

# **TAROT**

**A Course Advising System for the Future**

Joshua Eckroth, Ryan Anderson  
Stetson University

“teacher-scholars”

“teacher-scholars-advisors”

Ellucian Degree Works - Stetson University

Advising Course Plan - Computer Science Major

<https://catalog.stetson.edu/undergraduate/arts-sciences/computer-science/csci-plan/>

Message from the President

Mission, Values, and Heritage

Contacts and Accreditations

Administration

University Libraries

Undergraduate

- Academic Calendar
- General Information
- General Education
- Advising Course Plans

College of Arts and Sciences

- American Studies
- Art
- Biology
- Chemistry and Biochemistry
- Communication and Media Studies
- Computer Science
  - Advising Course Plan - Computer Science Major
- Creative Arts
- Digital Arts
- Economics
- Education

First Year		
		Units
<b>Fall</b>		
MATH 141Q	Calculus I with Analytic Geometry	1
CSCI 141	Introduction to Computer Science I	1
FSEM 100	First Year Seminar	1
General Education requirement		1
<b>Term Units</b>		<b>4</b>
<b>Spring</b>		
MATH 142Q	Calculus II with Analytic Geometry	1
CSCI 142	Introduction to Computer Science II	1
General Education Requirement		1
Elective		1
<b>Term Units</b>		<b>4</b>
Second Year		
<b>Fall</b>		
CSCI 201	Introduction to Computer Organization	1
CSCI 221	Software Development I	1
Natural Science Elective		1
Elective		1
<b>Term Units</b>		<b>4</b>
<b>Spring</b>		
CSCI 211	Discrete Structures	1
Natural Science Elective		1
General Education Requirement (any V course)		
Elective		

Ellucian Degree Works - Stetson University

Advising Course Plan - Computer Science

<https://catalog.stetson.edu/undergraduate/arts-sciences/computer-science/csci-plan/>

Message from the President

Mission, Values, and Heritage

Contacts and Accreditations

Administration

University Libraries

Undergraduate

Academic Calendar

General Information

General Education

Advising Course Plans

College of Arts and Sciences

American Studies

Art

Biology

Chemistry and

**CSCI 211. Discrete Structures. 1 Unit.**  
Boolean algebra and propositional logic, mathematical proofs, finite machines, Turing machines, formal languages, combinatorics, probability. Prerequisite: [CSCI 141](#) and either [MATH 141Q](#) or [MATH 130](#) or [MATH 125Q](#).

