

Canvas TA Queue - Design Document

12.05.2019

—

Team TheQ

Mia Ngo

Max Staples

Austin Prete

Taku Sakikawa

Executive Summary

TA hours provide students the chance to get essential one-on-one help on coursework and concepts. However, unstructured TA hours can often be hectic, with each student vying for the limited time of the TAs. The University of Utah School of Computing has helped mitigate that problem by creating a TA queue system which students enter during TA hours and are helped in the order they entered the queue. Unfortunately, this system is currently limited to just the School of Computing. Registration and login are handled entirely outside of the Learning Management System used by the university as a whole, Canvas.

A TA queue system available directly within Canvas would provide the benefits of the SoC's system to all classes within our university, as well as any school using Canvas. It also would enable much easier usage by students, TAs and professors, as the queue would be associated with the class in Canvas and TA availability could be entered when setting up course information. Additionally, an option for virtual assistance would allow students to receive help remotely over a video conference with a shared digital whiteboard. Ultimately, the Canvas-integrated TA queue would allow for more efficient and directed TA hours and increase student success as a result.

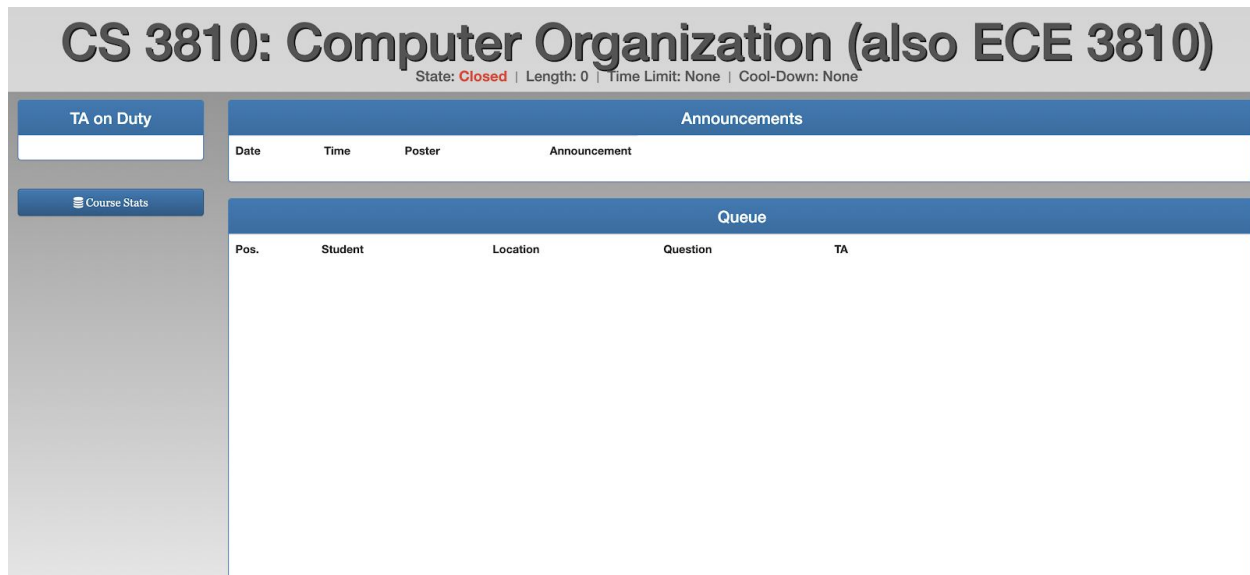
Background

Idea Space

Products similar to Canvas TA Queue includes TA queue hosted by the University of Utah.

There are two main limitations of these products:

1. Systems are not embedded in Canvas website
2. Students and TAs need to physically meet and talk



(Image: University of Utah TA queue)

Since the current TA queue is completely different system and there is no relation between it and Canvas, so if instructors want to use this system, they need to manually set up their own class queue by contacting the University of Utah.

Unlike the current solution, Canvas TA Queue is embedded in Canvas website for easy usage for both instructors and students.

Canvas TA Queue is not only an embedded TA queue system, but also allows students who are not located at campus to chat with TAs by providing a video chat and sharing screen systems embedded in canvas website as well.

