



The image features a graphic design on a white background. It consists of two overlapping circles. The larger circle on the left is a vibrant blue with a thin orange border. The smaller circle on the right is a lighter, sky-blue color with a thin orange border. The text 'ProgressReport' is centered horizontally across the middle of the circles. 'Progress' is written in white, bold, sans-serif font within the blue circle, while 'Report' is written in a light blue, outlined, sans-serif font that overlaps the right side of the blue circle and the left side of the light blue circle. A thin black vertical line passes through the center of the circles, and a thin black horizontal line passes through the center of the text.

ProgressReport

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Users Guide

Firstly, thank you for taking an interest in [Progress Report](#)! We hope that you will find our product useful in your endeavors, but first, we'd like to tell you about what we want to help you accomplish with our product.

What We Do...

Deciding what to [major](#) in is often a [difficult and stress-filled decision for students](#), as it not only impacts the remaining three to four years of one's time at Princeton, but also where and what one will be doing in the future. Even when students decide their major, there is the [complicated mire of degree requirements](#) that students have to wade through in order to ensure graduation.

Once you add [certificates](#) on top of one's major, keeping track of what classes are fulfilling which particular major requirement, or which classes can fulfill both a major and a certificate requirement, or what classes one still has to take in order to graduate becomes an [extremely complicated process](#).

What We Do... (Cont.)

Currently, the only mechanism in place for students to determine which distribution and degree requirements that they are fulfilling is [TigerHub](#). However, TigerHub only provides the most important aspects of this information [after students have declared a major](#), which, for many, is after their fourth semester at Princeton.

[Knowing what classes](#) you have already taken prior to declaring your major can often be useful in the [major decision process](#), since you can see whether courses you have already taken fulfill the major prerequisites or requirements.

Furthermore, finding a [single, centralized source of all major requirements](#) is challenging, as the course registrar page is often outdated, leaving searching through each department's website as the only alternative for students who wish to compare different major requirements.

What we hope to accomplish with [ProgressReport](#) is to give students an [easy-to-use, informative platform](#) to determine what major and certificate requirements they have fulfilled, whether they are seniors trying to ensure that they have

What We Do... (Cont.)

taken all the necessary courses to graduate, freshmen trying to decide what they want to major in, or sophomores deciding what certificates they might pursue.


There are [countless ways](#) for students to make use of our platform, some of which we will cover in this guide, and some that we don't know of yet, but hope that you will discover through your academic journey here at Princeton.

Now that we've gotten through our introduction, let's take a look at how to use [ProgressReport!](#)


FIRST STEPS

Login + Account Creation

Our login system is integrated with the Princeton Central Authentication System (CAS), which means that you don't need to create any extra account to use ProgressReport. When you first reach the page at <http://progressreport.hero-kuapp.com/> you will be redirected to the login page for CAS, which looks like:




PRINCETON
UNIVERSITY



Central Authentication Service

NetID

Password



LOGIN

☐ Prompt me before logging into other CAS protected sites.

Change your Password

Inputting Courses

After logging in, you will be taken to back to ProgressReport and be asked to upload your transcript or to input courses manually. The transcript that we ask you to upload is the internal TigerHub transcript that students can request immediately by logging into TigerHub and clicking on the View Internal Transcript button.

You have no holds.

Courses and Enrollment

Course Planner

Enroll in Course(s)

