

showME

COS 333 Project
May 2018

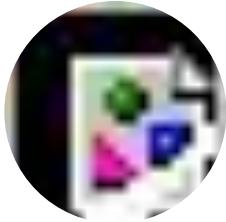
Pratik Chheda, Jamie Cuffe, Moyin
Opeyemi, Roopa Ramanujam & Helen
Zhang

We seek to
revolutionize
advising at
Princeton

TEAM



Jamie Cuffe
Front-End



Roopa Ramanujam
Back-End



Pratik Chheda
Front-End



Helen Zhang
Back-End



Moyin Opeyemi
Business Level Logic



Jeremie Lumbroso
Advisor



AGENDA

PROBLEM



SOLUTION



FRONTEND



DEMO



BACKEND



DECISIONS



FUTURE WORK



LESSONS



QUESTIONS

“

How can we make academic planning at Princeton a better experience?

The screenshot shows the Microsoft Word ribbon toolbar. It includes icons for Paste, Cut, Copy, Paste Special, Undo, Redo, Calibri (Body), Font Size 12, Bold, Italic, Underline, Alignment options (left, center, right, justify, center-justify, distribute), Wrap Text, General tab, Conditional Formatting, Format as Table, Cell Styles, Insert, Delete, Format, and Sort & Filter.

A	B	C	D	E	F	G	H	I	J	K	L	M
1	Distribution Requirement	Key	Computer Science Skeleton				Courses					
2	One Class Left	Will Take	Sophomore Year		Junior Year		Senior Year		Computer Science			
3	Chemistry (Placement Test)	Would Have to Take	Fall	Spring	Fall	Spring	Fall	Spring	Theoretical			
4		Open	COS 226	COS 217	COS 340	COS 423	COS 323	COS 448	1. COS 340 - Reasoning about Computation (w/ Chazelle)			
5	Concentration Requirement	Alternate	PHY 103	EGR 491	COS 333	ORF 350	Independent	COS 318	2. COS 423 - Theory of Algorithms			
6	2 Theoretical		ECO 349	PHY 104					Systems			
7	2 Systems		REL 225						1. COS 333 - Advanced Programming Techniques			
8	2 Applications		EGR 250						2. COS 318 - Operating Systems (w/ IP & if good with COS 217)			
9	2 Additional (1 may be indep)								3. COS 306/ELE 206 - Contemporary Logic Design (w/ COS 217)			
10	1 Independent Work		Computer Science with Finance Certificate				Applications					
11			Sophomore Year		Junior Year		Senior Year		1. COS 323/ORF 363 - Computing and Optimization (w/ AAA)			
12	Finance Requirement		Fall	Spring	Fall	Spring	Fall	Spring	2. COS 326 - Functional Programming			
13	Microeconomics		COS 226	COS 217	COS 340	COS 423	COS 323	COS 448	3. COS 424 - Fundamentals of Machine Learning			
14	2 Core Classes		PHY 103	EGR 491	COS 333	ORF 350	Independent	COS 318	4. ORF 350 - Analysis of Big Data (Suggested over COS 424)			
15	3 Elective Classes		ECO 349	PHY 104	ECO 362	ECO 363			Additional			
16	Independent Work Paper		REL 225	ECO 310					1. Option of Semester Independent Work			
17			EGR 250						2. EGR 491/ELE 491 - High-Tech Entrepreneurship			
18	Possible Certificates		Computer Science with Finance & Interested Classes				3. COS 448 - Innovating Across Technology, Business, and Marketplaces					
19	Engineering & Management Systems		Finance									
20	Statistics & Machine Learning		Sophomore Year		Junior Year		Senior Year		1. ECO 310 - Microeconomic Theory			
21	Entrepenuerhip		Fall	Spring	Fall	Spring	Fall	Spring	2. ECO 362 - Financial Investments			
22			COS 226	COS 217	COS 340	COS 423	COS 323	COS 448	3. ECO 363 - Corporate Finance and Financial Institutions			
23			PHY 103	EGR 491	COS 333	ORF 350	Independent	COS 318	4. ECO 349 - Public Economics			
24			ECO 349	PHY 104	ECO 362	ECO 363	PHI 205	EGR 497	5. COS 333 - Advanced Programming Techniques			
25			REL 225	ECO 310	REL 219	VIS 219	EGR 492	EGR 495	6. ORF 350 - Analysis of Big Data/ ECO 326 - Economics of the Internet: The Digital Revolution			
26			EGR 250		DAN	DAN	DAN	DAN	Interesting Classes to Take			
27									1. EGR 495 - Special Topics in Entrepreneurship - Venture Capital Enabling Innovation			
28									2. EGR 497 - Entrepreneurial Leadership			
29									3. EGR 491 - High-Tech Entrepreneurship			
30									4. EGR 492 - Radical Innovation in Global Markets			
31									5. PHI 205 - Introduction to Ancient Philosophy			
32									6. REL 219 - Business Ethics			
33									7. VIS 219 - Art for Everyone (PDF Only)			
34									8. DAN 207, 210, 211, 213, 214 (PDF Only)			

PROBLEM



Student



Advisor



Administration

Automate manual processes to
enable effective advising

SOLUTION : showME

showME

Jcuffe
Upload Transcript

COURSE QUEUE

COMPLETED CERTIFICATES 1

COMPLETED COURSES 23

ATTAINABLE CERTIFICATES 3

COURSES NEEDED 4

MOST POPULAR APPLICATIONS OF COMPUTING
Completed by 14% of students

FASTEST GROWING ENTREPRENEURSHIP
Created by popular demand

RAREST AFRICAN AMERICAN STUDIES
Join the 1% enrolled

Applications of Computing | 100%

Prerequisite 1 of 1 completed

Intermediate 2 of 2 completed

Substantial Computing Content 4 of 1 completed

Depth 1 of 1 completed

Contact Info
Colleen Kenny
ckenny@cs.princeton.edu
Website

Track Breakdown

Prerequisite COS 126 ISC 231 ISC 232 ISC 233 ISC 234

Intermediate COS 226 COS 217 COS 324 ORF 363

Substantial Computing Content ORF 467 ORF 309 ELE 206 MAE 345 COS 318 COS 320
COS 324 COS 326 COS 333 COS 340 COS 343 COS 375

KEY FEATURE: Centralize Certificate Information

- ▶ 18 fully supported certificates
- ▶ Includes essential certificate info
- ▶ Tracks and associated courses shown