Computer Science Major

Creative Arts

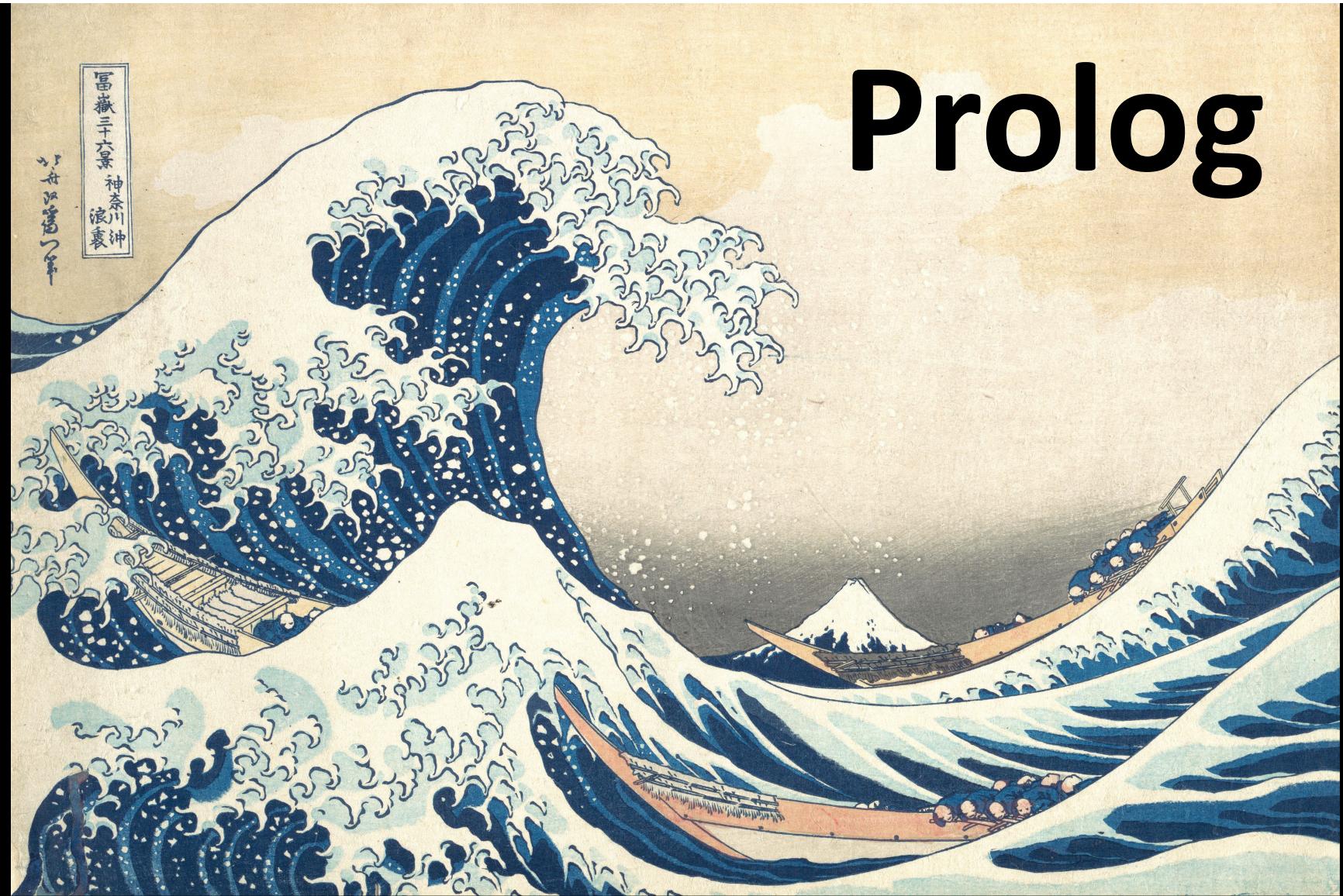
Digital Arts

Economics

Education

First Year		
		Units
<b>Fall</b>		
MATH 141Q	Calculus I with Analytic Geometry	1
CSCI 141	Introduction to Computer Science I	1
FSEM 100	First Year Seminar	1
General Education requirement		1
<b>Term Units</b>		<b>4</b>
<b>Spring</b>		
MATH 142Q	Calculus II with Analytic Geometry	1
CSCI 142	Introduction to Computer Science II	1
General Education Requirement		1
Elective		1
<b>Term Units</b>		<b>4</b>
<b>Second Year</b>		
<b>Fall</b>		
CSCI 201	Introduction to Computer Organization	1
<input checked="" type="checkbox"/> CSCI 211	Software Development I	1
		1
		1
<b>Term Units</b>		<b>4</b>
<b>SPRING</b>		
CSCI 211	Discrete Structures	1
Natural Science Elective		1
General Education Requirement (any V course)		1
Elective		