Change Section

Drop a Course

Replace a Course

Advising

Academic Planning Form

View Advisers

WASS

Grades and Transcripts

View Grades

View Degree Progress

View Internal Transcript

Request Official Transcript

Request Proof of Enrollment

View Test Scores and AP

Personal Information

Add/Update Preferred Name

Update Addresses, Phone & More

Payroll

View Paycheck

Fall 2016 Course Selection Calendar

View Past Announcements

Fall 2016 Course Selection Calendar

Read more

2015-2016 Spring

Class Schedule

Add

Drop

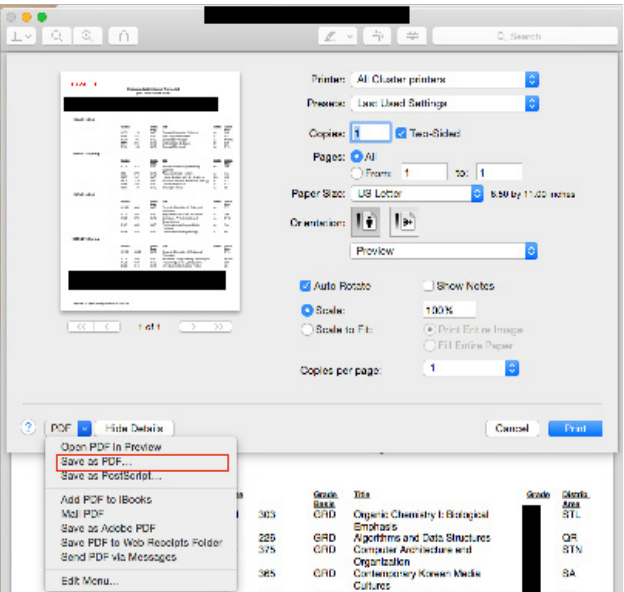
Section Change

Monday	Tuesday	Wednesday	Thursday	Friday
ENG 215 - L01 10:00 am-10:50 am McCosh Hall 46	COS 333 - L01 11:00 am-12:20 pm Friedland 101	ENG 215 - L01 10:00 am-10:50 am McCosh Hall 46	COS 340 - P01 10:00 am-10:50 am Computer S 102	
CHM 304B - L01 11:00 am-12:20 pm Frick Chem B02	CHM 304B - B02 1:00 pm-1:20 pm Frick Chem A06	CHM 304B - L01 11:00 am-12:20 pm Frick Chem B02	COS 333 - L01 11:00 am-12:20 pm Friedland 101	
COS 340 - L01 3:00 pm-4:20 pm McCosh Hall 28		ENG 215 - P03 1:00 pm-2:20 pm McCosh Hall B11	COS 340 - L01 3:00 pm-4:20 pm McCosh Hall 28	
		CHM 304B - C04 8:00 pm-9:15 pm McDaniel 100		

2015-2016 Spring Final Exam Schedule

Inputting Courses (Cont.)

After downloading your transcript, you need to **decrypt** it in order for our website to be able to retrieve your course information from your transcript. The decryption process is simple. For **MAC users**, you can open the pdf file in Preview, and select to print it. When the Printing window pops up, select “**Save as PDF**” which will save a decrypted version of your transcript on your computer. For **PC users**, we have **further instructions on the website** itself to aid you in the decryption process.



After decrypting your transcript, all you have to do is upload that copy to **ProgressReport** by clicking on the **Upload Transcript** button.

AB | Mathematics

You have used 1 of your 4 PDFs.

RE-UPLOAD TRANSCRIPT

Inputting Courses (Cont.)

You can also input courses **manually** into the user input box which is below the Upload Transcript button.

Need to include courses that were fulfilled by AP Credit or other courses that don't normally show up on your transcript? No problem! Add them manually here. If you don't want to share your grades for specific courses or all courses with us, that's fine.
To add a cross-listed course, please list only one of the listings.
Example: MAT103,PHY104 A-,COS306

Additional Courses

Separate courses with a comma and put a space between the course and grade (if you list it).

ADD COURSES

You can also decide to only manually **add specific courses to a single major or certificate** of interest by selecting a major or certificate and using the **Manual Course addition feature** under each **major and certificate list**.

MOL Major GPA: 3.80 REMOVE

More Information about this Program

Add Additional Progress to this Major:

organicchemrequirement chemprerequisite core physics elective quantitativestat molprerequisite quantitative other