The screenshot displays a digital certificate for the 'Applications of Computing' program. At the top, it says 'Applications of Computing | 100%'. Below that is a large circular area containing 'Contact Info' with a profile picture, the name 'Colleen Kenny', the email 'ckenny@cs.princeton.edu', and a link to a 'Website'. To the right of this circle is a detailed description of the program: 'The Program in Applications of Computing is an interdisciplinary program designed for Princeton undergraduates who want to combine the study of computing and computers beyond an introductory level with another academic concentration, but who are not majoring in Computer Science. The program welcomes students from all disciplines, including both areas traditionally making heavy use of computation (such as engineering, the physical sciences, economics, and mathematics) and emerging application areas (such as biology, cognitive science, graphic arts, music, history, philosophy, politics, sociology, literature, and so on). Many students have found this program an effective way to apply computer science to their own disciplines, and to understand how computing concepts and technology are changing our world.' Another circular area on the right side highlights 'Contact Info' again, listing 'Colleen Kenny' and her email 'ckenny@cs.princeton.edu' along with a 'Website' link. The bottom section of the page lists 'Prerequisite' courses (COS 126, ISC 231, ISC 232, ISC 233, ISC 234), 'Intermediate' courses (COS 226, COS 217, COS 324, ORF 363), and 'Substantial Computing Content' courses (ORF 467, ORF 309, ELE 206, MAE 345, COS 318, COS 320).

KEY FEATURE: Visualize Certificate Progress

- ▶ Completion percentage
- ▶ Track progress breakdown
- ▶ Meta data:
 - ▷ Certificates Completed
 - ▷ Courses Completed
 - ▷ Attainable Certificates
 - ▷ Courses Needed

The dashboard displays the following information:

- Completed Certificates:** 0
- Completed Courses:** 32
- Attainable Certificates:** 1
- Courses Needed:** 1

MOST POPULAR APPLICATIONS OF COMPUTING: Completed by 14% of students.

FASTEAST GROWING ENTREPRENEURSHIP: Created by popular demand.

RAREST AFRICAN AMERICAN STUDIES: Join the 1% enrolled.

Applications of Computing | 80%

Category	Status
Prerequisite	1 of 1 completed
Intermediate	1 of 2 completed
Substantial Computing Content	1 of 1 completed
Depth	1 of 1 completed

The Program in Applications of Computing is an interdisciplinary program designed for Princeton undergraduates who want to combine the study of computing and computers beyond an introductory level with another academic concentration, but who are not majoring in Computer Science. The program welcomes students in all disciplines, including both areas traditionally making heavy use of computation (such as engineering, the physical sciences, economics, and mathematics) and emerging application areas (such as biology, cognitive science, graphic arts, music, history, philosophy, politics, sociology, literature, and so on). Many students have found this program an effective way to apply computer science to their own specialties, and to understand how computing concepts and technology are changing our world.

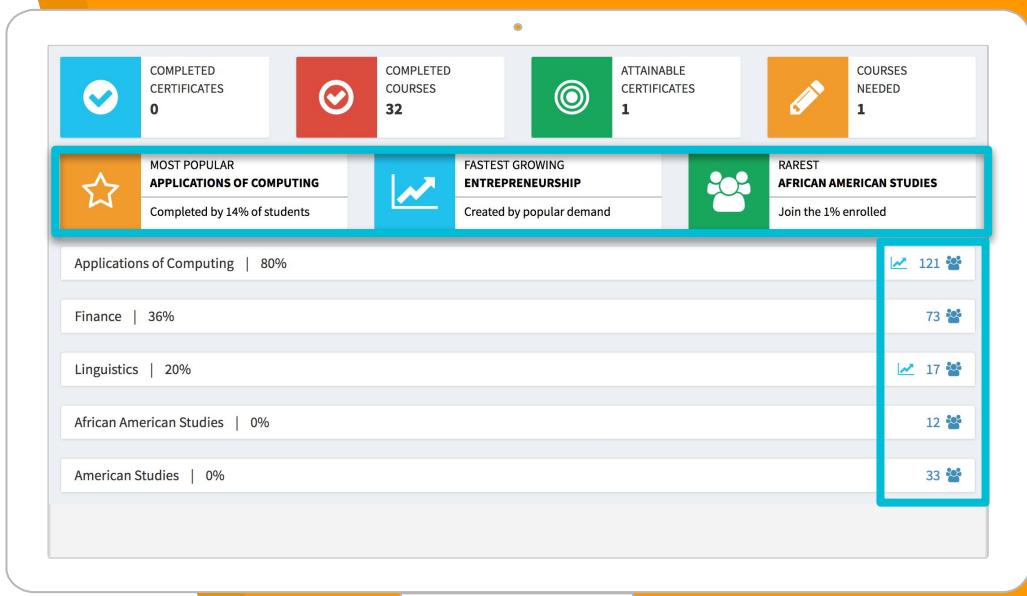
Contact Info

- Colleen Kenny
- ckenny@cs.princeton.edu
- [Website](#)

121 🎓

KEY FEATURE: Discover New Certificates

- ▶ Popularity Consideration
- ▶ Trending data
- ▶ Aggregate data



KEY FEATURE: Long-term Course Planning

- ▶ Course queue feature
- ▶ Highlighting prospective courses

The screenshot displays a user interface for course planning. On the left, a "COURSE QUEUE" sidebar lists "ISC 231" and "COS 217". The main area shows a course page for "Applications of Computing" with a progress bar at 80%. The page includes sections for Prerequisite (1 of 1 completed), Intermediate (1 of 2 completed), Substantial Computing Content (1 of 1 completed), and Depth (1 of 1 completed). A detailed description of the program is provided, mentioning it's an interdisciplinary program for undergraduates. On the right, there's a "Contact Info" section with a photo, name (Colleen Kenny), email (ckenny@cs.princeton.edu), and a "Website" link.

COURSE QUEUE

- ISC 231
- COS 217

Applications of Computing | 80%

Prerequisite
1 of 1 completed

Intermediate
1 of 2 completed

Substantial Computing Content
1 of 1 completed

Depth
1 of 1 completed

The Program in Applications of Computing is an interdisciplinary program designed for Princeton undergraduates who want to combine the study of computing and computers beyond an introductory level with another academic concentration, but who are not majoring in Computer Science. The program welcomes students in all disciplines, including both areas traditionally making heavy use of computation (such as engineering, the physical sciences, economics, and statistics) and other application areas (such as biology, cognitive science, graphic arts, music, history, philosophy, politics, sociology, literature, and so on). Many students have found this program an effective way to apply computer science to their own specialties, and to understand how computing concepts and technology are changing our world.

