CPATH 2009 Portfolio

This document contains short descriptions of the projects funded from the FY 2009 CPATH competition. Each of the awards includes the integration of Computational Thinking (CT) as a key component of undergraduate education.

Search NSF awards (http://nsf.gov/awardsearch/) for additional information.

Computational Thinking with K-12 Connections

0939168 Ross, Los Rios CC System - Sacramento Regional CPATH Project II

Implements a plan to identify key computational skills and develop K-12 CT competencies that connect to these skills; presents clear plans for involvement of key stakeholders.

0938999 Hambrusch, Purdue - Computer Science Pathways for Educators

Places CT modules into education courses for groups of education students, thus addressing the important and timely issue of teacher training; creates a teacher certification program in computer science.

0939106 Van Camp, Marietta College - CPATH at Marietta College

Introduces CT across college disciplines and among students and teachers in the K-12 community; revises two courses in the computer science curriculum and supports the integration of CT as part of an existing outreach program for middle and high school students.

0939059 Hislop, Drexel; 0939088 Urban, Texas Tech; 0939028 Towhidnejad, Embry Riddle - From Middle School to Industry: Vertical Integration to Inspire Interest in Computational Thinking

Uses peer mentoring as a means to teach CT skills and to complement existing approaches at the institutions through vertical integration and team projects; connects activities in high school with those at the university level.

Computational Thinking in STEM Disciplines

0938763 Westbrook, U Arizona - Computational Thinking as a Foundation for Interdisciplinary Undergraduate Education

Develops CT in the School of Information Sciences, Technology and Arts (SISTA), a new school at UA; includes a curriculum model development across SISTA, covering a broad foundation in Information Systems and CT, with wide faculty engagement.

0939103 Kirby, N. Kentucky U - Informatics at Multiple Scales

Develops a initial course for a new department of CS, MIS and Communication, using units of informatics, similar to the subatomic to galaxy perspective in the physical sciences; possible informaticist in residence.

0939153 Salter, Oberlin - Teaching Computational Thinking through Integration of Dynamic Systems Modeling

Integrates dynamic systems with a computational model into a series of undergraduate courses; incorporates learning how to model and problem solve through computational methods, not just data management and processing.

0938393 Zhou, U Pittsburgh - Health Computing: Integrating Computational Thinking into Health Sciences Education

Develops a series of CIS courses relevant to health sciences education and enhances the CT ability of students in the Health and Rehabilitation Sciences; creates a model for health science education with a computing core; incorporates faculty and community partners and includes high school outreach.

Computational Thinking across All Disciplines

0939120 Malyuta , CUNY New York City - Planning for Institutional Transformation through Computational Thinking

Develops CT case studies, workshops, modules and other materials to be used in general education courses; could potentially produce materials and approaches that would benefit other post-secondary institutions serving similar audiences and working within similar contexts.

0939137 Berg, SUNY Albany - Learning Computational Thinking in Context: Using Problems and Cases in Financial Market Regulation

Teaches CT in the context of financial market regulation, using a very practical topic of high interest to the students, and employing a problem-based learning approach; creates an interdisciplinary class that will study requirements specification, semantic data analysis, testing, and HCI.

0939149 Alvarado, Harvey Mudd - Modular CS1 from the Inside Out: Computational Thinking for all STEM Students

Develops CT modules that will be used in introductory courses at several levels (public schools and university), contexts (computer science, biology, and engineering), and types of institutions; has a collection of partners who will test course materials.

0939032 Kuster , Carroll College - Developing Computational Thinking Skills Across the Undergraduate Curriculum

Enhances undergraduate CT skills and competencies by developing two new courses, a new minor in computational science, an interdisciplinary major in computational science, and by training faculty to teach these new courses integrating CT throughout the curriculum.

Tools and Resources for Undergraduate Computing Education

0939075   Chang, Iowa State - Experimenting with an Open Platform for the New Interdisciplinary Study on Gerontechnology

Develops a new program in Gerontechnology, involving the CS and the Gerontology departments infusing CT into both disciplines; transforms the SmartHome Lab into an open project platform making it available to others remotely.