Courses to add. Grade is optional to include. Example: Course Grade,Course Grade

other 1 Completed

CHM202 A X

physics 2 of 2 Completed

PHY103 A- X

PHY104 None X

molprerequisite 1 of 1 Completed

MOL214 None X

quantitative 1 of 1 Completed

COS126 A- X

Still need: 2 organicchemrequirement classes

1 chemprerequisite classes

4 core classes

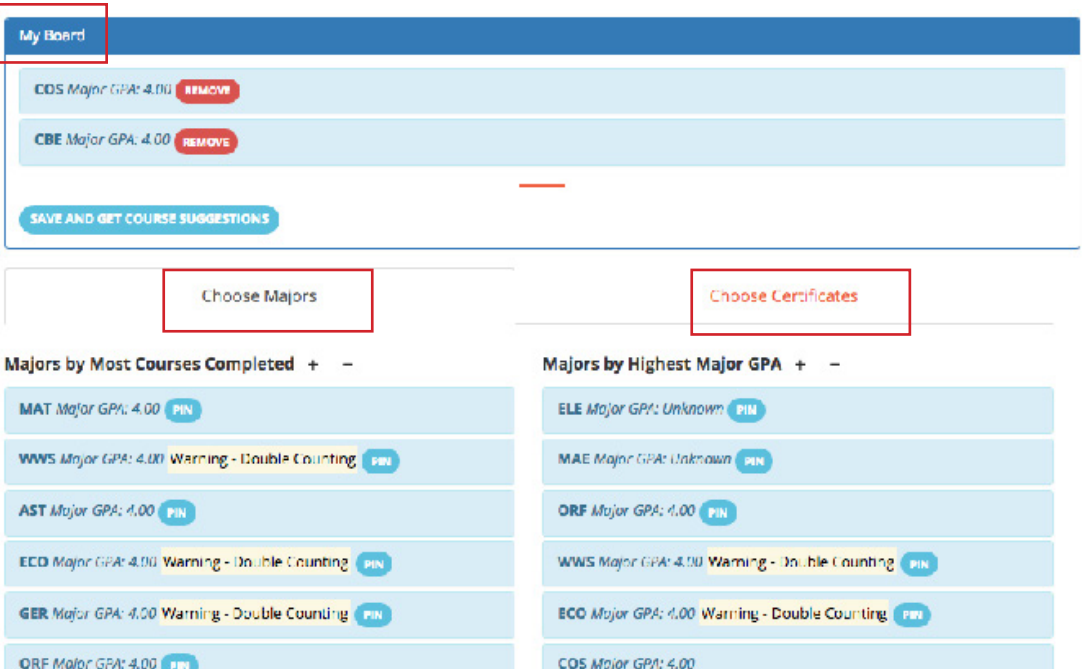
4 elective classes

1 quantitativestat classes

FEATURES

My Board: Keeping track of Interested Majors and Certificates

Now that all of your classes have been uploaded, you should note that the page consists of a [My Board](#) section, and a [Choose Majors](#) and [Choose Certificates](#) section.

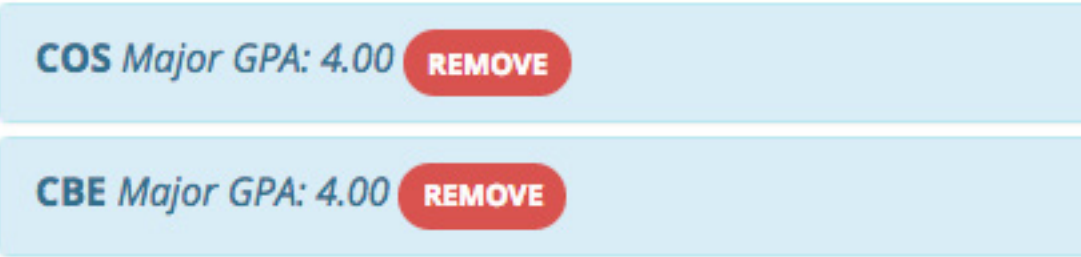


You can pin the [Majors and Certificates](#) which you are most interested in for [easy access](#), which will add it to the [My Board](#) section for [future visits](#) to our site.

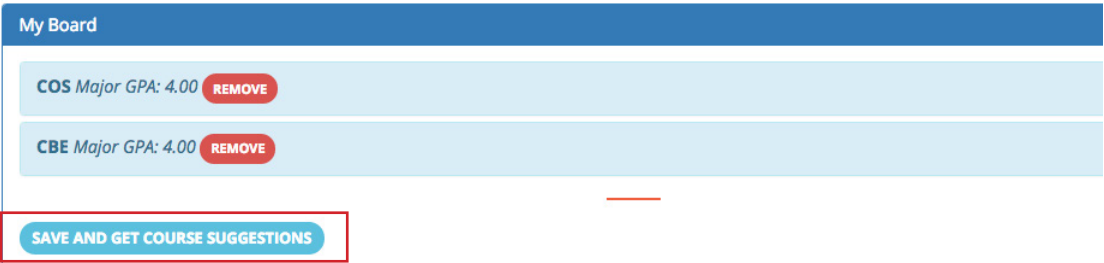


My Board (cont.)

Should you decide that you are no longer interested in a major, you can click the [remove button](#) next to it to remove it from your board.



After [making any changes](#) to your board, whether it is pinning new majors/certificates or removing them, make sure to click the [SAVE](#) button to ensure that your changes will be kept after you logout or refresh the page. This [SAVE](#) button will also generate a [list of recommended courses](#) based on your chosen majors and certificates of interest.



My Board (Cont.)

If you want to see which [requirements](#) you have [fulfilled](#) for a [particular major/certificate](#), all you have to do is click on the major/certificate and a list will expand to show you which [requirements you have fulfilled](#), as well as your [grades](#) for those classes.

You will also be able to see how [what you still need to complete](#) in terms of the [number of courses required for specific tracks](#) of the major or certificate.

MAT Major GPA: 4.00 REMOVE

More Information about this Program

realanalysis 1 of 2 Completed	
MAT125	None ✕
discrete 1 Completed	
MAT375	A ✕
algebra 1 of 1 Completed	
MAT145	A+ ✕
basicalculus 1 Completed	
MAT216	A ✕
complexanalysis 1 of 1 Completed	
MAT335	A+ ✕
geometrytopology 1 of 1 Completed	
MAT365	None ✕

Still need: 4 300-level classes

How can these features be used?

Being able to pin majors and certificates to your [Board](#) is meant to allow you [easier, continued](#)

My Board (cont.)

