

# A Case Study on Adding Computer Science as a Math Graduation Elective:

## A Report from the Alabama CS/Mathematics Crosswalk Committee

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### MOTIVATION AND BACKGROUND

Until recently, Alabama consistently had under 60 students take the AP Computer Science A (CS A) exam each year. The expected growth from an NSF grant that is training over 50 teachers on CS Principles (CSP) will significantly increase interest in computing across Alabama. A statewide committee of Mathematics and Computer Science teachers, and content specialists from the Alabama State Department of Education (ALSDE), met in August 2013 to compare the content of the AP CS A course and the CSP course with the Alabama Course of Study for Mathematics (ACSM). The purpose of the comparison was to identify overlaps in content and to make recommendations to the ALSDE regarding the option of awarding mathematics graduation credit for completion of the CS Courses.

The committee was asked to:

- Evaluate the content of the CSP and AP CS A courses
- Review the content in the high school ACSM
- Examine support documents to clarify content
- Map specific mathematics course of study objectives to content in the two CS courses

### SUMMARY OF CROSSWALK MAPPING

The following table lists the specific courses in the ACSM that were considered in the crosswalk activity (courses on the far left column), along with the total number of content standards in each course. The result of the crosswalk mapping indicates the number of topics that were evaluated to overlap with the CSP Learning Objectives (column 3) and the CS A course description (column 4).

Course	# of Content Standards	# of Standards Addressed in CSP	# of Standards Addressed in AP CS A
Algebra II	46	6	7
Algebra II/w Trig	50	6	7
Discrete Math	13	10	9
Math Investigations	12	7	2
Pre-Calculus	54	12	6
Analytical Math	18	2	4

### EXAMPLE MAPPINGS FOR CS PRINCIPLES

A subset of the complete table of mappings for CSP is provided below, which highlights the CSP Learning Objectives that had the most overlap with concepts in the ACSM. All of the annotated ACSM materials and the documents produced by the committee are available at:

<http://tinyurl.com/Alabama-Crosswalk>

Learning Objective	CSP Description	Algebra II	Algebra II/Trig	Discrete Mathematics	Mathematical Investigations	Pre-Calculus	Analytical Mathematics
LO 2.3.1	Use models and simulations to represent phenomena.	37, 38	41, 42			39,40, 41, 42, 43	
LO 3.1.1	Use computers to process information, find patterns, and test hypotheses about digitally processed information to gain insight and knowledge.			13	11	39, 40, 41,42,43, 46, 53	
LO 3.2.2	Use large data sets to explore and discover information and knowledge.	42	46	10, 13		39, 40, 41,42,43, 47, 48	
LO 5.5.1	Employ appropriate mathematical and logical concepts in programming.	39	43	2, 3, 11			13, 14
LO 7.4.1	Explain the connections between computing and economic, social, and cultural contexts.	14	14		12	12	

### COMMITTEE RESULTS

- The committee's recommendation supported the awarding of a mathematics graduation credit for the completion of CSP or AP CS A.
- This recommendation was reported at an Alabama State Board of Education Work Session in November 2013. State Superintendent Tommy Bice recommended that the committee's report be accepted and the Board formally approved the recommendation at a December 2013 meeting.
- Over half of the CS4Alabama pilot teachers are math certified and now offering the CSP course in their school for math graduation credit.