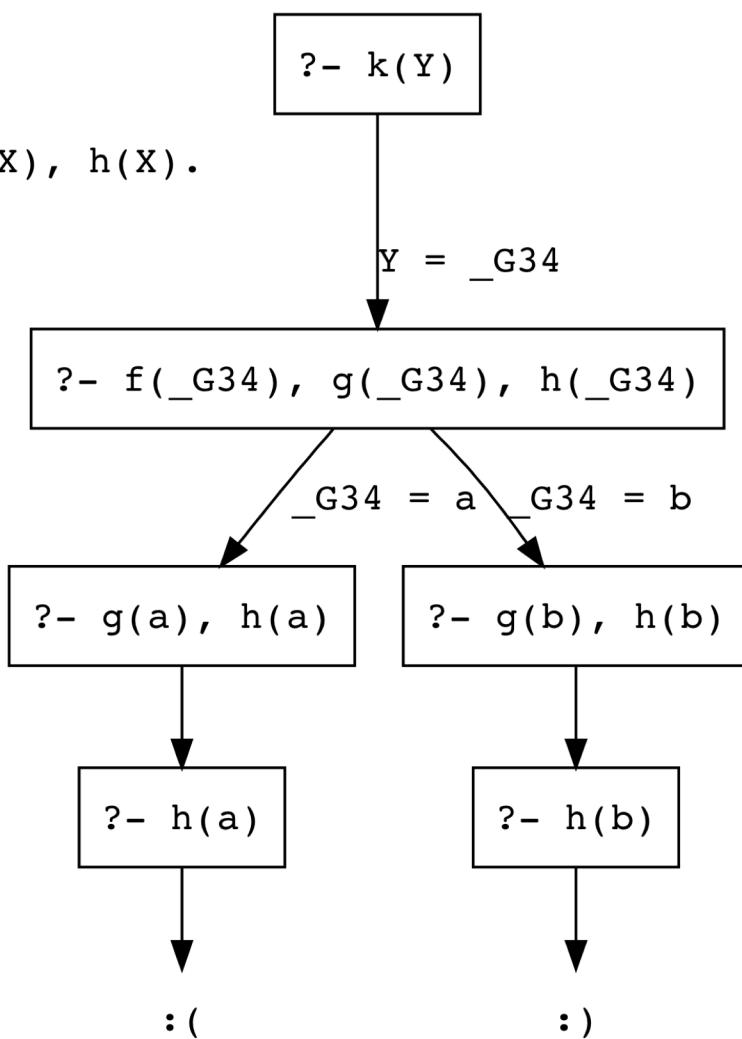
# Prolog



```

f(a).
f(b).
g(a).
g(b).
h(b).
k(X) :- f(X), g(X), h(X).

```



## **Goal: Plan FSEM**

2018-2019	Fall
	Spring
2019-2020	Fall
	Spring
2020-2021	Fall
	Spring
2021-2022	Fall
	Spring

## **Goal: Plan JSEM**

2018-2019	Fall	FSEM
	Spring	
2019-2020	Fall	
	Spring	
2020-2021	Fall	
	Spring	
2021-2022	Fall	
	Spring	

## **Goal: Plan MATH 142**

2018-2019	Fall	FSEM
	Spring	
2019-2020	Fall	
	Spring	
2020-2021	Fall	JSEM
	Spring	
2021-2022	Fall	
	Spring	

## **Goal: Plan MATH 142 (subgoal: Plan MATH 141)**

2018-2019	Fall	MATH 141	FSEM
	Spring		
2019-2020	Fall		
	Spring		
2020-2021	Fall		JSEM
	Spring		
2021-2022	Fall		
	Spring		

## **Goal: Plan MATH 142**

2018-2019	Fall	MATH 141	FSEM
	Spring	MATH 142	
2019-2020	Fall		
	Spring		
2020-2021	Fall		JSEM
	Spring		
2021-2022	Fall		
	Spring		

## **Goal: Plan PHYS 141**

2018-2019	Fall	PHYS 141	MATH 141	FSEM
	Spring		MATH 142	
2019-2020	Fall			
	Spring			
2020-2021	Fall			JSEM
	Spring			
2021-2022	Fall			
	Spring			

## **Goal: Plan PHYS 142**

2018-2019	Fall	PHYS 141	MATH 141	FSEM
	Spring	PHYS 142	MATH 142	
2019-2020	Fall			
	Spring			
2020-2021	Fall			JSEM
	Spring			
2021-2022	Fall			
	Spring			