[access](#) to majors that you are especially interested in. Having all this information in a single location means that you can [compare](#) two majors or certificates side by side which can help in your [major selection](#), if you are still undecided between several choices. It can also help by showing if you meet the [prerequisites](#) necessary for a major, and what [electives you have already fulfilled](#), which may also be a significant factor in your decision-making processes.

Another way that having the [Board](#) is important, even for those who have declared their majors, is the easy accessibility of seeing [certificate requirements](#). For many students, there may be certificates that they can acquire with [little extra work](#). Having such certificates pinned to your [Board](#) means that you can see whether classes that you have already taken fulfill some of the courses required for certificates.

Additionally, for those who have committed to their majors and certificates, it allows you to [continually monitor your progress](#) in your major. In contrast with TigerHub's degree progress tool, your completed requirements are presented in a more clear manner.

We Suggest Majors/Certificates

As we mentioned in the previous section, [My Board](#) section allows students to keep track of particular majors and certificates they are interested in. But what if you don't really know what you are interested in? And how do you "pin" things to your board? Well, the [Choose Majors](#) and [Choose Certificates Tabs](#) are there for that purpose!

Below [My Board](#) is the [Choose Majors](#) and [Choose Certificate Tabs](#). The default selection for these tabs is to be on the Choose Majors tab.

Choose Majors	Choose Certificates
<div>Majors by Most Courses Completed + -</div> <div><div>AST Major GPA: 3.57 PIN</div><div>MOL Major GPA: 3.80</div><div>CHM Major GPA: 3.50 PIN</div><div>COS Major GPA: 3.70 PIN</div><div>NEU Major GPA: 3.70 PIN</div><div>ECO Major GPA: 3.30 PIN</div><div>MAT Major GPA: 3.30 PIN</div><div>PSY Major GPA: 3.70 Warning - Overfulfilled PIN</div></div>	<div>Majors by Highest Major GPA + -</div> <div><div>CBE Major GPA: Unknown PIN</div><div>WWS Major GPA: Unknown PIN</div><div>ELE Major GPA: Unknown PIN</div><div>HIS Major GPA: Unknown PIN</div><div>GER Major GPA: Unknown PIN</div><div>ORF Major GPA: Unknown PIN</div><div>MOL Major GPA: 3.80</div><div>COS Major GPA: 3.70 PIN</div></div>

Suggesting Majors/Certificates (cont.)

In the Choose Majors tab, there are two lists, one which lists suggested majors for you based on [how many requirements you have completed](#) in the major, another that lists suggested majors by your [major GPA](#).

Choose Majors	Choose Certificates
<div>Majors by Most Courses Completed + -</div> <div><div>WWS Major GPA: 4.00 Warning - Double Counting PIN</div><div>AST Major GPA: 4.00 PIN</div><div>ECO Major GPA: 4.00 Warning - Double Counting PIN</div><div>GER Major GPA: 4.00 Warning - Double Counting PIN</div><div>ORF Major GPA: 4.00 PIN</div><div>COS Major GPA: 4.00</div><div>PSY Major GPA: 4.00 PIN</div></div>	<div>Majors by Highest Major GPA + -</div> <div><div>ELE Major GPA: Unknown PIN</div><div>MAE Major GPA: Unknown PIN</div><div>ORF Major GPA: 4.00 PIN</div><div>WWS Major GPA: 4.00 Warning - Double Counting PIN</div><div>ECO Major GPA: 4.00 Warning - Double Counting PIN</div><div>COS Major GPA: 4.00</div><div>MAT Major GPA: 4.00 PIN</div></div>

Like with [My Board](#), if you want to see exactly which requirements you have fulfilled for the majors or certificates in the [Choose Majors/Certificates tabs](#), you can just click on the major/certificate to see a list of requirements that you have filled.

Suggesting Majors/Certificates (Cont.)

Similarly, if you want to look at [suggested certificates](#), click on the [Choose Certificate](#) tab. Like with the [Choose Majors](#) tab, there is a list of [Certificates by Most Courses Completed](#) which gives a list of certificates that have the most overlap between the courses that you have already taken and their requirements.

Certificates by Most Courses Completed + -

QCB PIN

PAC PIN

MSE PIN

TES PIN

PAL PIN

Additionally, if you want even [more information](#) about a certain major or certificate that is not provided by [ProgressReport](#), such as the department heads, or general department information, all you have to do is click on the [More Information About this Program](#) button that appears when you select a major or certificate, and you will be taken to the [University's Course Registrar Page](#).