Required Technology

The Canvas TA Queue project mainly leverages Web Software Architecture and Database System skills. Since this is a new feature within Canvas, the technology stack used will depend heavily on Canvas.

There will be three main parts, including the view, controller, and database:

- **View:** HTML5, CSS3, React, Redux, JQuery (Mia, Taku)
- **Controller:** RESTful API, Ruby on Rails, integrating BigBlueButton (Austin)

- **Database:** PostgreSQL (Max)

Most of our team members have taken either Web Software Architecture or Database System course, or have some relevant working experience in the industry. Even though the languages and tools needed are not necessarily the same, our team members have the skills to quickly pick up a new coding language, such as Ruby or Redux.

For specific task distribution, everyone will collaboratively works on the project, and is expected to contribute work to the components other than their main responsibilities, since some tasks need to be completed before others. However, each person will be held accountable for different components.

- **Front-end:** Everything will be designed, built, and implemented from scratch with Canvas' minimalist style and accessibility in mind. This includes coming up with the UI design, implement the view, ensure accessibility and usability based on Canvas requirements.
 - *Taku and Mia:* have working experience with front-end web development.
- **Database:** This project mostly pulls existing information from Canvas database, such as students', classes', and TAs' information. There might be some new data added to the database if necessary.
 - *Max:* is interested in working with PostgreSQL and has taken the Database System course.
- **Back-end:** There should be logic to display the correct information for each user role, every button and function should work properly and able to update data to the Canvas database, etc. This part also includes BigBlueButton integration for the virtual TA help feature.
 - *Austin:* has working experience with the back-end.
- **Test:** Every team members are responsible to write their own test for the part they implemented. The test will be written in Selenium for the front-end, and Ruby for the back-end.

Software/Hardware Requirements

- Software Requirements
 1. Developer Requirements
 - a. Homebrew
 - b. Ruby 2.4.4 or later
 - c. Rails
 - d. BigBlueButton
 - e. PostgreSQL
 - f. Command Line Tools for XCode
 2. User Requirements
 - a. BigBlueButton
 - b. Canvas Account
- Hardware Requirements
 1. Computer - If the user wants to use the whiteboarding feature of the queue, a mic is required for speaking with a T.A.
 - a. A camera is optional if the user would like to video chat with a T.A

System Architecture

TA Queue

This component allows students to put themselves in queue to get help from TAs. They will be able to enter information about where they're located and what questions they need help with. TAs will join the queue for TA hours and help students in the order they entered the queue.

Video Conference

This component allows students to virtually meet with TAs using the queue system. It will use a pre-existing video conferencing solution (BigBlueButton) to connect users and allow them to share a digital whiteboarding session.

Scheduling

This component allows course staff to set their help hour schedules and change them as needed throughout the course. Students can view TAs' weekly schedules and also export them to their calendars.

Statistics

This component allows course staff to chart statistics related to queue usage and efficiency. It will visualize information about queue usage such as students helped per day, total time spent helping students per TA, etc. It will include filters such as date ranges to help narrow the data and create more useful charts.

Database

A Postgres database will be used to store all data concerning the usage of the queue by students and TAs. All other components will pull from the database any information that it needs, such as names and settings for the queue.

Personnel

Mia Ngo

Mia will lead the development of the video conferencing component. This component will require working with both the front-end and back-end. She has experience with full-stack web development and previously built and integrated APIs for Canvas during her internship.

Max Staples

Max will lead the development of the scheduling component. This component will be very involved with communicating with the database and Max has considerable experience involving databases and query languages as well as incorporating queries with frontend components.

Austin Prete

Austin will lead the development of the statistics component. He has both frontend and backend web development experience and has previously worked with charting libraries such as *charts.js*, *d3.js*, and *chart.ly*.

Taku Sakikawa

Taku will lead the development of the queue component. He has experience in web development using Ruby on Rails. He also has experience with databases and front-end development.