0938964   Turner, Cal State San Bernardino - Revitalizing Computing Education through Community-Based Video Game Development Projects

Integrates a video game development emphasis into the undergraduate computing curriculum; involves students from various institutions, including high school students, contributing to the development of games.

0938809 Denning, Naval Postgraduate; 0938948 Snodgrass, U Arizona - A Field Guide to the Science of Computation

Develops a resource that presents deep insights into the field of computing, the Field Guide to the Science of Computation; content developed by four working groups composed of the major leaders in the field and tested in K-12 schools.

Computational Thinking in Computing Sciences and Engineering

0939164 Bodenheimer, Vanderbilt - Revitalizing Computing Education through Computational Science

Creates a computational science minor focusing on distributed, parallel, and concurrent computing while improving coverage of these topics in the undergraduate major; serves a broad audience of students in science, engineering and computer science.

0939034 Morelli, Trinity College; 0939097 Danner, Wesleyan; 0939022 Izmirli, Connecticut College - Building a Community to Incorporate Humanitarian Free and Open Source Software into Undergraduate Computing Education

Integrates a humanitarian free and open source software (H-FOSS) model throughout the computing curriculum; expands the H-FOSS community, develops a curriculum, and establishes a sustainable infrastructure; expansion of prior CPATH project.

0939122 Burge, Miami; 0939081 Vouk, NC State - Incorporating Communication Outcomes into the Computer Science Curriculum

Develops the CT and communication abilities of CS and Software Engineering students; fully integrates communication instruction and activities throughout the curriculum to enhance, rather than replace, the learning of technical content, and to support development of CT abilities.

0939108 Tu, U New Orleans; 0929015 Zhang, Southeastern LA; 0939102 Lang, Xavier U - A Verification-Driven Learning Model that Enriches Computer Science and Related Undergraduate Programs

Implements a novel verification-first approach to the computer science curriculum; introduces software development by exposing students to existing code before asking them to develop their own; facilitates student learning through involvement in real-world computing scenarios.

0938995 Musial, Puerto Rico Rio Piedras - Asserting Parallel Computational Thinking into the Undergraduate 4-year Computer Science Curriculum

Redesigns CS curriculum to make parallel computation pervasive; addresses parallel computation, one of the weakest areas in CS education, and one of the most important going forward.

0939128 Stein, Olin College - Spreading Small Footprints

Extends the Small Footprints model developed and implemented at Olin to four other institutions, Massachusetts Amherst, Harvard, Colby, and RPI; features a reduced computer science core, with active learning and collaboration with other disciplines.

0939055 Narayanan, Auburn; 0939157 Crosby, U Hawaii; 0939017 Hundhausen, Washington State - Broadening Studio-Based Learning in Computing Education

Extends the studio learning model implemented in three regions during a prior CPATH award to a large group of institutions; commitments from 20 institutions including 4 HBCUs and a community college to adopt or adapt the model in 7 or more states.

0939138 Jones, Florida A&M – Computational Thinking Driven Evolution to Studio-Based Active Learning

Implements best practices and studio-based learning in CS1-CS3; includes a partnership with Tallahassee Community College for implementation of the model.

0939089 Boisvert, U Mass Boston - Advancing the Successful IT Student through Enhanced Computational Thinking

Develops a CT framework and populates it with authentic scenarios which are piloted; moves CT into IT education through a national network of allied partners including community college – university partner pairs in Massachusetts, Northern Virginia, Indiana, Oklahoma, and Northern California

0939198 Faulk, U Oregon - Globally Distributed Software Development: An Instructional Community Model

Conducts distributed software development student projects in conjunction with partner universities in different locations within and outside the US; promotes a more formalized approach and better documentation.

0939065 Sticklen, Michigan State - Implementing Constituency-driven Curricular Changes that Integrate Computational Thinking Across Engineering Disciplines

Integrates CT and authentic problem solving into the engineering disciplines; includes a partnership with Lansing Community College and the Corporation for a Skilled Workforce.