Contact Info

Colleen Kenny
ckenny@cs.princeton.edu
Website

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Demo

TECHNOLOGY STACK

JavaScript | HTML | CSS | Bootstrap

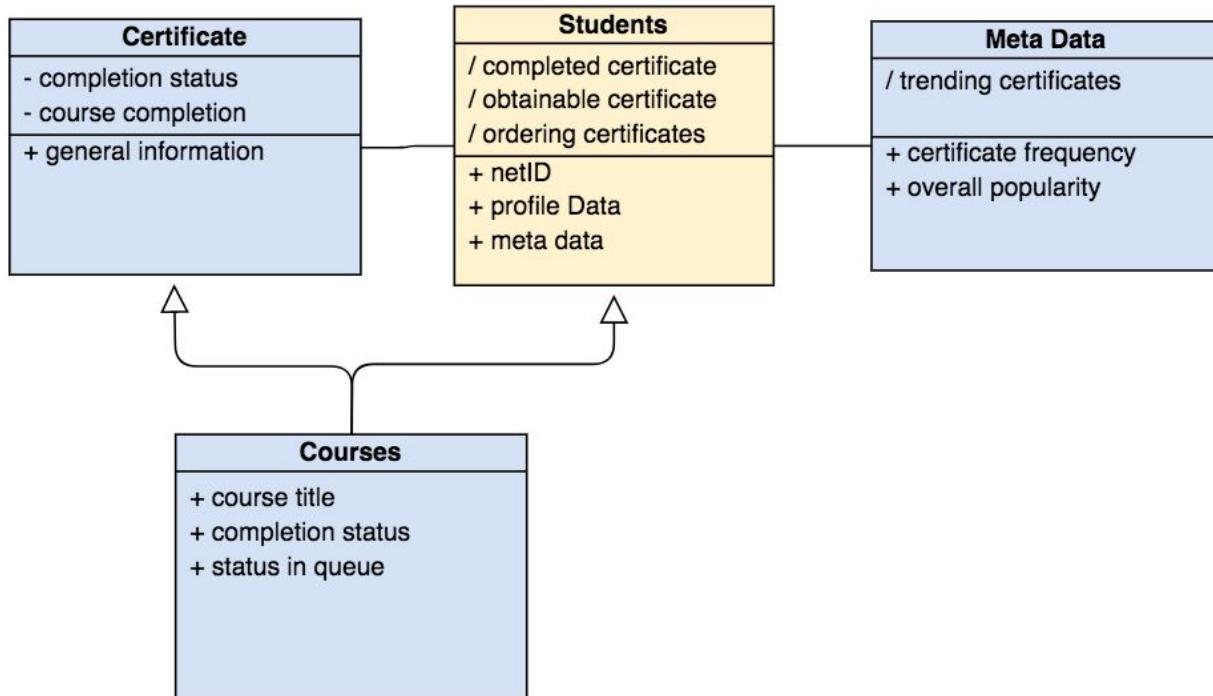


Django | Python



PostgreSQL

BACKEND MODELS



BACKEND EXTERNAL TOOL INTEGRATION

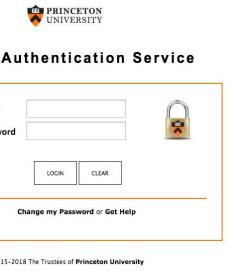
Verifier

```
1 from functools import partial
2 from primitives import EMPTY
3
4 # all_ = {`identity`, `constant`, `caller`,
5 #         `partial`, `rpartial`, `func_partial`,
6 #         `lfunc`, `rlfunc`}
7
8
9 def identity(x):
10     return x
11
12 def constant(x):
13     return lambda *x, **y: x
14
15 def caller(*args, **kwargs):
16     def caller(f):
17         return lambda *x, **y: f(*x, **y)
18
19     A = get_lambda(f)
20     A.set_lambda(f)
21     A.set_kwarg(kwargs)
22
23     A.set_args(args)
24
25     A.set_kwarg(kwargs)
26
27     return lambda *x, **y: f(*x, **y)
28
29 def rpartial(func, *args):
30     return lambda *x: func(*args + x)
31
32 def func_partial(func, *args):
33     return lambda *x: func(*args + x)
```