System Features

Rank 1: Bare Essentials

- **Queue section available on Canvas courses**
 - A new tab in the sidebar and course section for the TA queue, available in any course that has enabled the queue.
- **Students enter/leave the queue**
 - Students can enter the queue and specify where they are located and what questions they have. Students can also leave the queue at any time.
- **TAs enter/leave the queue**
 - TA can enter the queue and start their TA hours, or they can finish their TA hours.
- **Basic information displayed for the Queue**
 - Students currently in the queue, TAs available, time limit for help sessions.
- **Freezing the queue**
 - Freeze button to manually freeze the queue.

Rank 2: Planned Features

- **Queue statistics page**
 - Students helped/day, average wait times, etc.
- **Announcement for TA Queue**
 - TAs can make announcements related to their TA hours.
- **Scheduling TA hours**
 - TAs can schedule their TA hours using the calendar.
 - Professors can edit TA hours on the calendar.
- **View TA hours**
 - Students can view TA hours on the calendar.
- **Video conference TA hours**
 - TAs have an option to help students remotely using BigBlueButton.
 - Virtual whiteboarding will be available for working through problems.

Rank 3: Bells and Whistles

- **Survey to schedule TA hours**
 - TAs mark their availability on the calendar.
 - Professors can see the availability and use it to create help hours schedule.
- **Exporting TA hours**
 - The TA help schedule can be exported as a .ical file to be uploaded to Google Sheets or other calendar software.
- **Automatically freeze queue**
 - Determine time limit and freeze the queue based on the number of students in the queue and the number of TA currently helping.

Timeline

	Mia Ngo	Austin Prete	Max Staples	Taku Sakikawa
Alpha	Integrate BigBlueButton into Canvas. This includes adding easy access to conference calls for students and TAs.	Add TA Queue statistic page. This includes rendering basic graphs from statistics generated from the database.	Add TA scheduling system. The professor can create the help hours schedule. Students can view the schedule.	TA's can post announcements regarding the queue and their help hour.
				Automatically update the browser (using web polling) when student/TA enter something.
Beta	Automatically freeze the queue when reaching a number-of-student limit.	Add more filtering and graph options to the statistics page.	Allow professor to make changes to the schedule. TA's to make one time changes for a specific week.	Time limit countdown for TA's. Each TA has a time limit that they can spend on helping each student.
	Add survey feature to schedule TA hours.	Deploy onto a web server and manage the deployment	Export help schedule to user's calendar.	
Production	Polish GUI.			
	Fix bugs and Add Tests.			
	Integrate with Canvas.			

Appendix A

Number	Use Case 1
Title	Entering the queue as a Student role
Short Description	Student user enters the queue for help
List of Steps	<ol style="list-style-type: none"> 1. Student log into Canvas 2. Click on the class he/she wants to get help with 3. Click on the TA Queue tab (see Figure 1) 4. Click on the Enter Queue button (see Figure 2) 5. A modal pops up (see Figure 3) for students to input his/her location (remote/on-campus) and questions 6. Click the button Enter Queue
Related UI	See Figure 1, Figure 2, Figure 3

Number	Use Case 2
Title	Entering the queue as a Student role remotely
Short Description	Student user enters the queue for help remotely
List of Steps	<ol style="list-style-type: none"> 1. Student log into Canvas 2. Click on the class he/she wants to get help with 3. Click on the TA Queue tab (see Figure 1) 4. Click on the Enter Queue button (see Figure 2)

	<ol style="list-style-type: none"> 5. A modal pops up (see Figure 3) for students to input his/her location (remote/on-campus) and questions 6. For remote help option, user has to toggle the remote button, and also decide on whether or not they will share their code during this help or not → this will indicate whether the video call is private or public 7. Click the button Enter Queue
Related UI	See Figure 1, Figure 2, Figure 3

Number	Use Case 3
Title	Leaving the queue as a Student role
Short Description	Student user leaves the queue for help when he/she no longer needs TA help
List of Steps	<ol style="list-style-type: none"> 1. After entering the Queue, the “Enter Queue” button will transform into the “Leave Queue” button 2. Click on the “Leave Queue” button to remove yourself from the queue
Related UI	see Figure 4

Number	Use Case 4
Title	Entering the system as a TA role

Short Description	TA enter the TA queue system
List of Steps	<ol style="list-style-type: none"> 1. TA login to Canvas and go to the class which he/she is TA'ing for 2. Hit "TA Queue" tab on the left to enter the system
Related UI	See Figure 1