ORF Major GPA: 3.67 PIN

More Information about this Program

electives 5 of 5 Completed

COS217	B+ ✕
CHM303	A ✕
COS226	A- ✕
CHM304	None ✕
COS340	None ✕

Still need: 2 orfelectives classes

1 mathrequirement classes

6 corerequirements classes

Undergraduate Announcement 2015-16 PRINCETON UNIVERSITY

Contents

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Council and Institutes

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Courses

Chair

Tenz A. Dunsen

Departmental Representative

Abir J. Karmali

Director of Graduate Studies

William A. Massey

Professor

Reza A. Gholami

Jung-Jen Lin

Abir J. Karmali

William A. Massey

John H. Viterbi

Warren D. Newell

Robert J. Vanderbei

Visiting Professor

Frank J. Fabozzi

Associate Professor

Natasha Chaturvedi

Shantanu Dutta

Assistant Professor

Amir Al. Alami

Srinivas Eswara

Han-Jia

Mykhailo Shcherbina

Mingdi Wang

Associate Faculty

Yuzhen An-Kohda, Economics

Markus A. Grunert, Economics

William F. Hines, Economics

Sanjay B. Salunke, Electrical Engineering

Dr. Steven Kim, Electrical Engineering

Paul D. Sornette, Mathematics

Christopher A. Sims, Economics

Yuhua C. Song, Mathematics

John D. Smith, Law & Public Policy for Enterprise

Chenxiang

Wei Xiang, Economics

Information and Departmental Plan of Study

Operations research and financial engineering may be considered as the modern form of a liberal education, modern because it is based on science, mathematics, computing and technology, and liberal in the sense that it

Suggesting Courses

As mentioned earlier, after you click the [SAVE](#) button on [My Board](#), underneath [My Board](#) will appear a list of recommended courses based on your multiple interests. For example, if you plan on majoring in [Computer Science](#), and also plan on fulfilling a certificate in [Technology and Society](#), [Planets and Life](#), and/or [Quantitative and Computational Biology](#), the after pinning these areas of interest onto [My Board](#) and clicking [SAVE](#), you would see:

Courses we would recommend for you based on your interests..

COS323 fulfills... COS PAL

CHM202 fulfills... CHM PAL QCB

COS424 fulfills... COS TES

COS432 fulfills... TES

EGR495 fulfills... TES

This feature is meant to make the course selection process easier for students who are looking to fulfill multiple requirements with a single course.

Tracking Requirements

Another useful feature that we provide for students is to have a better idea of [what requirements they are actually fulfilling](#) with the classes that they take. When you first click on a major, a [drop down list](#) will expand to show you what [tracks](#) are within your major, as well as what classes in those tracks you have taken.

CHM Major GPA: 3.57 Warning - Double Counting REMOVE

More Information about this Program

physicsmath 2 of 2 Completed	
MAT201	B+ ✖
MAT202	B+ ✖
core 2 of 2 Completed	
CHM303	A ✖
CHM304	None ✖
prerequisite 4 of 6 Completed	
PHY103	A- ✖
PHY104	A- ✖
CHM303	A ✖
CHM304	None ✖

For example, the student above has completed the [physics and math prerequisites](#) to be a chemistry major, but still has [5 core classes](#) to complete and [2 prerequisite classes](#).

Furthermore, if you click on any of the class names that you have taken, a [pop-up](#) will appear letting you know what [requirements](#) in your

Tracking Requirements (Cont.)

pinning areas of interest, not just the specific that you are looking at in the moment, that the course is fulfilling.

The screenshot shows a 'My Board' interface with a blue header. Below the header, there is a section titled 'CHM Major GPA: 3.67 Warning - Double Counting'. A list of pinned courses is shown with categories: prerequisite (PHY103, PIY104, CHM303, CHM304), core (CHM303, CHM304), and physics/math (MAT201, MAT202). A pop-up window for PHY103 is open, showing that it is currently fulfilling requirements in AST, CHM, and QCB programs, and could also fulfill requirements in MOL and MSE programs.

The above student clicked on the class PHY 103, and can see that he or she is fulfilling requirements in AST, CHM and QCB programs, which he or she indicated interest in by pinning to their board. We also tell you a few other certificates/majors, besides those listed on your Board that this course can be used to fulfill. Hopefully, if you try this feature on a course you really enjoyed, you will get some ideas about majors and certificates you may want to pursue.

Tracking Requirements (Cont.)

We also keep track of how many other classes you still need to fulfill in the various department tracks to ensure that you have fulfilled all the requirements.

The screenshot shows a 'COS Major GPA: 3.54' interface with a blue header and a 'REMOVE' button. Below the header, there is a section titled 'More Information about this Program'. It shows a list of completed classes and their grades: COS375 (A-), COS333 (None), COS340 (None), COS126 (A-), COS217 (B+), MAT202 (B+), and COS226 (A-). A red box highlights the text 'Still need: 2 applications classes' and '2 300-level classes'.

Additionally, you will notice that we provide a warning on majors where a single class is counting towards two requirements. The “Warning - Double Counting” warning means you might be lacking a course if double counting is not actually allowed in that major or certificate.

