

UC DAVIS

C-STEM CENTER



"As a teacher of mathematics for the past 28 years, I have to say that this is the best program I have worked with to inspire and focus on most struggling learners in Algebra."

Susan Johnston
Math Teacher
Livermore High School

The C-STEM program transforms K-14 computing, science, technology, engineering, and mathematics education in both formal and informal programs, with a focus on Algebra. The C-STEM Math-ICT curriculum provides K-12 students with up to 13 years of computer science education through integrated learning of math and science with hands-on coding, making, and robotics. Previous research studies show that computer science alone does not help students' math achievement. However, through over a decade of dedicated research and development, C-STEM now has a track record in transforming math education with higher achievement through computing.

C-STEM Success Stories by teachers with no prior coding experience:

<http://c-stem.ucdavis.edu/about-us/success>

For at-risk and gifted students alike, **C-STEM program significantly increases math performance and closes achievement gap:**

American Canyon Middle School, American Canyon, CA

100% of C-STEM Integrated Math I students scored "Standards Exceeded" or "Standards Met" on the Common Core Smarter Balanced Test (**94%** "Standards Exceeded" and **6%** "Standards Met.")
37% of students scored **the highest score possible**, compared to the district wide **33%** and school-wide **38%**.

Livermore High School, Livermore, CA

In a C-STEM Algebra 1 class consisting of **84%** "at-risk" students with a GPA below 2.0, extreme attendance issues, very low socio-economic backgrounds, or identify as foster or migrant education students, students scored an **83% average on the district final exam** on Algebra (versus **68%** district wide average using the same exam). The **course pass rate is 100%** with an average course grade **84%**.

Hillcrest High School, Riverside, CA

94% of students in C-STEM Integrated Math II were able to earn passing marks, compared to the site average of **61%** passing rate in non C-STEM Integrated Math II courses.

Northwest Local School District, Cincinnati, OH

77% of the students in the Applied Math class using C-STEM curriculum **passed the 8th grade Math AIR assessment** versus **16%** of the students in Applied Math who passed in the previous year (not using C-STEM curriculum).

In only one week or less, teachers, through C-STEM Professional Development with hands-on experience, can bring computing and robotics into their classroom teaching.

"Oh my gosh! I barely can contain myselfsoooo fun!!! So challenging and so rewarding at the same time!!!"

Jessica Fernandez
Math Teacher
Glenn Edwards Middle School

For more information, contact
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California Department of
EDUCATION



CTE PROGRAM OF STUDY: C-STEM Information and Communication Technology (ICT) Career Pathway Industry Sector: Information and Communication Technologies
Career Pathway: Software and Systems Development



This template assumes students have completed high school exit exams and basic skills coursework. Local graduation requirements may vary.

Legend:

- Course is recommended by industry experts
- Course is articulated, see comments below
- Course may be taken via concurrent or dual enrollment
- Indicates a course that may satisfy multiple requirements

Levels	Grade	CTE Courses	English Language Arts	Math	Social Science	Science	Other Required Courses or Recommended Electives	Dual and/or Concurrent Enrollment	Articulated Courses (College Credit for HS Classes)
Middle	7	Introduction to Computer Programming	English	Math 7 with Computing	World History / Geography	Life Sciences	Physical Education		
	Recommended Activities: RoboPlay Video Competition, RoboPlay Challenge Competition, GIRL Camp								
Senior	8	Robotics and Video Production	English	Math 8 with Computing	US History / Geography	Life Sciences	Physical Education		
	Recommended Activities: RoboPlay Video Competition, RoboPlay Challenge Competition, GIRL Camp								
Secondary	9	Computer Programming for Solving Applied Problems	English	Algebra I with Computing and Robotics IM1 with Computing and Robotics		Physical Science with Computing and Robotics	Physical Education		
	Recommended Activities: RoboPlay Video Competition, RoboPlay Challenge Competition, GIRL Camp								
HS Name	10	Computing with Robotics or Physical Computing with Pi and Arduino	English	Geometry with Computing and Robotics. IM2 with Computing and	World History	Biological Science	Physical Education		
	Recommended Activities: RoboPlay Video Competition, RoboPlay Challenge Competition, GIRL Camp, Job Shadowing, Work Based Learning, Service Based Learning, Mentorships, Career Technology Student Organization (CTSOs), Maker Fair, Hacker Space. Seek industry certifications such as Microsoft, CompTIA, CIW, CISCO, etc. Add to digital portfolio.								
HS Name	11	AP Computer Science Principles	English	Algebra II with Computing and Robotics. IM3 with Computing and Robotics	US History		Foreign Language I or Visual & Performing Arts ★ (Districts may allow CTE to fulfill this)		
	Recommended Activities: RoboPlay Video Competition, RoboPlay Challenge Competition, GIRL Camp, Job Shadowing, Work Based Learning, Service Based Learning, Mentorships, Career Technology Student Organization (CTSOs), Maker Fair, Hacker Space. Seek industry certifications such as Microsoft, CompTIA, CIW, CISCO, etc. Add to digital portfolio.								
HS Name	12	Principles and Design of Cyber-Physical Systems or Physical Computing with Pi and Arduino		AP Statistics or Pre-Calculus (with Computing and Robotics)	Government(semester) Economics (semester)	Physics with Computing and Robotics		STAT120: Statistics ★	
	Recommended Activities: RoboPlay Video Competition, RoboPlay Challenge Competition, GIRL Camp, Job Shadowing, Work Based Learning, Service Based Learning, Mentorships, Career Technology Student Organization, Maker Fair, Hacker Space. Seek industry certifications such as Microsoft, CompTIA, CIW, CISCO, etc. Enroll at Community College. Add to digital portfolio.								