Number	Use Case 5
Title	Leaving the system as a TA role
Short Description	A TA leaves the TA queue system when he/she is done helping students
List of Steps	<ol style="list-style-type: none"> 1. Hit "Finish helping button"
Related UI	See Figure 5

Number	Use Case 6
Title	TA starting to help a student
Short Description	TA user will look at the queue and see the next person to help.
List of Steps	<ol style="list-style-type: none"> 1. User clicks help button on the student that is next in the queue. 2. User sees location and question of the student to be helped and finds the student in the lab.
Related UI	See Figure 6

Number	Use Case 7
Title	TA starting to help a student with the remote TA help option
Short Description	TA user will look at the queue and find the next person to help has requested remote help.
List of Steps	<ol style="list-style-type: none"> 1. User clicks help button on the student that is next in the queue. 2. User sees new page that starts a video conference call. 3. User waits for the student to connect to the call, then helps the student. 4. When the call is finished, the user goes back to the main queue page.
Related UI	See Figure 7, 8

Number	Use Case 8
Title	TA is done helping a student
Short Description	TA user has finished helping a student and removes them from the queue.
List of Steps	<ol style="list-style-type: none"> 1. User clicks on finish button next to the student the user was helping. 2. User sees the student they helped removed from the top of the queue. 3. User can now help the next student in the queue.

Related UI	See Figure 9
------------	--------------

Number	Use Case 9
Title	Professor or TAs check course statistics
Short Description	Professors and TAs have a special view inside the TA Queue section of Canvas that allows them to see statistics related to queue usage.
List of Steps	<ol style="list-style-type: none"> 1. Navigate to the TA Queue section of the course in Canvas. 2. Click on the Statistics button in the right-hand sidebar. 3. In the available dropdown, select the statistic you are interested in viewing. 4. Select start and end date ranges for the statistic. 5. At this point the UI will update to show graphs for the relevant statistic and time range. 6. Repeat steps 3-5 for whatever statistics you are interested in viewing.
Related UI	See Figure 10

Number	Use Case 10
Title	Professor/TA creates TA hours schedule
Short Description	Professor or TAs of class create the weekly TA hours schedule using a calendar scheduling interface. Professors can schedule all TAs, but a TA

	can only schedule themselves.
List of Steps	<ol style="list-style-type: none"> 1. Navigate to the TA Queue section of the course in Canvas. 2. Click on the Scheduler button in the right-hand sidebar. 3. Select a TA to schedule. 4. Create time blocks on the weekly calendar, adjusting them to be correct for the relevant TA. 5. Repeat steps 1 and 2 for each TA in the class. 6. When done, finalize the TA schedule, which will become the default schedule used for the queue.
Related UI	See Figure 11

Appendix B

CS 4000-001 Fall 2019 > Modules

Fall 2019

Account

Dashboard

Courses

Groups

Calendar

Inbox 58

Help

Home

Announcements

Assignments

Discussions

Grades

People

Pages

Files

Syllabus

Quizzes

Modules

Conferences

Collaborations

Chat

Media Gallery

My Media

Office 365

TA Queue ← Navigate to the Queue

View Course Stream

View Course Calendar

To Do

Course Groups

Recent Feedback

Figure 1 - Course home page with 'TA Queue' tab to navigate students/TA to TA queue

CS 4000-001 Fall 2019 > TA Queue

Fall 2019

Home

Announcements

Assignments

Discussions

Grades

People

Pages

Files

Syllabus

Quizzes

Modules

TA Queue

Collaborations

Chat

Media Gallery

My Media

Office 365

TA Queue

Open Length: 5 Time Limit: 10 minutes Location: CADE Lab

Pos.	Student	Location	Question	TA
1	John Smith	lab1-3	Marketing Presentation	Ethan
2	Noah Jones	lab2-5	Mock-up	Chloe
3	Whitney Davis	lab3-3	Resume	
4	Mason Miller	virtual-lab	HW1	

