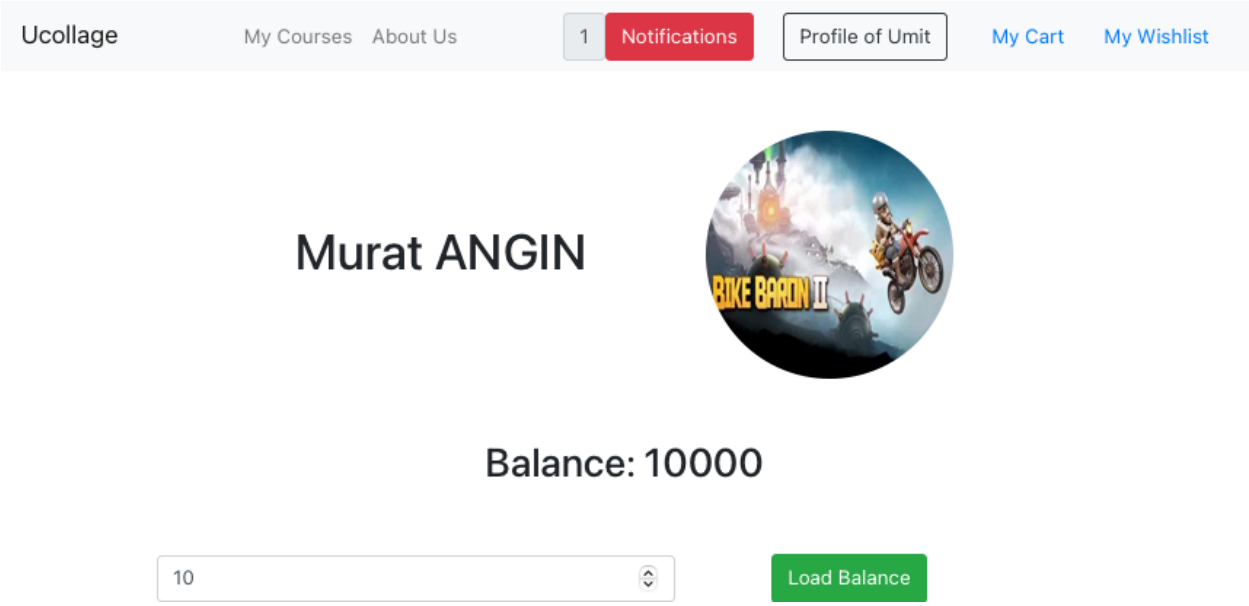
Course creators create an announcement about a course and users can see these announcements from this page. If the user has the current course, when the user enters the system, the user gets a notification, if the creator of the course created an announcement before. Users can see these notifications by clicking the notification button located at the navbar of the page and colored with red.

About Course Page



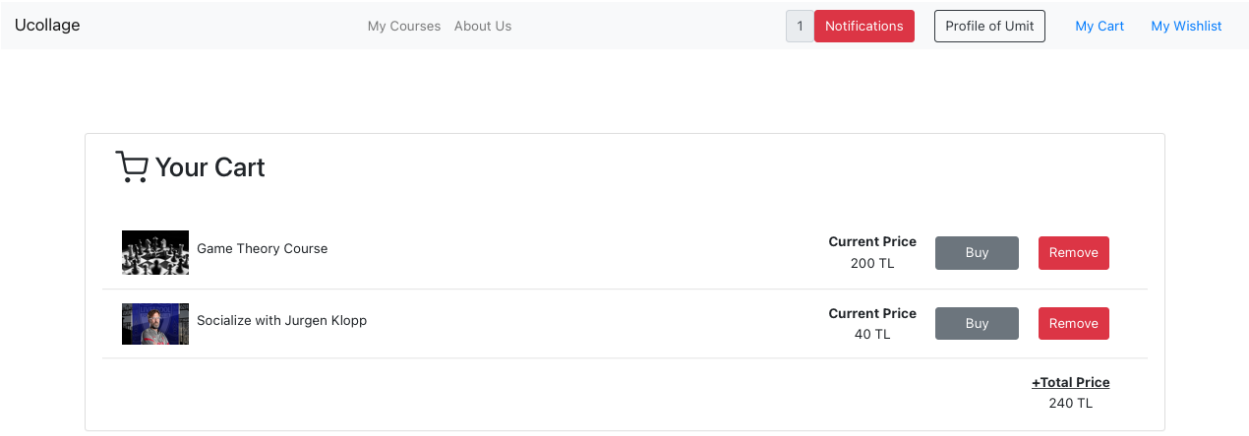
Users and creators can display the information about the course page. In this page the course information and the creator profile is displayed to the screen. By pressing the buttons located under the profile picture of the creator, users can reach the website, linkedin and youtube links of the creators.