POST SECONDARY COLLEGE NAME	Grade	CTE Courses			Additional and Optional Courses			General Education Requirements			Occupations Relating to this Pathway	
		Acct 110:Financial Acct Acct 120:Managerial Acct	...For completion of Local AS/AA Degree (total Units)	...For completion of Achievement Certificate (total units)	...For completion of Skills Certificate (total Units)	Area A English Language Communication & Critical Thinking (9 units)	Area B Scientific Study & Quantitative Reasoning with 1 lab (9 units)	Area C Arts & Humanities (9 units)	Area D Social Sciences (9units)	Area E Lifelong Learning & Self Development (3 units)	Careers requiring a high school diploma or equivalent	Careers requiring a BA / BS degree
13		ECON121: Microeconomics				English composition	Mathematics	Arts		Customer Service Representative Computer Technician (with certifications) Networking Technician	Computer Info Systems Managers Computer Hardware Engineers Computer Programmers Business Systems Analysts Database Administrators Web Developer Applications Developer	
		Intro to Programming (ITIS 190) and Intro to Database Management Systems (ITIS170)				Oral Communication	Physical Science	Humanities		Networking Technician	Computer Info Systems Managers Computer Hardware Engineers Computer Programmers Business Systems Analysts Database Administrators Web Developer Applications Developer	
14		Select 1 from: Business Statistics(STAT120) or Finite Math(MATH130)				Critical Thinking	Life Sciences	Arts or Humanities (recommended foreign language)		Careers requiring some post secondary	Computer Info Systems Managers Computer Hardware Engineers Computer Programmers Business Systems Analysts Database Administrators Web Developer Applications Developer	
		Select 1 from: Business Information Systems (BUS140) or Computer Information Systems (ITIS120)				Area D Social Sciences (9units)	Area E Lifelong Learning & Self Development (3 units)			Computer Support Specialists Help Desk Specialists System Administrators Software and Hardware Salesperson Bookkeeper E Commerce Small Business Entrepreneur	Careers requiring a BA/BS + (beyond the scope of this template) Computer & Information Systems Manager Chief Information Officer Chief Technology Officer	
15		Suggested Majors: Business, with a concentration in Management Information Systems, Business Information Systems								Careers requiring 2 year degree	For students interested in attending a UC Campus, be aware that courses included on the CSU GE pattern are not always consistent with IGETC GE Pattern for UC Admission	
16		Industry recognized certifications, Credentials, licenses, or apprenticeships related to this pathway COMP TIA, Microsoft, CISCO, etc. as well college certificate or degree completion								Network Engineer Business Programmer Social Media/Marketing Specialist		
		Comments: <ul style="list-style-type: none"> • courses with this color are UC Davis C-STEM courses. One or more of C-STEM courses can be replaced by other equivalent or relevant courses. • Prerequisite requirements may vary by school and may alter the sequence of courses above. • This template is based upon requirements for CSU transfer pattern and assumes that all basic skills (remedial) coursework is completed. • Where there are course numbers identified, the course number references the CID course. Course content for these courses may be found at www.c-id.net/descriptors. Per Title 5, students may only receive credit for articulated high school work upon completion of a credit by exam mechanism that ensures that the objectives of the community college course have been met. Completion of an articulated 										