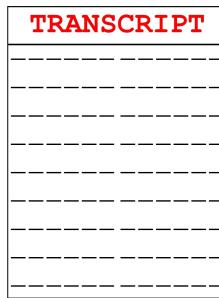
Standardized Data



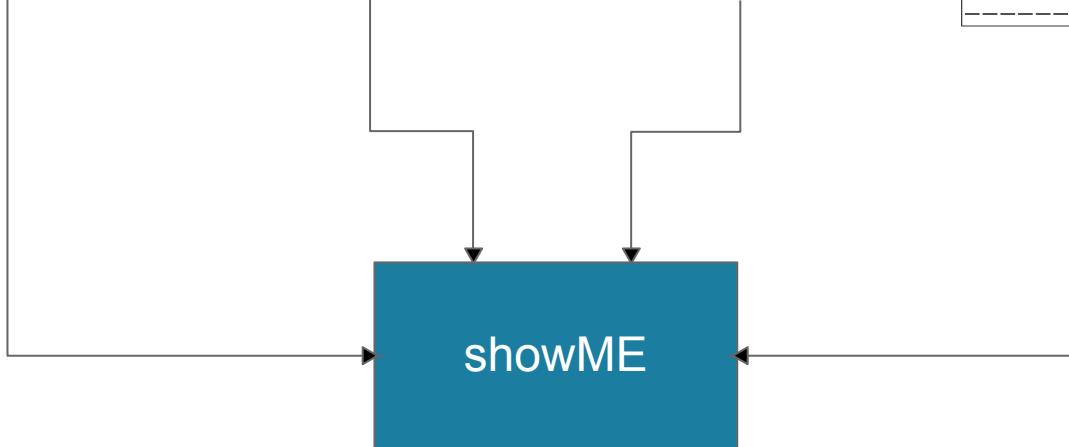
CAS Login



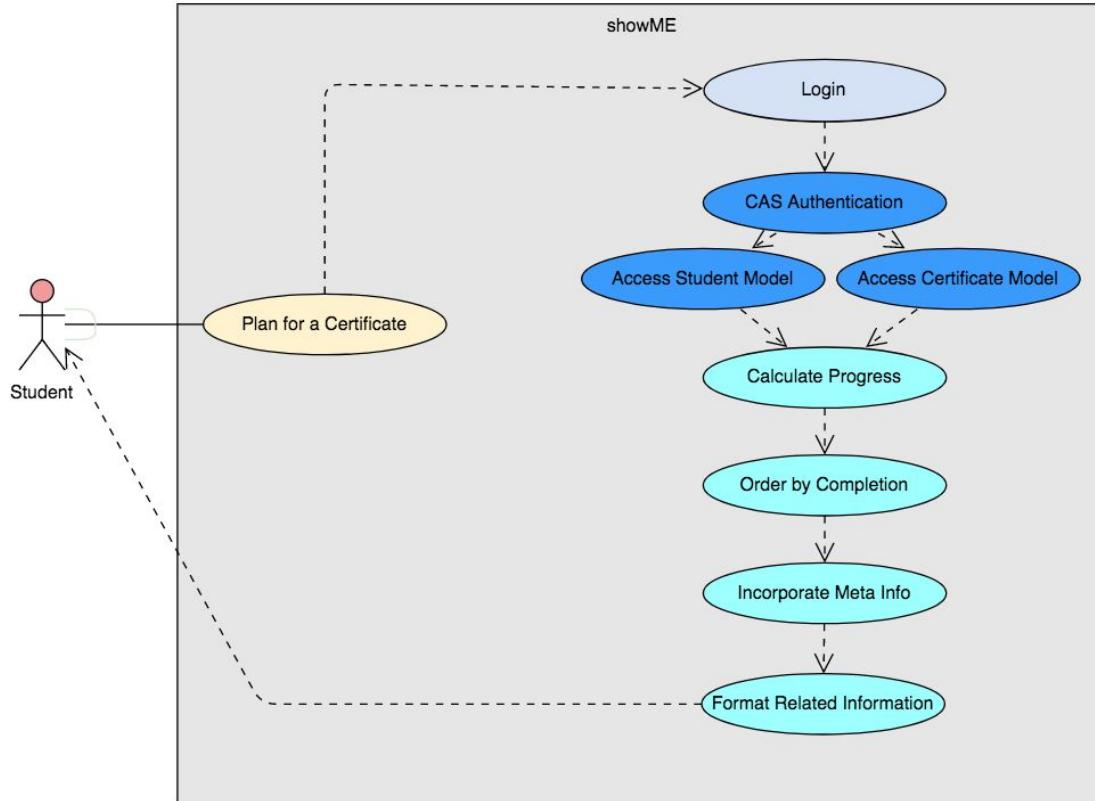
Transcript



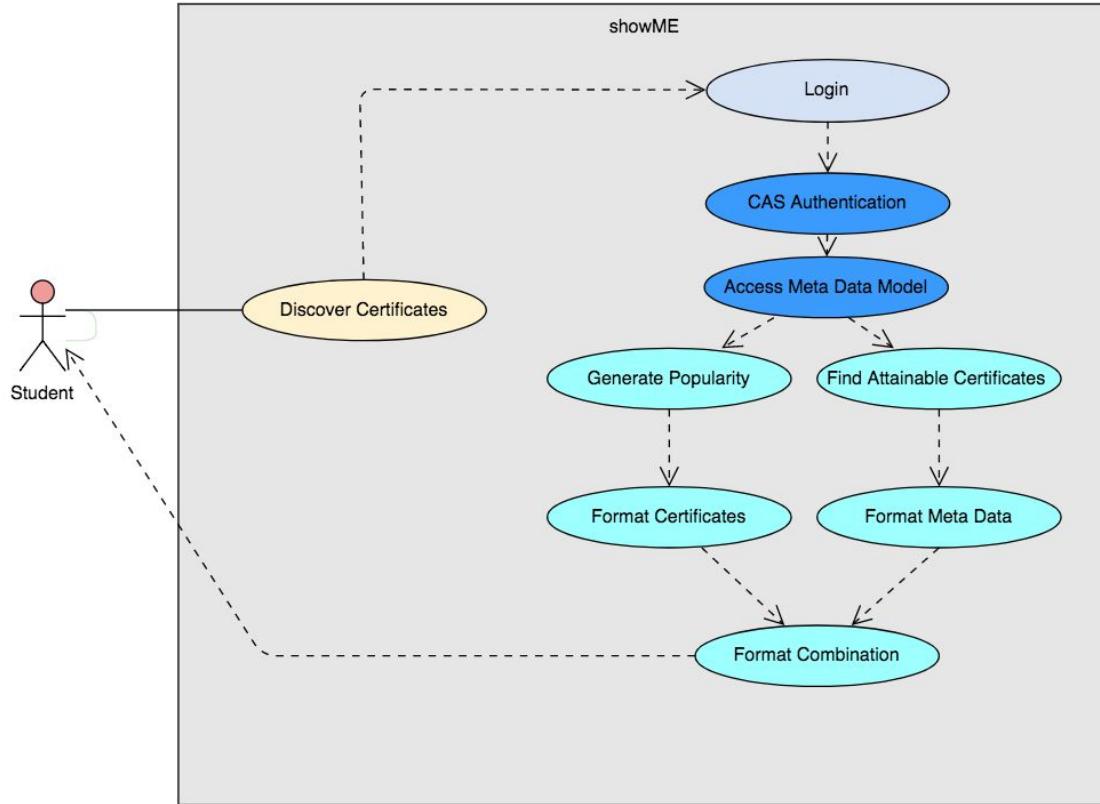
showME



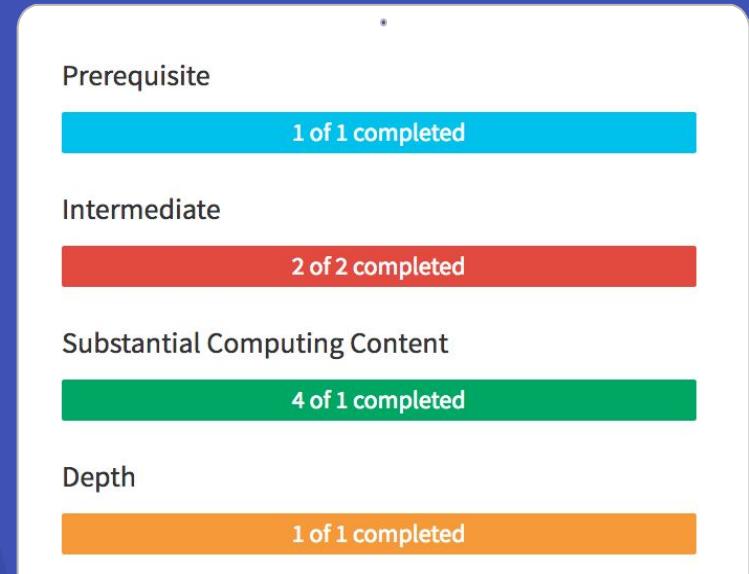
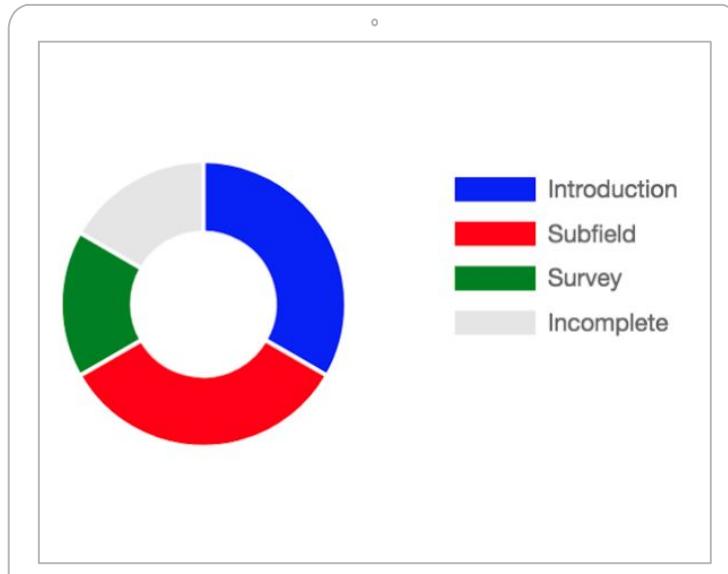
PLANNING FOR A CERTIFICATE



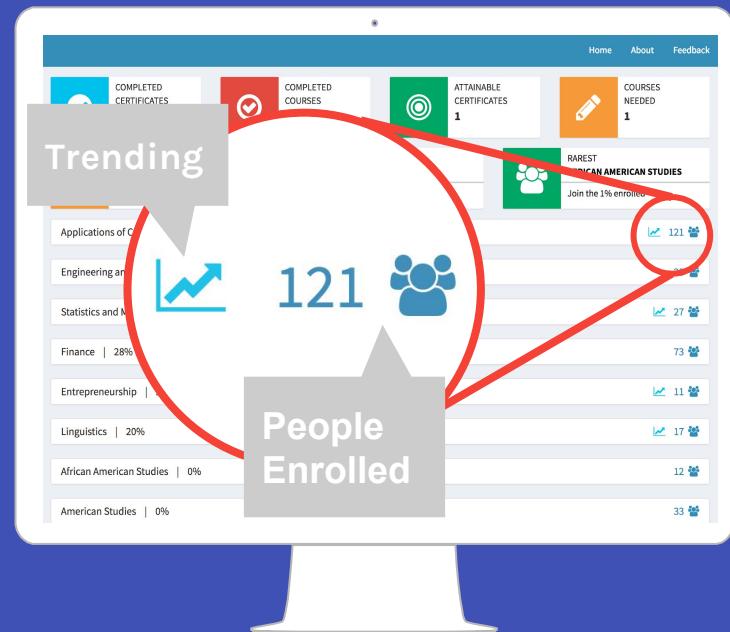
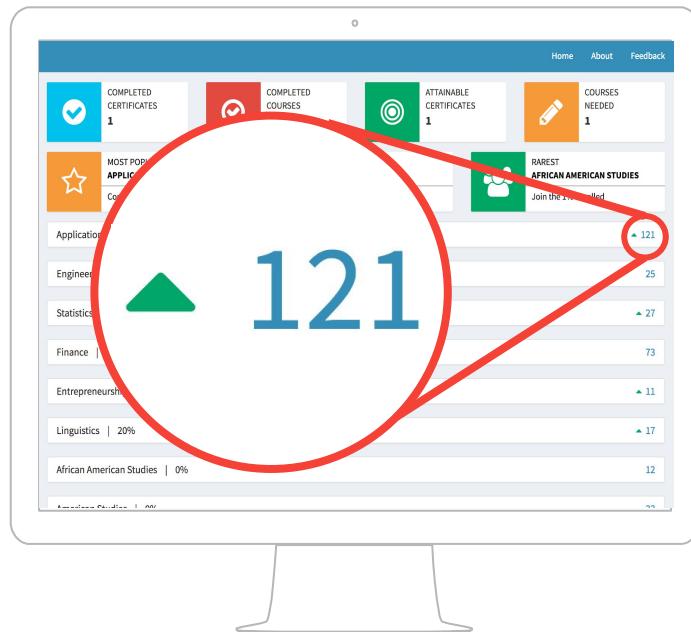
DISCOVERY OF CERTIFICATES



DECISIONS: Progress Representation



DECISIONS: UX with Icons



DECISIONS: Hosting Service



Amazon Lambda



AWS Serverless Framework

vs.

Heroku with Django Framework

- ▶ Scalability
- ▶ Deployment infrastructure

- ▶ CAS
- ▶ Django built-in tools

DECISIONS: Data Acquisition



User Input

vs.



Transcript Parser

DECISIONS: Data Collaboration

The screenshot shows a GitHub repository page for 'PrincetonUniversity / majors-and-certificates'. The repository is private and contains 159 commits, 1 branch, 0 releases, and 11 contributors. The latest commit was made 6 hours ago by user 'helenzhang1'. The repository description states: 'Repository for a machine-readable specifications of the requirements for majors and certificates at Princeton University.' The page includes tabs for Code, Issues (0), Pull requests (0), Projects (0), Wiki, Insights, and Settings.