Active TAs

Ethan Miller

Chloe Wilson

Enter Queue

View TA Schedule

Figure 2 - TA Queue tab view

CS 4000-001 Fall 2019 > TA Queue

Fall 2019

Home

Announcements

Assignments

Discussions

Grades

People

Pages

Files

Syllabus

Quizzes

Modules

TA Queue

Collaborations

Chat

Media Gallery

My Media

Office 365

TA Queue

Open Length: 5 Time Limit: 10 minutes Location: CADE Lab

Pos.	Student	Location	Question	TA
1	John Smith	lab1-3	Marketing Presentation	Ethan
2	Noah Jones	lab2-5	Mock-up	Chloe
3	Whitney Davis	lab3-3	Resume	
4	Mason Miller	virtual-lab	HW1	

Active TAs

Ethan Miller

Chloe Wilson

Enter Queue

View TA Schedule

Enter TA Queue

Enter your location and question for the TA.

Location Remote Share Code

Question

Enter

Figure 3 - Modal for Student entering a TA Queue

CS 4000-001 Fall 2019 > TA Queue

Fall 2019

Home

Announcements

Assignments

Discussions

Grades

People

Pages

Files

Syllabus

Quizzes

Modules

Conferences

Collaborations

Chat

Media Gallery

My Media

Office 365

TA Queue

Open Length: 5 Time Limit: 10 minutes Location: CADE Lab

Pos.	Student	Location	Question	TA
1	John Smith	lab1-3	Marketing Presentation	Ethan
2	Noah Jones	lab2-5	Mock-up	Chloe
3	Whitney Davis	lab3-3	Resume	
4	CURRENT USER	virtual-lab	HW1	

Active TAs

Ethan Miller

Chloe Wilson

Leave Queue

View TA Schedule

Figure 4 - TA Queue View after a student enter the queue

CS 4000-001 Fall 2019 > TA Queue

Fall 2019

Account

Dashboard

Courses

Groups

Calendar

Inbox

Help

Home

Announcements

Assignments

Discussions

Grades

People

Pages

Files

Syllabus

Quizzes

Modules

Conferences

Collaborations

Chat

Media Gallery

My Media

Office 365

TA Queue

TA Queue

Open Length: 5 Time Limit: 10 minutes Location: CADE Lab

Pos.	Student	Location	Question	TA
1	John Smith	lab1-3	Marketing Presentation	Ethan
2	Noah Jones	lab2-5	Mock-up	Chloe
3	Whitney Davis	lab3-3	Resume	
4	Mason Miller	virtual-lab	HW1	

Active TAs

Ethan Miller

Chloe Wilson

Finish Helping

View TA Schedule

Figure 5 - TA Queue view when TA is finishing his TA hours

CS 4000-001 Fall 2019 > TA Queue

Fall 2019

Home

Announcements

Assignments

Discussions

Grades

People

Pages

Files

Syllabus

Quizzes

Modules

Conferences

Collaborations

Chat

Media Gallery

My Media

Office 365

TA Queue

TA Queue

Open Length: 5 Time Limit: 10 minutes Location: CADE Lab

Pos.	Student	Location	Question	TA
1	John Smith	lab1-3	Marketing Presentation	Help
2	Noah Jones	lab2-5	Mock-up	Help
3	Whitney Davis	lab3-3	Resume	
4	Mason Miller	virtual-lab	HW1	

Active TAs

Ethan Miller

Chloe Wilson

Finish Helping

View TA Schedule

Figure 6 - TA role view, before helping a student

CS 4000-001 Fall 2019 > TA Queue

Fall 2019

Home

Announcements

Assignments

Discussions

Grades

People

Pages

Files

Syllabus

Quizzes

Modules

Conferences

Collaborations

Chat

Media Gallery

My Media

Office 365

TA Queue

TA Queue

Open Length: 3 Time Limit: 10 minutes Location: CADE Lab

Pos.	Student	Location	Question	TA
1	John Smith	virtual-lab	Marketing Presentation	Help
2	Noah Jones	lab2-5	Mock-up	Help
3	Whitney Davis	lab3-3	Resume	