## **Goal: Plan CSCI 498 (subgoal: plan three 300-level courses...)**

2018-2019	Fall	CSCI 141	PHYS 141	MATH 141	FSEM
	Spring		PHYS 142	MATH 142	
2019-2020	Fall				
	Spring				
2020-2021	Fall				JSEM
	Spring				
2021-2022	Fall				
	Spring				

## **Goal: Plan CSCI 498 (subgoal: plan three 300-level courses...)**

2018-2019	Fall	CSCI 141	PHYS 141	MATH 141	FSEM
	Spring	CSCI 211	PHYS 142	MATH 142	
2019-2020	Fall				
	Spring				
2020-2021	Fall				JSEM
	Spring				
2021-2022	Fall				
	Spring				

## **Goal: Plan CSCI 498 (subgoal: plan three 300-level courses...)**

2018-2019	Fall	CSCI 141	PHYS 141	MATH 141	FSEM
	Spring	CSCI 211	PHYS 142	MATH 142	
2019-2020	Fall				
	Spring				
2020-2021	Fall				JSEM
	Spring	CSCI 311			
2021-2022	Fall				
	Spring				

## **Goal: Plan CSCI 498 (subgoal: plan three 300-level courses...)**

2018-2019	Fall	CSCI 141	PHYS 141	MATH 141	FSEM
	Spring	CSCI 211	PHYS 142	MATH 142	CSCI 142
2019-2020	Fall				
	Spring				
2020-2021	Fall				JSEM
	Spring	CSCI 311			
2021-2022	Fall				
	Spring				

## **Goal: Plan CSCI 498 (subgoal: plan three 300-level courses...)**

2018-2019	Fall	CSCI 141	PHYS 141	MATH 141	FSEM
	Spring	CSCI 211	PHYS 142	MATH 142	CSCI 142
2019-2020	Fall	CSCI 221			
	Spring				
2020-2021	Fall				JSEM
	Spring	CSCI 311			
2021-2022	Fall				
	Spring				

## **Goal: Plan CSCI 498 (subgoal: plan three 300-level courses...)**

2018-2019	Fall	CSCI 141	PHYS 141	MATH 141	FSEM
	Spring	CSCI 211	PHYS 142	MATH 142	CSCI 142
2019-2020	Fall	CSCI 221			
	Spring				
2020-2021	Fall	CSCI 321			JSEM
	Spring	CSCI 311			
2021-2022	Fall				
	Spring				

## **Goal: Plan CSCI 498 (subgoal: plan three 300-level courses...)**

2018-2019	Fall	CSCI 141	PHYS 141	MATH 141	FSEM
	Spring	CSCI 211	PHYS 142	MATH 142	CSCI 142
2019-2020	Fall	CSCI 221			
	Spring	CSCI 201			
2020-2021	Fall	CSCI 321			JSEM
	Spring	CSCI 311			
2021-2022	Fall				
	Spring				

## **Goal: Plan CSCI 498 (subgoal: plan three 300-level courses...)**

2018-2019	Fall	CSCI 141	PHYS 141	MATH 141	FSEM
	Spring	CSCI 211	PHYS 142	MATH 142	CSCI 142
2019-2020	Fall	CSCI 221			
	Spring	CSCI 201			
2020-2021	Fall	CSCI 321			JSEM
	Spring	CSCI 311			
2021-2022	Fall	CSCI 301			
	Spring				

## **Goal: Plan CSCI 498 (subgoal: plan three 300-level courses...)**

2018-2019	Fall	CSCI 141	PHYS 141	MATH 141	FSEM
	Spring	CSCI 211	PHYS 142	MATH 142	CSCI 142
2019-2020	Fall	CSCI 221			
	Spring	CSCI 201			
2020-2021	Fall	CSCI 321			JSEM
	Spring	CSCI 311			
2021-2022	Fall	CSCI 301			
	Spring	CSCI 498			