Individual

- ▶ Data representation control
- ▶ Optimize for internal and individual performance

Collaboration

- ▶ Distribute workload
- ▶ Uniform representation for future projects
- ▶ Increased long-term support

REAL-WORLD TESTING

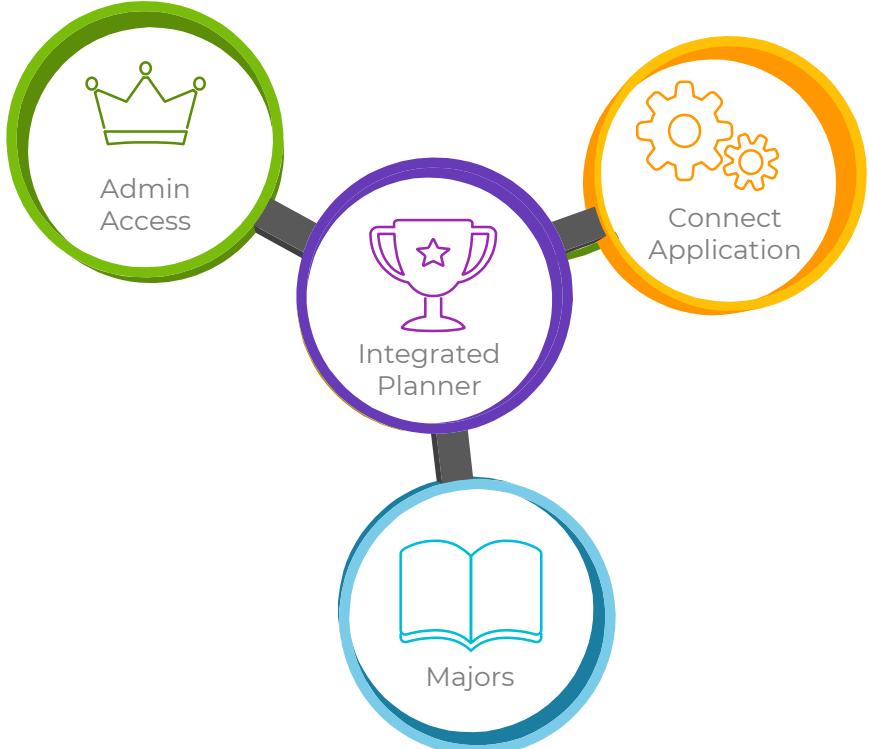
Local Testing

- ▶ REST API endpoints
- ▶ Console debugging
- ▶ Unexpected user flows/interaction

User Testing and Feedback

- ▶ User experience research
- ▶ Bug reports and UI suggestions via feedback form

FUTURE WORK



FUTURE WORK



Pre-Professional



Graduate Studies



Career Preparation

LESSONS LEARNED



THANKS!

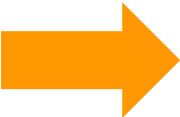
Any questions?

Appendix

PROBLEM SPACE

Hello
my name is

freshman



PRINCETON UNIVERSITY

Office of the Registrar

Course Offerings

Search Results for: New Search

Term: Fall 2018-2019, Distribution area: Any, Subject: Any, Catalog number: Any, Level: Any, Instructor: Any, Title: Any, Days: Any, Room: Any, Seats: Any, Status: Any, Books: Any, Eval: Any

Fall 2018-2019

Class	Course	Title	Day	Sec	Days	Time	Location	Ref	Max	Status	Books	Eval
28350	MED 221	African American Culture	SA	12	M-W	11:00 am - 11:50 am	40	70	Closed			
28482	AFR 236	Topics in African American Studies: The Big This Time -	LA	905	M	08:30 pm - 09:20 pm	54	35	Closed			
28487	AFR 245	African Art & Latin Amer. Arts	LA	187	T-Th	08:30 am - 09:50 am	8	30	Closed			
28208	AFS 220	AFS Junior Seminar	SA	905	T	02:30 pm - 04:20 pm	8	30	Closed			
28343	MED 321	The History of Black Capital	LA	131	T-Th	10:00 am - 10:50 am	22	80	Closed			

Information Requested

Course Offerings

View by Academic Year

Closed and Cancelled

New Courses

Courses in Progress

Faculty of the Year

Community-Based Learning

Summer Programs

STL, ETR, and QR

University General Education

Contact Programs



PRINCETON UNIVERSITY

Department of COMPUTER SCIENCE

Undergraduate Program Graduate Program Courses Research People

Navigation

Home Undergraduate Program

BROWSE BY:

▼ Certificate

Course of Study Sample Interests Interdisciplinary Interests

► Academic

► Independent

► Study Abroad

► Get Involved

► Jobs & Internships

BENDHEIM CENTER FOR FINANCE

Program in American Studies

Home About Us People Events Academics Undergraduate Graduate ODE(A)

Program Admissions Certificate Requirements Programs of Study

Certificate Requirements

The Program in American Studies is delighted and honored to announce that, starting Fall 2018, it will be offering the existing Certificate in American Studies, a brand new Certificate in Latin American Studies, and a new Certificate in Latino Studies.

New Programs

2018-19 Program in American Studies, the Program in Latin American Studies, and the Program in Latino Studies.

Asian American Studies or Latino Studies by successfully completing five courses.

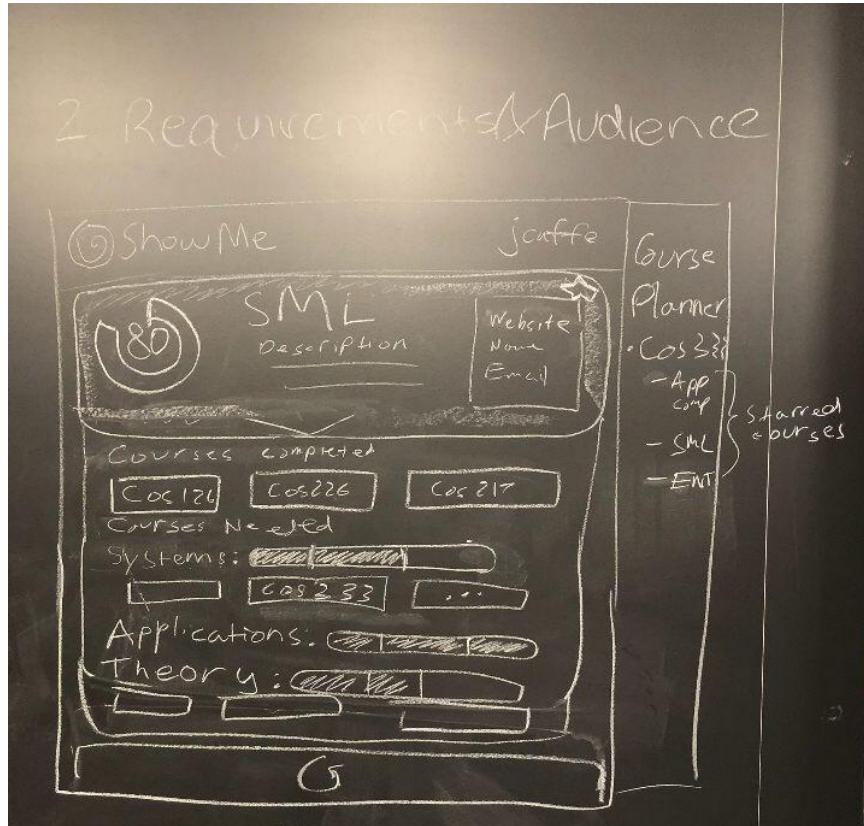
Information hidden in data. Interesting datasets usually contain hidden patterns and/or actionable information. That's what makes data interesting and valuable. To extract this valuable information, models and computational algorithms to identify patterns among the data variables. These algorithms for the data, compress the data, estimate the values of missing variables, quantify the new conclusions from the data in a justified way.