Active TAs

Ethan Miller

Chloe Wilson

Finish Helping

View TA Schedule

Figure 7 - TA role view, before helping a student remotely

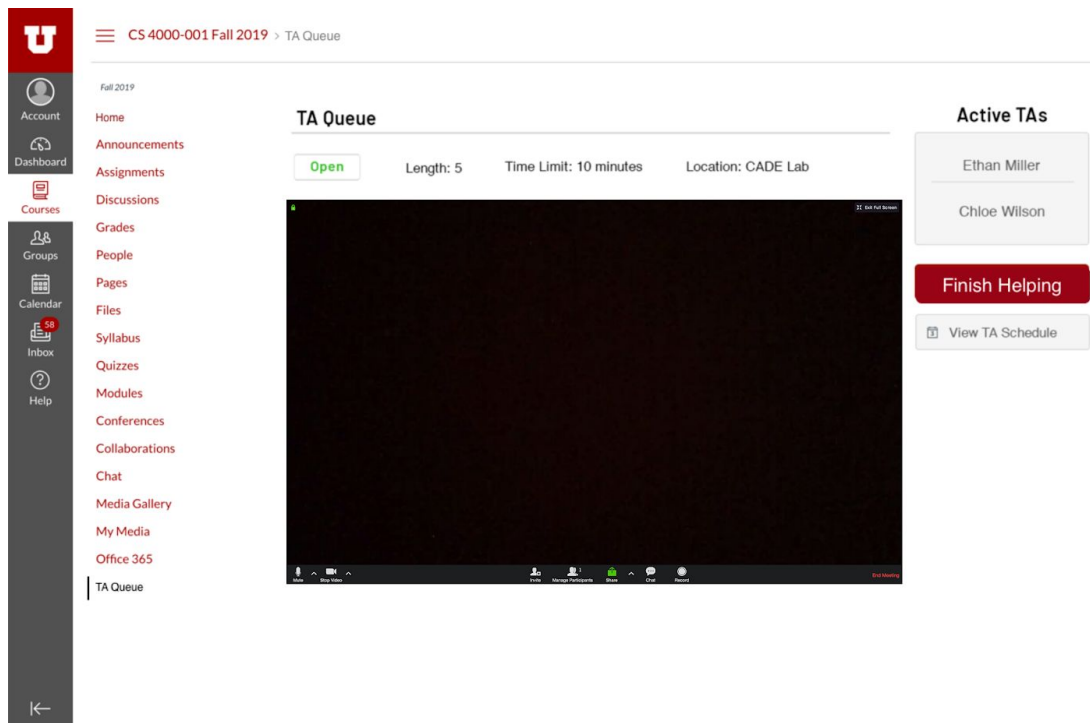


Figure 8 - TA role view, helping a student remotely

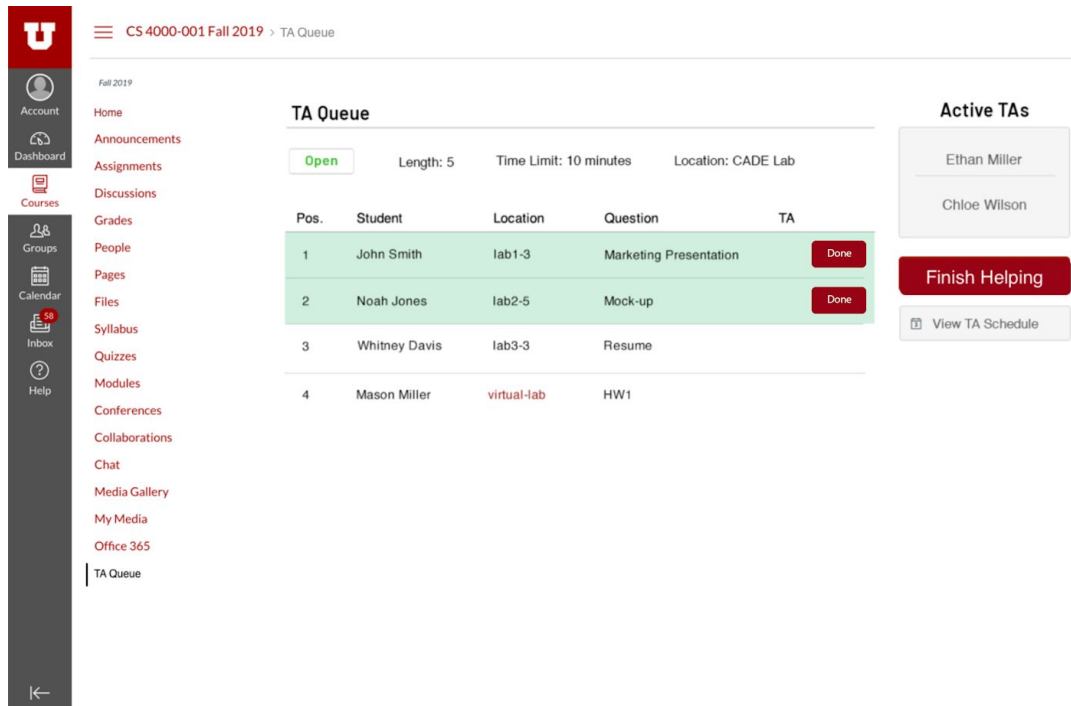