My Balance Page



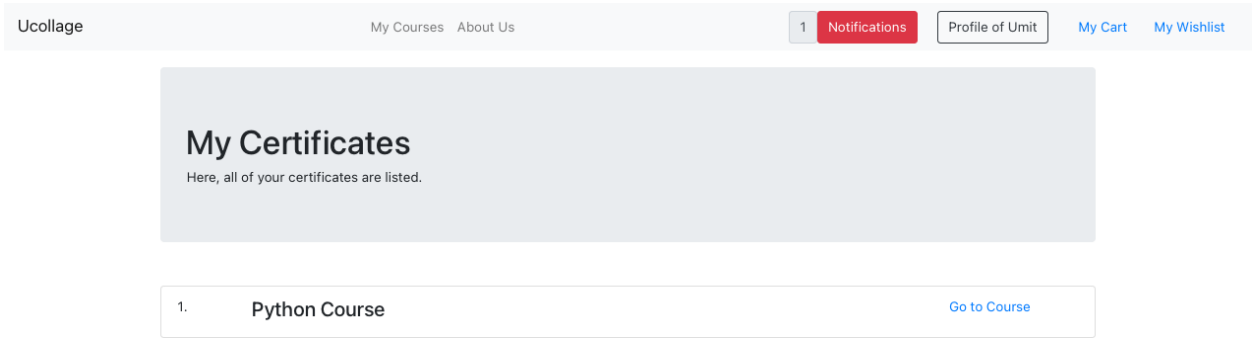
By using this page, users can load balance to themselves in order to buy courses. Either by entering the amount of the balance or by increasing or decreasing with arrows located in the “load balance” text box, users can select the amount of the balance. In the page the total amount of balance, the name of the user and the profile picture of the user is displayed.

My Cart Page



Users can see the courses that were added to their cart. They can buy courses via the buy button after seeing the course description one more time and they can remove courses from their cart. On the right bottom, users can see the total price of their cart dynamically.

My Certificates Page



The certificate information of the current user is displayed on that screen. If a user complete a course the system automatically triggers the certificate entry and the certificate is given to the current user. Then, users can see their certificates from this screen. By clicking the “Go to Course” link located on the right side of the certificate, users can redirect to the course page of the certificate.

My Courses Page

Ucollage My Courses About Us 1 Notifications Profile of Umit My Cart My Wishlist

Your Courses

Search

Search text

Technology | 2/5

Python Course

This course is aimed at complete beginners who have never programmed before, as well as existing programmers who want to increase their career options by learning Python.

Cooking | 4/5

Bakery Course

Save yourself a TON of time and energy as your business grows, by making sure the first few steps you take while building your bakery business, are wise and knowledgeable.

Technology | 3/5

JavaScript: Understanding the Weird Parts

In this course you will gain a deep understanding of Javascript, learn how Javascript works under the hood, and how that knowledge helps you avoid common pitfalls and drastically improve your ability to debug problems.

Music | 1/5

Guitar Course

Pep teachings are different than all of the other online teachers. He has made it super easy to be successful at playing guitar. All you have to do is follow the videos in order and put together some good practice habits.

