

# CS0 as a General University Requirement Course: Who's Enrolling?

## Overview

### CS Education Movement

Introductory CS education has received a massive amount of attention in recent years, including:

- White House's CS for All Initiative [1]
- Hour of Code [2]
- Computer Science Education Week

Because only 25% of high schools offer CS courses [3], often college students enroll in CS courses with little or no programming experience.

### The Rise of CS0

Consequently, the need for a CS0 course taught at a slower pace using a more beginner-friendly programming language is growing. Studies have found higher retention and success rates for CS1 students when they take CS0. As a result, many universities are offering an optional CS0 course.

### Who Enrolls in CS0?

Students in CS0 vary significantly in terms of their:

- Programming experience levels
- Majors
- Math experience levels

To more successfully recruit students to CS0 and retain students as CS majors, we want to know more specifically who enrolls in CS0 and why. We propose to answer these questions and to provide insight into the effects of student enrollment when CS0 is offered as a general university requirement course (CptS 111).

## CS0 at WSU

### CptS 111

#### Introduction to Algorithmic Problem Solving

CptS 111 introduces students to computational thinking, and because it satisfies a quantitative general university requirement, students learn to solve quantitative problems from a wide variety of "real life" situations. Effort is made to engage students by introducing programming and lab assignments that are interesting, relevant, or fun while covering basic topics in the course, including functions, literals, operators, arithmetic, lists, loops, conditionals, and graphics.

### Programming Tools Used

This course uses the Python programming language, APIs such as Google Maps, and hardware from AdaFruit Industries.



### References

- [1] [www.csforall.org](http://www.csforall.org)
- [2] <https://hourofcode.com/us>
- [3] Information Technology and Innovation Foundation, 2016

## Survey Results

### Responses to Survey by CptS 111 Students (N=87) in Fall 2016

(14 females, 69 males, 4 did not disclose gender; 133 surveyed; 46 did not respond)

#### • Are any of your family members in a CS-related profession?

Answer	Bar	Response	%
Mother		5	11.63%
Father		12	27.91%
Sibling		5	11.63%
Other		24	55.81%

- 43 students (49.43%) attended a high school that offered a programming course; Java was the most common programming language.
- 36 students (41.38%) had programming experience prior to CptS 111.

#### • How did you obtain your programming experience?

Answer	Bar	Response	%
Middle school		1	2.78%
High school		25	69.44%
Online course		12	33.33%
Coding camp or workshop. Please explain:		2	5.56%
Other.		10	27.78%

#### • How did you hear about CptS 111?

Answer	Bar	Response	%
Advisor		70	82.35%
Friend		6	7.06%
Advertising		2	2.35%
Week of welcome event		1	1.18%
Other		11	12.94%

- 33 students (38.37%) knew CptS 111 is a UCORE course satisfying the [QUAN] (quantitative reasoning) requirement when they enrolled.

#### • Why did you decide to enroll in CptS 111?

Answer	Bar	Response	%
Plan to major in computer science		43	49.43%
Plan to major in computer engineering		8	9.20%
Plan to major in electrical engineering		15	17.24%
Plan to major in an area outside of EECS, but taking CptS 111 because programming sounds interesting/is helpful for my major		10	11.49%
Other reason		7	8.05%
Do not have the math prerequisite for CptS 121		4	4.60%

- Before enrolling in CptS 111, 55 students (63.22%) considered majoring in CS. After CptS 111, the number rose to 60 (68.97%).
- The majority of non-CS majors in CptS 111 plan to major in Electrical or Computer Engineering or MIS/Business.
- If CptS 111 \*were not\* a UCORE [QUAN] course, 3 students (3.45%) would not have enrolled (2 unsure).
- 80 students (91.95%) would encourage other students to enroll in CptS 111 (1 no, 6 unsure).

#### • Are you planning to enroll in CptS 121 (CS1) next semester?

Answer	Bar	Response	%
Yes		57	65.52%
No		6	6.90%
Not sure		13	14.94%
No, but I probably will later		11	12.64%

## Publicity and Outreach Efforts

### Advisors

Advisors encouraged to inform students that CptS 111 is now UCORE and provided handouts to give to students during advising sessions.

### Website <http://school.eecs.wsu.edu/cpts111/>

Describes the course, emphasizes no prior programming experience is necessary, showcases course projects, includes current CptS 111 student testimonials.

### Posters Displayed Throughout WSU Campus



16 students (18.39%) saw a poster prior to enrolling; 3 said the poster influenced their decision to enroll in CptS 111:

- "The 'All Majors Welcome' was very encouraging."
- "Made it seem interesting"
- "I thought about it and decided that I wanted to gain a stronger understanding about computers"

## Summary

### Impact

Research investigating students enrolling in CS0 and tracking their progress toward degree completion is relevant to educators striving to continue or improve CS student retention and success rates. These are of increasing importance as demands for CS-related jobs continue to rise and as universities endeavor to produce innovative graduates to enter diverse and interdisciplinary technical fields.

### Future Work

Future work includes tracking the progress of the Fall 2016 CS students and the long-term impact of transitioning CS0 to a UCORE course:

- Success in CS1 and CS2
- Numbers and retention of CS majors and minors
- Proficiency of graduates with programming proficiency
- CS0 included in more diverse majors, minors, and certificate programs
- Senior design/capstone project and research collaboration