Undergraduate Certificate in Finance

The rapidly developing field of finance focuses on the pricing of financial assets, including equities, bonds, currencies, and derivative securities; portfolio management and the evaluation of financial risks; banking and financial intermediation; the financing of corporations; corporate governance; financial market and banking regulation; and many other topics.

In addition to the obvious practical relevance of finance, the field confronts both challenging intellectual problems and a distinctive formal framework within which these problems can be addressed. Knowledge of modern finance is also essential to the proper understanding of many other topics in economics and public policy, including the determination of exchange rates and international capital flows; the making of monetary and fiscal policy; the role of financial reform in developing and transition economies; the regulation and taxation of financial markets and financial instruments; and anti-trust policy, to give a few examples.

STAGE 1: Concept Drawing



STAGE 2: Mockup

showMe



Statistics and Machine Learning

The Program in Statistics and Machine Learning is designed for students, majoring in any department, who have a strong interest in data analysis and its application across disciplines.

Courses Completed

SML 201 MAT 385 ELE 364 ...

Courses Needed

Foundations of Statistics

ORF 245 PSY 251 ...

Theory ORF 309 ORF 363 ...

MAT 385 ORF 309

Bubbles signify progress in this track.
Green: Completed
Red: Uncompleted
Yellow: In course queue



Linguistics

Linguistics is the scientific study of language and all its properties. Students at Princeton develop the skills of a linguist through hands-on engagement with gathering and interpreting data from many different languages.

SML Contact Info

✉ csml.princeton.edu

👤 Susan Johansen

✉ sjohansen@

Course Queue

COS 226 X
Data Structures and Algorithms
Mark Braverman

ORF 245 X
Fundamentals of Statistics
Samory Kpotufe

ORF 309 X
Probability and Stochastic Systems
Miklos Racz

LIN 308 X
Bilingualism
Christiane Fellbaum

LIN Contact Info

✉ linguistics.princeton.edu

👤 Yolanda Sullivan

✉ syolanda@

Click a course to add it to the queue.

First Week

showME

showME Prototype

- COMPLETED CERTIFICATES **1**
- COMPLETED COURSES **16**
- ATTAINABLE CERTIFICATES
- COURSES NEEDED **12**

Applications of Computing
Colleen Kenny AB 2020

User Image

Profile

Sign out

Pre-Alpha

showME

showME Prototype

Search... Q

COURSE QUEUE

COS 226

- Data Structures and Algorithms
- Mark Braverman

MAE 345

+

Completed Certificates

Completed Courses

Attainable Certificates

Courses Needed

Contact Info

Courses Completed

Courses Needed

COS: Applications of Computing

Applications of Computing

Contact Info

Alpha

showME

pchheda

COURSE QUEUE

Coming soon...

COS 226

Data Structures and Algorithms

Mark Braverman

MAE 345

Search...

Upload Transcript

pchheda

showME Prototype

COMPLETED CERTIFICATES 2

COMPLETED COURSES 4

ATTAINABLE CERTIFICATES 1

COURSES NEEDED 3

Applied and Computation Mathematics

Applications Systems Theory

Applied and Computation Mathematics

At Princeton, the Program in Applied and Computational Mathematics offers a small group of undergraduate students the unique opportunity to learn to perform accurate and controlled numerical studies and, perhaps most important, exposes them to the philosophy and tools of interdisciplinary applied mathematics in a very personal and individualized manner. Students who complete the prescribed requirements are awarded a certificate in Applied and Computational Mathematics. Recently a new option has become available to undergraduate math majors who intend to pursue the PACM certificate, the applied math track.

+ Courses

Mathematical Foundations

MAT 3** APC 523

MAT 4** APC 527

APC 350 AST 301

APC 503 CBE 448

APC 501 COS 323

APC 506 COS 325

Contact Info

Gina Holland

gholland@princeton.edu

<https://www.pacm.princeton.edu/undergraduate/course-study>

Beta

showME

jcuffe

COURSE QUEUE

AAS 201

SPA 327

LAS 337

Upload Transcript

showME Prototype

COMPLETED CERTIFICATES 1

COMPLETED COURSES 23

ATTAINABLE CERTIFICATES 1

COURSES NEEDED 1

African American Studies

+ Courses

Introduction

AAS 201

Subfield

AAS ***
SOC 227

SOC 210

WWS 370

SOC 361

SWA 200
SOC 354

SPA 327
SOC 345

SPA 352
SOC 359

African American Studies

Earning a certificate in African American Studies is a straightforward and enriching course of study which complements, and complicates, any Princeton concentration. Students who opt to pursue a certificate in African American Studies gain access to an extraordinary bibliography that prepares them to think about race and difference in sophisticated ways. Certificate earners are required to complete 5 units of coursework, which include AAS 201; two survey courses; and two additional subfield courses. Additionally, certificate earners are encouraged to make African American people, literature, history, or related study and/or research in African American Studies central to their senior thesis topic. PDF courses cannot be counted toward your certificate requirements (not including P/D/F Only courses).