## Goal: Plan CSCI 499

2018-2019	Fall	CSCI 141	PHYS 141	MATH 141	FSEM
	Spring	CSCI 211	PHYS 142	MATH 142	CSCI 142
2019-2020	Fall	CSCI 221			
	Spring	CSCI 201			
2020-2021	Fall	CSCI 321			JSEM
	Spring	CSCI 311			
2021-2022	Fall	CSCI 301			
	Spring	CSCI 498	<b>CSCI 499?</b>		

## **Goal: Plan CSCI 498 (subgoal: plan three 300-level courses...)**

2018-2019	Fall	CSCI 141	PHYS 141	MATH 141	FSEM
	Spring	CSCI 211	PHYS 142	MATH 142	CSCI 142
2019-2020	Fall	CSCI 221			
	Spring	CSCI 201			
2020-2021	Fall	CSCI 321			JSEM
	Spring	CSCI 311			
2021-2022	Fall	CSCI 301	CSCI 498		
	Spring	<del>CSCI 498</del>			

## Goal: Plan CSCI 499

2018-2019	Fall	CSCI 141	PHYS 141	MATH 141	FSEM
	Spring	CSCI 211	PHYS 142	MATH 142	CSCI 142
2019-2020	Fall	CSCI 221			
	Spring	CSCI 201			
2020-2021	Fall	CSCI 321			JSEM
	Spring	CSCI 311			
2021-2022	Fall	CSCI 301	CSCI 498		
	Spring		CSCI 499		

## Goal: Plan electives...

2018-2019	Fall	CSCI 141	PHYS 141	MATH 141	FSEM
	Spring	CSCI 211	PHYS 142	MATH 142	CSCI 142
2019-2020	Fall	CSCI 221			
	Spring	CSCI 201			
2020-2021	Fall	CSCI 321	CINF 331		JSEM
	Spring	CSCI 311			
2021-2022	Fall	CSCI 301	CSCI 498		
	Spring		CSCI 499		

## We have a planning engine.

Unlike most other planning engines (e.g., FastDownward), we can find *all* solutions.

Our engine might be less efficient. We'll have write the code so the “most likely case” is found first, but all cases can be found with enough time.

We'll probably cache (“table”) much of the execution.

## ***Level 0: Questions about the present.***

What have I taken?

How many credits do I have?

What is my GPA?

# “My Progress”

Cur GPA: 3.2  
Credits: 32

2017-2018	Fall	CSCI 141 (B+)	MATH 141 (A-)	RELS 141 (P)	FSEM (B+)
	Spring	CSCI 142 (A-)	SOCI 101 (B)	MATH 142 (B-)	HLSC (A)

Required classes remaining:

- CSCI 201
- CSCI 211
- CSCI 221
- CSCI 321
- CSCI 301
- CSCI 311
- CSCI Electives (2)
- CSCI 498
- CSCI 499
- JSEM
- Physics 1 & 2

## ***Level 1: Questions about a possible future.***

What should I take to graduate on time?

Can I successfully double-major?

Can I take a semester off?

What is the best GPA I can achieve?

# “My Outlook” – Finish my degree

Cur GPA: 3.2  
Max GPA: 3.7  
Min GPA: 1.2

2017-2018	Fall	CSCI 141 (B+)	MATH 141 (A-)	RELS 141 (P)	FSEM (B+)
	Spring	CSCI 142 (A-)	SOCI 101 (B)	MATH 142 (B-)	HLSC (A)
2018-2019	Fall	CSCI 211	CSCI 221	PHYS 141	
	Spring	CSCI 201	CSCI 311	PHYS 142	
2019-2020	Fall	CSCI 304	CSCI 321		
	Spring	CSCI 301	CSCI 331		
2020-2021	Fall	CSCI 498			
	Spring	CSCI 499			

## “My Outlook” – Double major (Math + CS)

2018-2019	Fall	CSCI 141	MATH 141	PHYS 141	FSEM
	Spring	CSCI 142	MATH 142	PHYS 142	CSCI 211
2019-2020	Fall	CSCI 221	MATH 211	MATH 221	
	Spring	CSCI 331	MATH 243	MATH 411	MATH 431
2020-2021	Fall	CSCI 321	MATH 321	MATH 331	JSEM
	Spring	CSCI 201	CSCI 311	MATH 312	MATH 341
2021-2022	Fall	CSCI 498	CSCI 301	CSCI 304	
	Spring	CSCI 499			