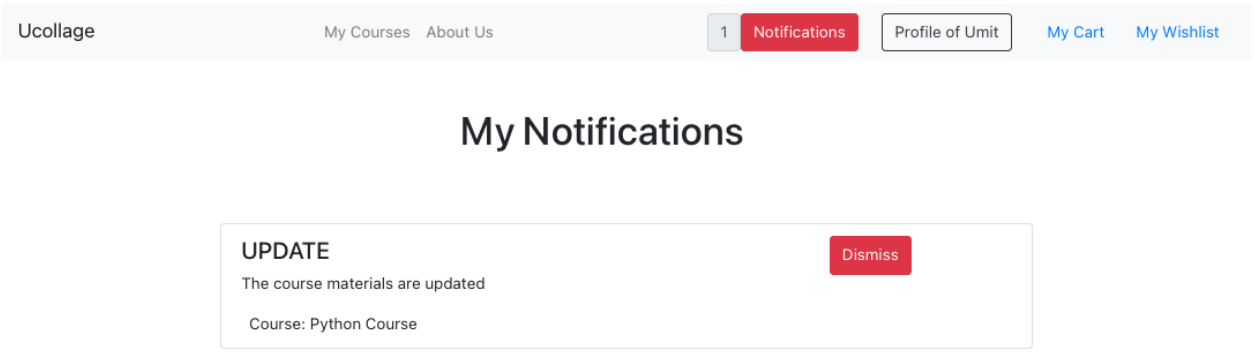
Life | 5/5

Life in Liverpool

Liverpool is the 6th most visited city in the UK thanks to its rich history, beautiful architecture and diverse nightlife. Although Liverpool is a thriving city, property prices and the cost of living remain low compared to other UK cities

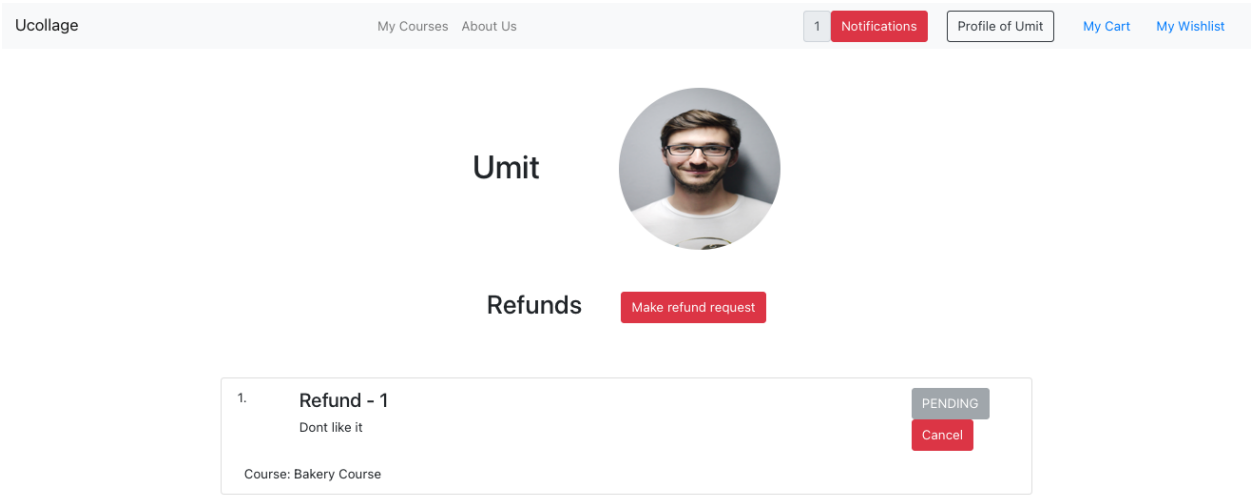
On this screen, users and creators can see their related courses. If the current person is a user in order to display courses on that screen s/he needs to buy that course. If the current person is a creator, s/he needs to create those courses. By typing the “Search” text box, users can search courses on that page with keywords.

My Notification Page



When a creator creates an announcement about a course, and if the current user has the course, then at the navbar of the system user sees the number of notifications. By clicking the “Notifications” button located at the top of the screen and colored red, users can redirect to that page and see their notifications. By pressing the “Dismiss” button, users can dismiss the selected notification.