Contact Info

Jana Johnson
jana.johnson@princeton.edu
[" > Website](#)

Final Product

showME

jcuffe
Upload Transcript

COURSE QUEUE

COMPLETED CERTIFICATES 1

COMPLETED COURSES 23

ATTAINABLE CERTIFICATES 3

COURSES NEEDED 4

MOST POPULAR APPLICATIONS OF COMPUTING
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Intermediate 2 of 2 completed

Substantial Computing Content 4 of 1 completed

Depth 1 of 1 completed

Track Breakdown

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Website

Prerequisite COS 126 ISC 231 ISC 232 ISC 233 ISC 234

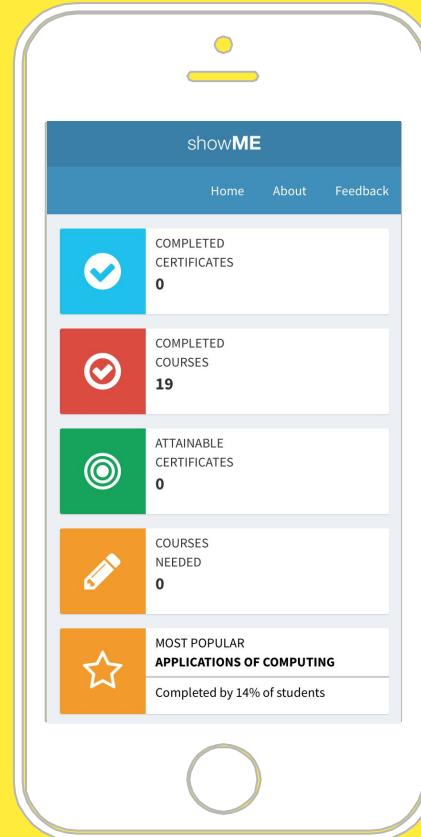
Intermediate COS 226 COS 217 COS 324 ORF 363

Substantial Computing Content ORF 467 COS 324 ORF 309 COS 326 ELE 206 COS 333 MAE 345 COS 340 COS 318 COS 343 COS 320 COS 375 COS 375

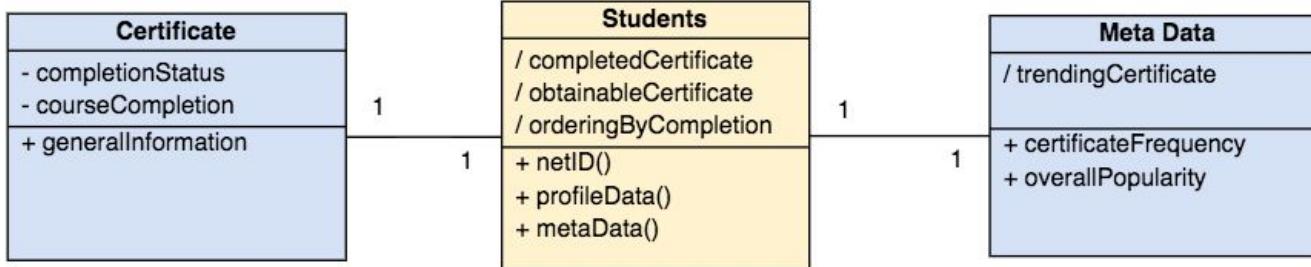


IPHONE PROJECT

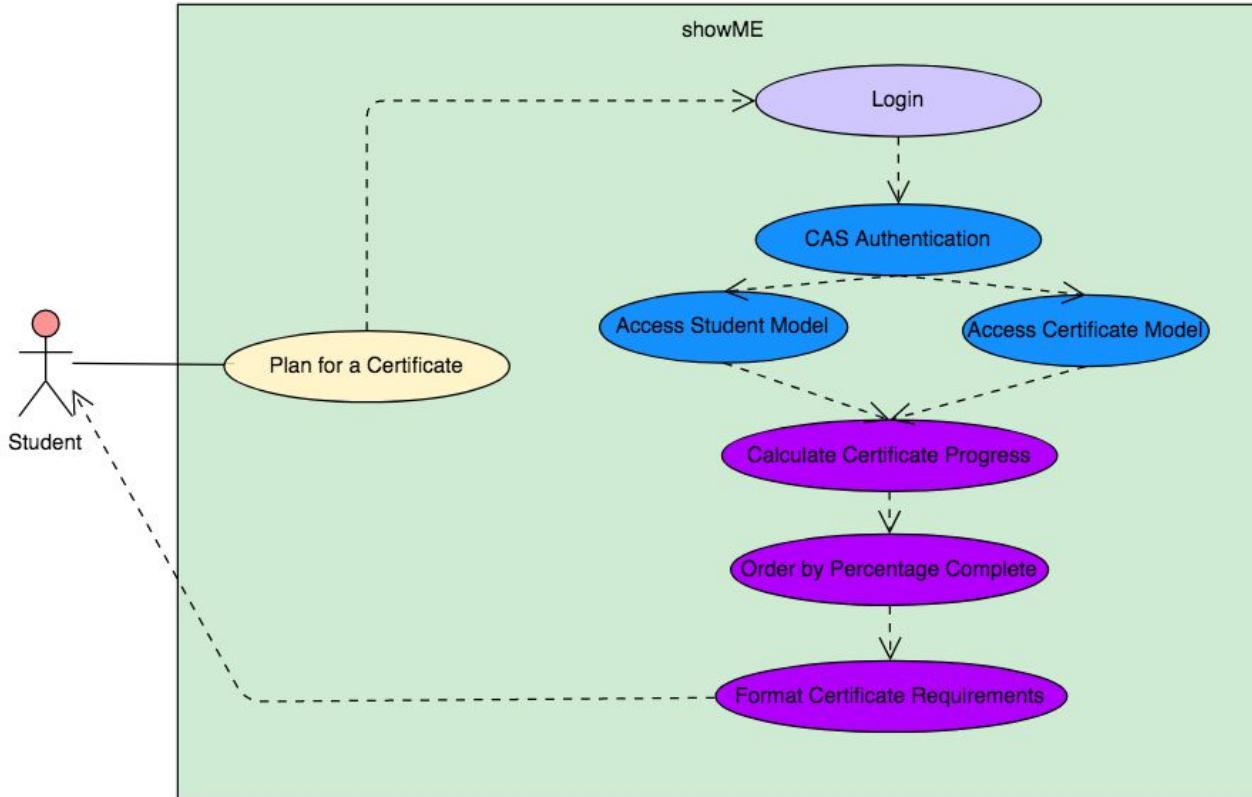
showME is also optimised for mobile interface.



BACKEND MODELS



PLANNING FOR A CERTIFICATE



DISCOVERY OF CERTIFICATES