Tracking Requirements (Cont.)

ECO Major GPA: 4.00 Warning - Double Counting PIN	
More Information about this Program	
departmental 1 Completed	
ECO310	A+ ✕
core 1 Completed	
ECO310	A+ ✕
cognate 1 Completed	
ORF309	None ✕

For example, the student above is using both **ECO 310** as a **departmental** and a **core requirement**, but it is possible that these two different requirements need to be fulfilled by **separate classes**, rather than a single one that is on both tracks. You can **manually distribute classes** that are double counted by clicking on the **X** to **remove** a double counted class from a track.

The “Warning - Overfulfilled” means that we are overcounting courses in a track and you should delete some manually or redistribute these courses to other tracks.

Tracking Requirements (Cont.)

PSY Major GPA: 3.90 Warning - Overfulfilled PIN	
More Information about this Program	
200requirement 1 of 2 Completed	
PSY254	A ✕
generalfield 2 of 1 Completed	
COS126	A- ✕
MOL214	A ✕

In this case, a student has **over fulfilled** the **General Field** requirement for a PSY major, so she or he should select which class they want to be counted as their general field course, and **delete the other** to prevent this error.

We can also track how many **PDFs** you have used already, which can be useful to students who aren’t sure if they have **enough PDFs** to PDF a class they are currently taking, or to let **rising upperclassmen** who have not used their PDFs yet to be aware of such an **option**.

BSE | Computer Science

You have used 0 of your 4 PDFs.

Developers Guide

For our users that are interested in [continuing our work](#) and [maintaining or improving](#) this project, this section is for you! We'll be taking you through a [brief introduction to our system](#) in this part of the guide.

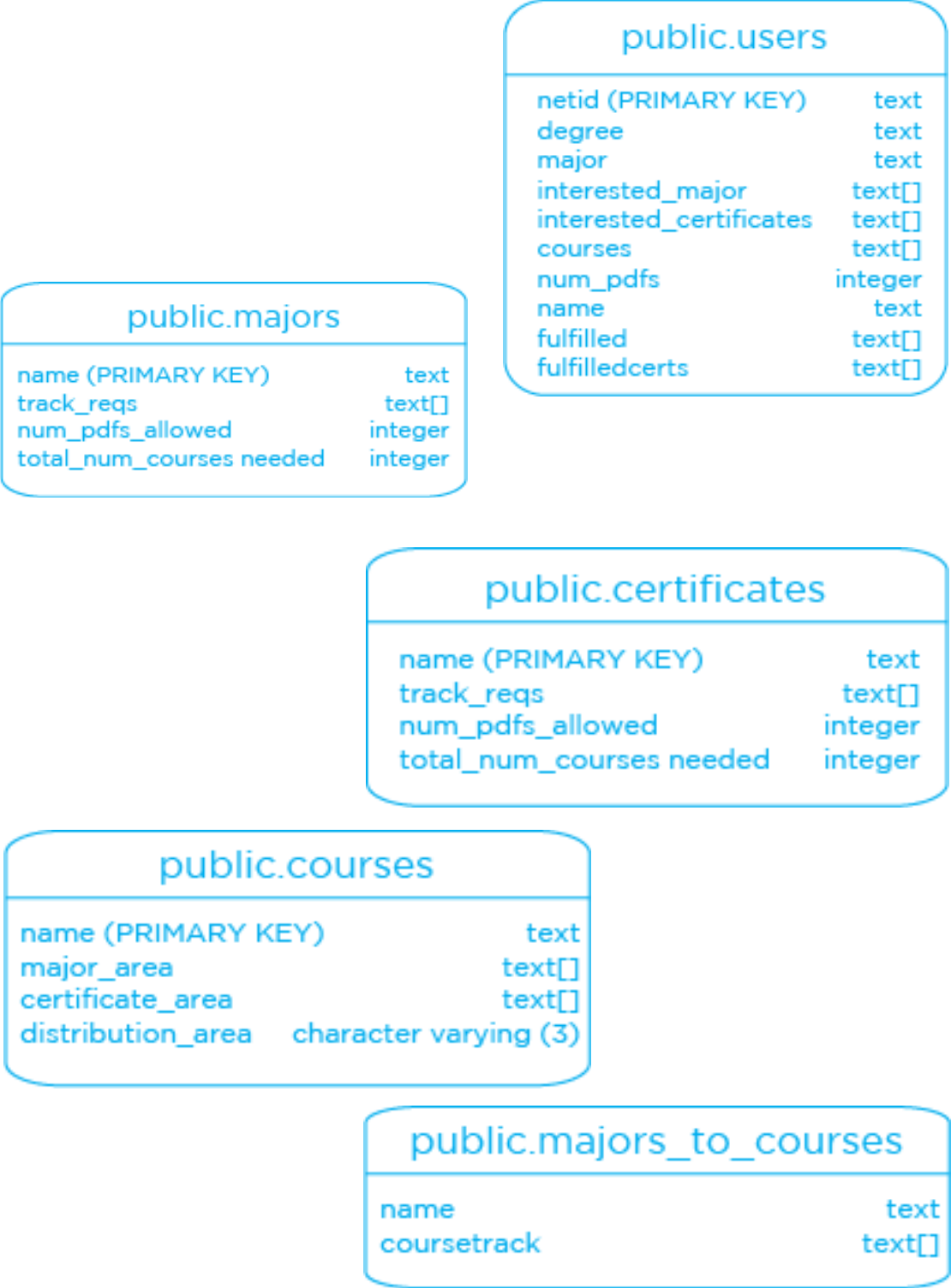
Back-End Systems (Relevant Code: models.py)