Figure 9 - TA role view, after helping a student



Figure 10 - Course statistics view, displays statistics such as students helped per day, average students helped per day, etc.

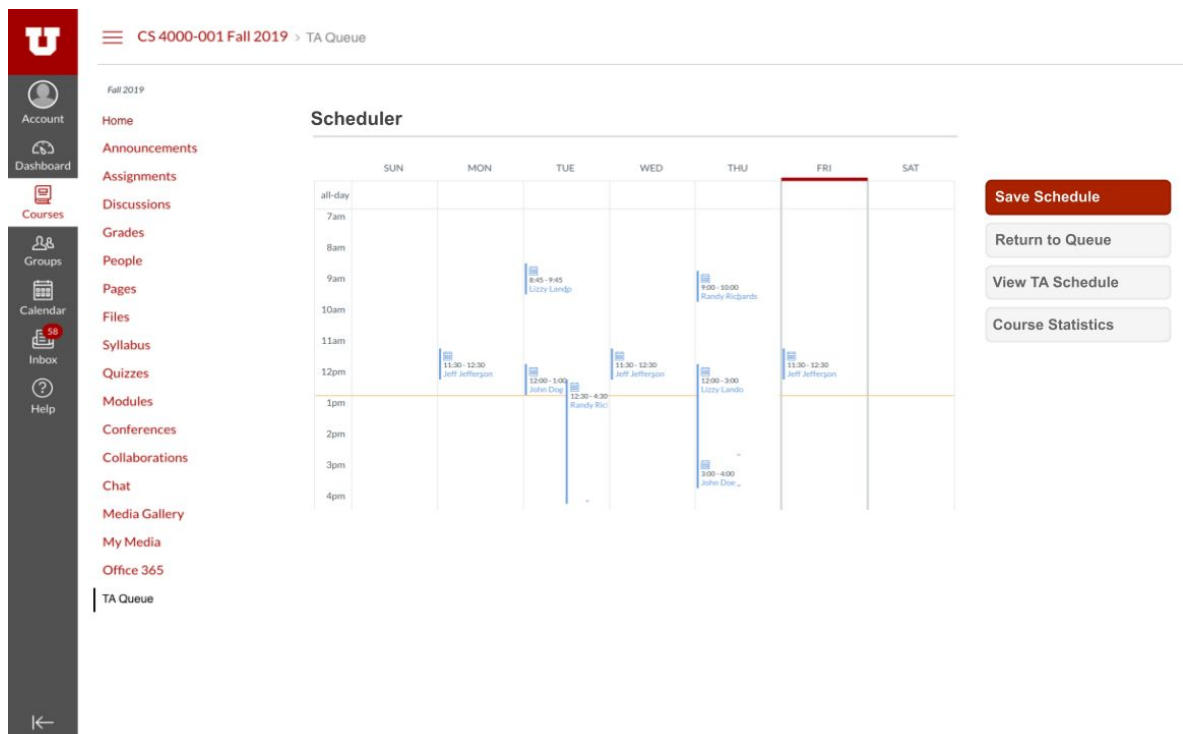


Figure 11 - Scheduler view, where the TA hours schedule is created and edited.