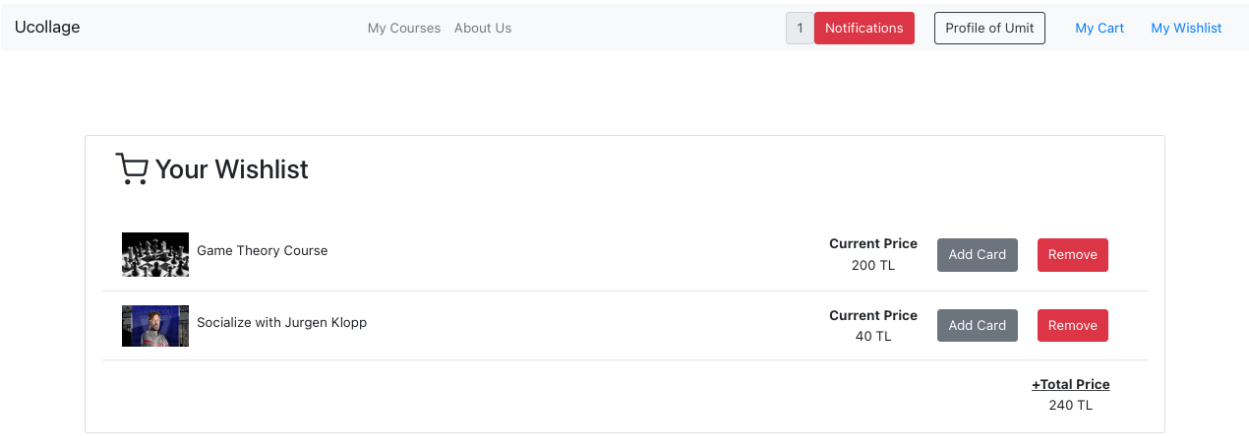
My Refunds Page



With using the My Refunds Page, users can see the processes and results of their refunds. They can see the title of their refund, their refund reason and the course that they want to refund. By using the make refund request button, they can choose the course that they want to

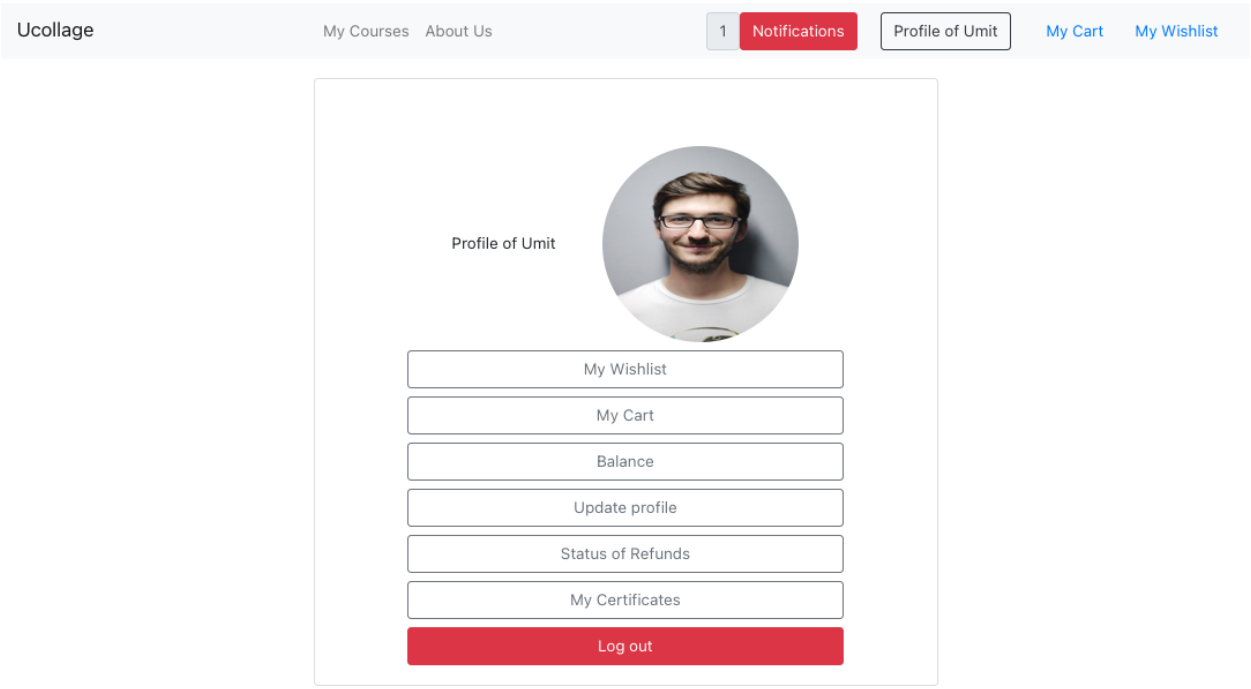
refund. By using buttons on the left side of each course, users can cancel their refunds and see the result of their requests which can be allowed, denied and pending.