# “My Outlook” – Semester abroad

2018-2019	Fall	CSCI 141	MATH 141	PHYS 141	FSEM
	Spring	CSCI 142	MATH 142	PHYS 142	CSCI 211
2019-2020	Fall	CSCI 221			
	Spring				
2020-2021	Fall	CSCI 321	CSCI 431	JSEM	
	Spring	CSCI 201	CSCI 311		
2021-2022	Fall	CSCI 301	CSCI 304	CSCI 498	
	Spring	CSCI 499			

## “My Outlook” – GPA given conditions

Technique: use constraint logic programming over real numbers (CLPR)

Suppose I am a Junior, and I’m currently enrolled in Physics 142.  
I believe my grade will be a B, C+, or C.

What is the best and worst possible GPA *upon my graduation?*

Min GPA: 2.27

Max GPA: 3.02

*Likewise, what grade do I need in course X to achieve a final GPA of Y?*

## ***Level 2: Questions about all possible futures.***

Which electives can I take?

What's the latest semester I can take this course?

What is the best time to study abroad?

## “My Options” – Possible electives

Out of 2,132 schedules:

- CSCI 304: Fall 2021 (36%)
- CSCI 331: Spring 2020 (57%), Spring 2021 (10%), Spring 2022 (11%)
- CSCI 431: Fall 2020 (36%), Fall 2021 (8%)
- CINF 331: Spring 2020 (43%)

## “My Options” – Possible semesters abroad

- Fall 2018 (0%)
- Spring 2019 (17%)
- Fall 2019 (31%)
- Spring 2020 (35%)
- Fall 2020 (0%)
- Spring 2021 (0%)
- Fall 2021 (18%)

## ***Level 3: Questions about the rules.***

How similar are these two majors?

How many teachers are needed this semester?

What is the best course rotation schedule?

## “Course Insights” – How similar are two majors?

CSCI vs. CINF, common courses are:

- CSCI 141
- CSCI 142
- CSCI 211
- CSCI 221
- CSCI 321

## “Course Insights” – How many teachers are needed?

Technique: generate all possible schedules for students starting in odd/even years, then count courses.

- Even years, Fall: 10 courses, 4 teachers
- Even years, Spring: 7 courses, 3 teachers
- Odd years, Fall: 11 courses, 4 teachers
- Odd years, Spring: 9 courses, 3 teachers

...assuming 1 section of each course and 3-3 course load.

## “Course Insights” – When should courses be offered?

Technique: set certain course rotations as unknowns, then find working schedules.

Suppose we don't know when to offer CSCI 221 and CSCI 321.

TAROT finds CSCI 221 in Fall/Even rotation and CSCI 321 in Spring/Odd rotation (simultaneously) have successful schedules.

We could also count # of all successful variations.

The T is Silent

127.0.0.1:8123/index.php?controller=main&action=makeAdvancedSchedule

# TAROT

HOME ABOUT HELP/CONTACT PRIVACY

## Jane's Outlook

Year	Semester	Course	Course	Course	Course
2018	Fall	csci141	free	math141	pcb141
2019	Spring	csci142	csci211	math142	pcb142
2019	Fall	csci201	csci221	free	free
2020	Spring	csci301	csci304	free	free
2020	Fall	csci311	csci321	free	free
2021	Spring	csci331	free	free	free
2021	Fall	csci498	free	free	free
2022	Spring	csci499	free	free	free

My Progress  
My Outlook  
My Options  
Course Insights

Major(s) CSCI  CSEC  CINF

Desired Graduation Spring 2022

Constrain!

# The Future



# The Future



**Integrate TAROT with student database.**

**Finish web GUI.**

**Ask departments to commit to 2-year rotations.**

**Analyze schedules for chokepoints, unreachable courses, fragile majors, etc.**