As we are dealing with large amounts of data, consisting both of [user data](#), as well as the [requirements for the majors and certificates](#) on campus, our backend consists of a [postgreSQL database](#) with five tables.

We have one table for [user data](#), one for [major requirements](#), one for [certificate requirements](#), one for [all courses](#), and one that connects [majors to their required courses](#).

The structure of these four tables can be seen on the next page.

Database Table Structures

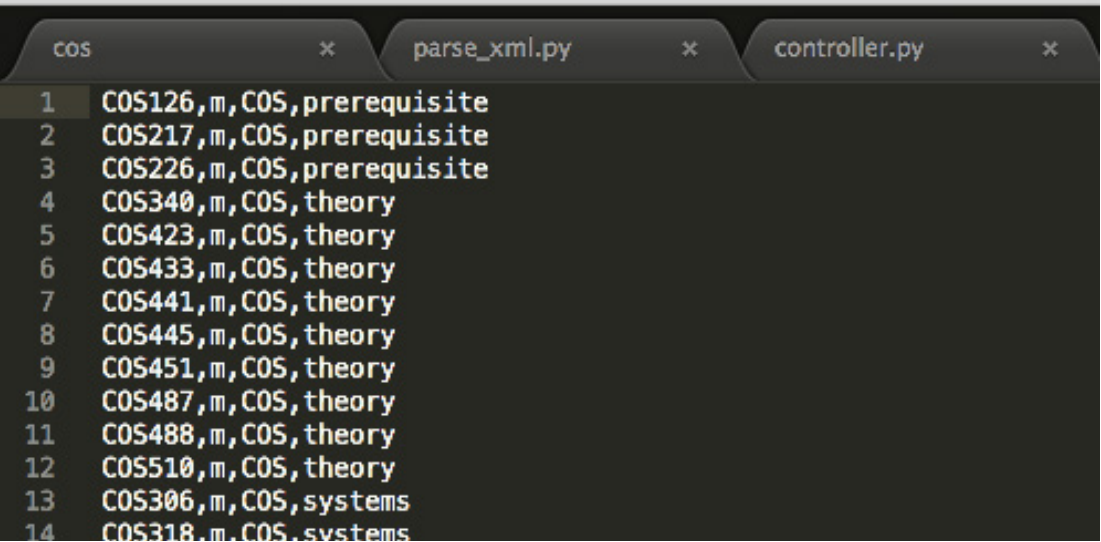


Back-End Systems (Cont.)

In order to get data into these databases, we wrote and used [two python scripts](#) that [parsed information](#) from a text file into the associated database schema and input into our databases. This was a good decision so that we had a [text file based backup](#) should our database crash. We had data files for each major and certificate, in the format of:

[COURSE, m \(if major\) or c \(if certificate\), MAJOR/CERTIFICATE NAME, TRACK REQUIREMENT COURSE FULFILLS](#)

An example of a text file that contained the data for a COS major that we loaded into the database is shown:
For those requirements which were able to be



```
cos      x  parse_xml.py  x  controller.py  x
1 COS126,m,COS,prerequisite
2 COS217,m,COS,prerequisite
3 COS226,m,COS,prerequisite
4 COS340,m,COS,theory
5 COS423,m,COS,theory
6 COS433,m,COS,theory
7 COS441,m,COS,theory
8 COS445,m,COS,theory
9 COS451,m,COS,theory
10 COS487,m,COS,theory
11 COS488,m,COS,theory
12 COS510,m,COS,theory
13 COS306,m,COS,systems
14 COS318,m,COS,systems
```

Back-End Systems(Cont.)

fulfilled by say [any 300-level class](#), we listed this in the database as something like [DEP3](#) (where DEP is the department name) then used [psql pattern matching](#) to handle these special cases.

We would recommend for those implementing the system to [attempt to write a webscraper to grab the course, major, track data](#). Unfortunately, at Princeton the major requirements pages are set up so differently from each other as to make a standardized web scraper ineffective, which is why manual collection was necessary.