My Wishlist Page



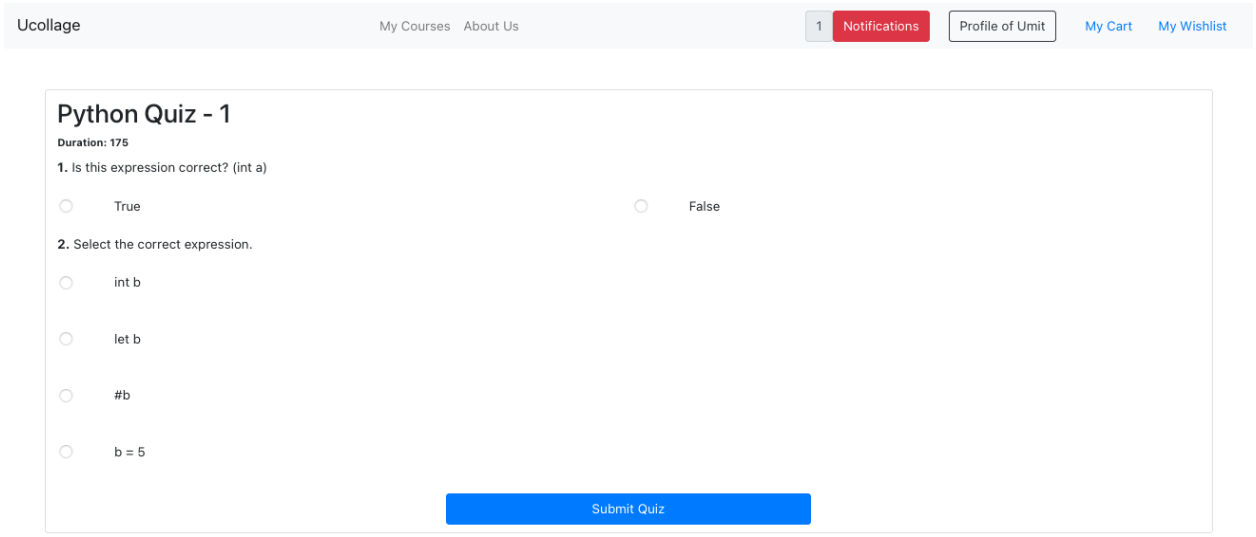
Users can see the courses that were added to their wishlist. They can add courses to their cart via add card button and they can remove courses from their wishlist. On the right bottom, users can see the total price of their wishlist dynamically.

Profile Page



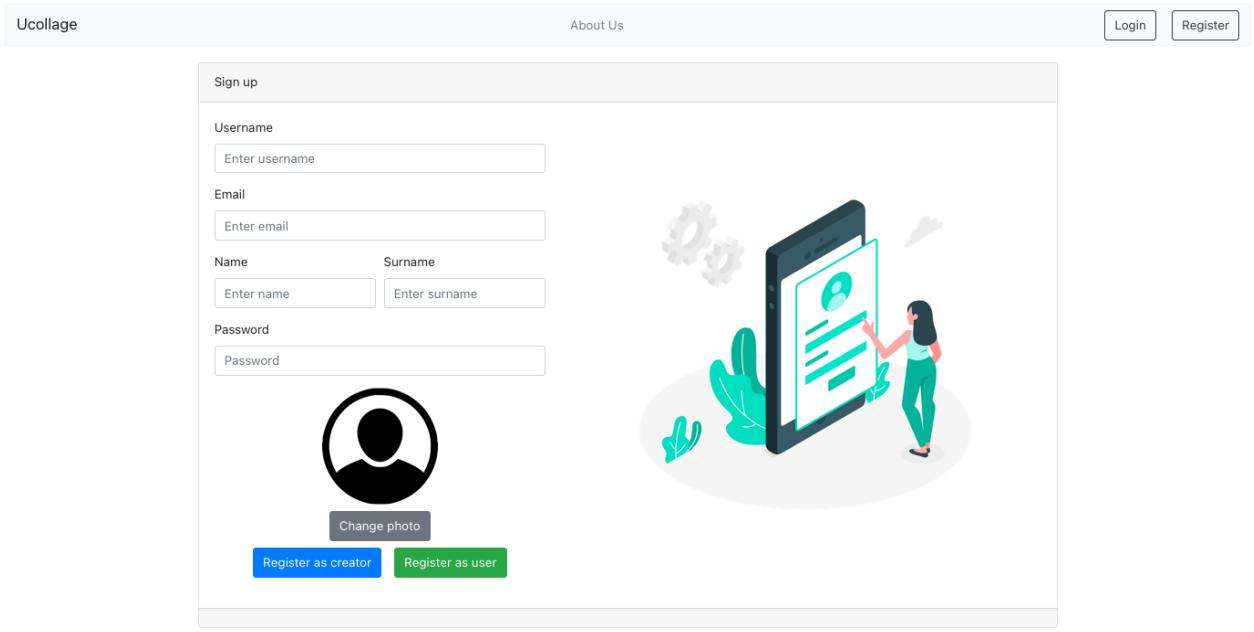
Each user has their own Profile page. On this page users can see their name and profile photos. With the My Wishlist button, they can go to their wishlist, with the My Cart button, they can go to their cart. with the Balance button, they can go to the Balance Page, with the Update Profile button, they can go to the Update Profile Page. Using the Status of Refunds button they can go to the Refunds Page and with the My Certificates button, they can go to the My Certificates Page. Lastly, with the Logout button, users can log out from their account.

Quiz Page



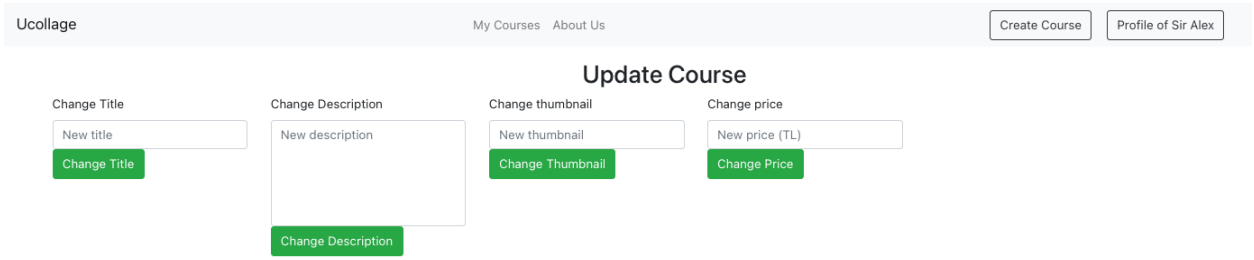
Users who are taking the course can see this Quiz Page. In this page, users solve these questions that the creator prepared. These questions can be both True/False or multiple choice questions. Also, all quizzes have their own duration time that creators determine. Users have to solve and submit the quiz before the time is up. At the end of the quiz, they can see the point that they take from the quiz by a pop-up.