All database connections and actions were handled with the [psycopg2 adapter for Python](#).

We store not only the [user's courses in the database](#) but also their [progress in different majors and certificates](#) as calculated by us. This allows us to not only [reduce computational cost](#) by only having to rerun the progress calculation algorithm when a student re-uploads a new transcript (which is much more infrequent than the number of times a student will sign into the app), but this also allows the user to [add progress to specific majors and certificates](#) without changing their course list or affecting their prog-

Back-End Systems (Cont.)

ress in other majors in our database. Essentially, we wanted to give the user as [much control and flexibility](#) with keeping track of their progress as possible in consideration of the fact that they may be [more familiar with a major than we are](#). For example, if the user for some reason just wants to [add a course](#) (or perhaps Independent Work progress) to [one major](#) like Computer Science without it potentially [showing up in other majors such as Astrophysical Sciences](#), we give them the option to add to individual majors, updating their “fulfilled” or “fulfilledcerts” columns in the users table without changing their “courses” column.

We set up two [inverted tables](#), one from [majors to arrays of courses](#) and one from [courses to arrays of majors](#); the former was essential to our [course suggestion algorithm](#) while the latter served all other functionality such as [showing what fields a course is relevant to](#). Finally, our majors and certificates tables kept track of the [requirements](#) needed to fulfill a major or certificate (in terms of number of courses per track, etc.), which was useful both in weighting courses for the course suggestion algorithm and reporting to the user what they still need to fulfill.

Transcript Parsing (Relevant code: controller.py - functions: parse_transcript, parse_course)

We use the [Python package pdfquery](#) to help in performing [transcript parsing](#). In writing our commands to pdfquery, we harnessed the standard markers “GRD”, “SPF”, and “PDF” as our anchors to extract each individual course. Although courses appearing on Princeton transcripts differ in many respects, they all always have one and only one of the above markers on the same line as the full course information.

We used [regular expressions](#) to parse each course information line into pieces including [department and number, grade, and distribution requirement](#). Since the registrar has slightly [modified](#) the order of course information on transcripts in the past few years, we have tested and taken special care to make our transcript parser [compatible with all Princeton transcripts from at least \(hopefully\) the past three years](#). Of course, implementing this for another university would require careful attention to how their transcripts are set up.

Due to the fact that Princeton internal transcripts are initially [encrypted](#), we had to ask the user (and provide them with instructions) to easily [unencrypt the transcript before passing it to us](#). In the case that they did not unencrypt first or mistakenly uploaded another type of file (not their transcript), we wrote [special error handling](#) to alert the user to their mistake.

Progress Structure in Midtier (Relevant Code: Controller.py)

We structure a student's progress in the middle tier via a [dictionary indexed by majors/certificates' names](#). Each major and certificate is itself a [dictionary containing the major GPA](#) and the [courses completed](#) in each track. We wrote a simple algorithm to [sort](#) majors by number of courses completed in the major and by GPA.

Course Suggestion Algorithm (Relevant Code: model.py - function: suggestcourses)

- 1) Pool all courses that fulfill [some requirement](#) in at least one of the student's [interested majors or certificates](#)
- 2) Throw out courses that the student has [already taken](#)
- 3) Weight courses in the tracks which the student has [NOT fulfilled higher](#) than courses in the tracks which the student has COMPLETED, relative to the amount of courses the student still needs to take in that track
- 4) Weight courses by how many [tracks they fulfill](#)
- 5) Weight courses that fulfill requirements across [MULTIPLE majors higher](#)
- 6) Weight courses which are [prerequisites](#) higher
- 7) Suggest highest weighted courses (max of 5)

Front-end Overview (Relevant Code: views.py, templates folder, static folder)

Our front-end was built using Bootstrap templates. We used [Jinja2](#) to [control the information shown to the user](#), passing the actual majors and their course information as well as details such as which majors and certificates needed double counting warnings in a dictionary to the templates.

Although we did not achieve a fully responsive design due to time constraints, we worked to try to make our front-end as [responsive and dynamic as possible](#). We harnessed [jQuery](#) and [AJAX](#) to this end, aiming to show changes to a student's progress as soon as they were made while reloading the page as infrequently as possible.

In our implementation, we kept [separate tables for every major in every column](#) (GPA, My Board, and Completed), meaning that [updating a major in every place it appeared was more difficult](#). In future, we would recommend (perhaps using d3.js) [keeping a major's data in one place in Jinja2](#) where the data can be [easily manipulated](#) and just having multiple displays of it that are all updated at once.

Conclusion

Once again, thank you for having an interest in our product and we hope that you will enjoy what we have created, whether as a casual user, or as a prospective developer!

- Marisa Chow, Isabelle Ingato, Andrew Kim & Allison Chang