Register Page



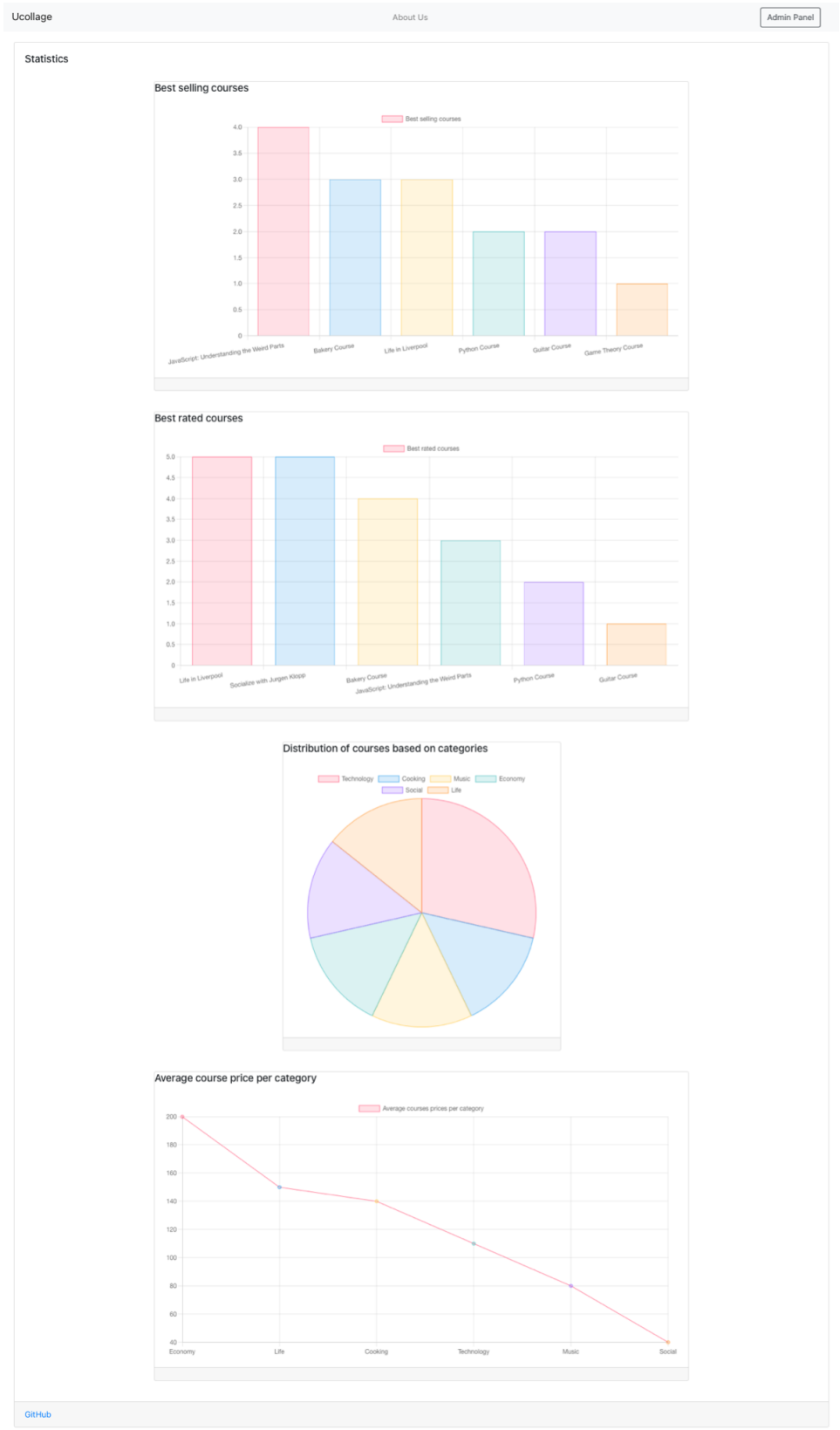
By using this page, a new user can register to the system. The user should enter a username, email address, name, surname and password to the text boxes respectively. After that it is optional to change the default profile photo. If the user press Register as a user button, the system will create a new user, if the user press Register as a creator button, the system will create a new creator with this information.

Update Course Page



Using this page, creator of a course can change the course title with change title button, change the description of the course by with Change Description button, change the thumbnail of the course by givin new url and press the Change Thumbnail button and lastly, the creator can change the price of the course. Therefore, with this page, the creator can update his/her own courses.

Statistics Page



The admin of the Ucollege, can access these statistics via Admin Panel. The best selling courses, best rated courses distribution of courses based on categories and average course price of the category are shown on this page. By using this page, admin can see the statistics of the Ucollege courses.

Website

You can visit http://muratangin187.github.io/CS353-Project/