DEPARTMENT OF COMPUTER SCIENCE

COLORADO SCHOOL OF MINES
EARTH • ENERGY • ENVIRONMENT

Computer Science Professional Development
Plans for 2019
Start registration process here: https://tinyurl.com/C-START-2019

Overview

The Colorado School of Mines has offered FREE computer science (CS) professional development (PD) for several years, thanks to grant funding from the National Science Foundation. The following plans have been developed in response to the funding now available to districts from the Colorado Department of Education for CS teacher professional development.

Our plans have been organized to try and assist the following types of teachers:
1. Current K-12 teachers who are new to CS (e.g., want to add some CS into a class)
2. Current CS teachers who are looking to fine tune OR add new content
3. Experienced CS professionals currently teaching with little educational pedagogy training

The opportunities below attempt to list the teacher type and level (elementary/middle/high school) that the PD is targeted for, though any interested educator is welcome if room exists.

Cost for each workshop at the Colorado School of Mines is $200/day (for Colorado teachers). This fee includes all PD, materials, lunch, and parking. Teacher assistance during deployment is also available.

For Colorado teachers who do not have access to other funding, **training scholarships, travel scholarships, and teacher stipends** exist.

Participants will receive a certificate for the professional development hours attended. Course credit is also possible, depending on interest. We need 3+ teachers interested in credit for a given workshop to offer credit (as paperwork is cumbersome). The amount of credit (which is an addition fee) depends on the number of hours in the PD training (approximately 0.5 credit per day of training).

Lastly, CS@Mines is willing to try and be flexible based on need; if a district wants several of their teachers to learn X and X is not listed below, contact Tracy Camp and we'll try to set something up.

If you have any questions, please contact Tracy Camp, Department Head and Professor of Computer Science, Colorado School of Mines, tcamp@mines.edu. Here's our website: cstart.mines.edu.

Plans for Summer 2019 (if enough teachers enroll):

June 11-13, 2019
Introduction to Snap! at Mines (for Type #1 elementary/middle/high school Teachers)
Snap! is a visual, drag-and-drop programming language that is suitable for a serious introduction to computer science in K-12. If you would like to introduce students to programming, then come learn the basics of *Snap!* We recommend this workshop for those new to programming (e.g., before learning Java).

June 11-13, 2019
Web Programming at Mines (mainly for Type #1 high school Teachers; though others welcome)
This 3-day workshop will cover a brief introduction to HTML and CSS, and then spend the bulk of the time on programming in JavaScript.

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June 17-21, 2019
Java Programming at Mines (mainly for Type #1 high school Teachers, though others welcome)
This 5-day workshop introduces the Java programming language, a general-purpose programming language (class-based and object-oriented). Java is the programming language on the AP CS A exam.

June 24-27th, 2019
Introduction to Cryptography at Mines (mainly for Type #2/#3 high school Teachers)
This 4-day workshop aims to provide basic cryptography knowledge, concepts, and skills. High-school students will subsequently be able to (1) use cryptographic techniques for security and privacy protection and (2) be motivated to learn more about cryptography. The training includes lectures, hands-on lab exercises, and group discussions on the following example topics: secret-key cryptography, public-key cryptography, digital signature, and blockchain.

July 7-10, 2019
CS Teacher's Association Annual Conference
See https://www.csteachers.org for details.

July 8-10th, 2019
User Authentication Security at Mines (mainly for Type #2/#3 high school Teachers)
This 3-day workshop aims to provide important knowledge, concepts, and skills related to online user authentication security. High-school students will subsequently be able to (1) better protect their online activities and (2) be motivated to learn more about cybersecurity. The training includes lectures, hands-on lab exercises, and group discussions on topics such as phishing attack detection.

July 8-10th, 2019 at Mines (mainly for elementary school Teachers)
CS Unplugged at Mines (mainly for Type #1 elementary Teachers, others welcome)
A 1-day PD program (K-2: July 8th, 3-4: July 9th, and 5-6: July 10th) designed to teach students computational thinking. CS Unplugged activities are a hands-on approach through games, puzzles, magic tricks, and competitions to teach computer science concepts without the use of a computer. The activities are designed to engage students and serve as a vehicle to learn the foundations of computing without the complication of using the computer: http://cstart.mines.edu/FAST/

July 11-12th, 2019
CS Pedagogy at Mines (mainly for computer science high school teachers)
This 2-day workshop will concern CS pedagogy and how to broaden participation in computing. The workshop will discuss several best practices that are known in CS education. This workshop is recommended for high school computer science teachers, though others are welcome.

July 15-17th, 2019
Python at Mines (mainly for Type #1 middle/high school teachers)
This 3-day workshop teaches Python, a high-level general purpose programming language that is easy to learn and suitable for an introductory programming course. This workshop will teach the fundamentals of programming as well as the advanced features on Python. Participants are encouraged to attend at least July 15-16th, with July 17th as an option for those who want to delve deeper. NOTE: best for middle/high school teachers who are new to CS.

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July 15-18th, 2019
Advanced Placement Summer Institute in Denver, Colorado
See http://ceiapsi.org for details.

CSPdWeek

ECS | Exploring Computer Science

C4C counselors for computing

Bootstrap +computing creatively thriving mathematically

Mobile CSP

July 22-26, 2019 CSPdWeek returns to Mines with FOUR OPTIONS:

CSPdWeek Option #1: Bootstrap: (likely) Data Science (5 days) at Mines (for Type #1/#2/#3 middle/high Teachers) What factors make some people live longer than others? Are the schools in one part of your neighborhood better than schools in another part? How would you measure that? This curriculum teaches students to view programs as questions we ask of data, and can be integrated into a social studies, statistics, or computing course. Students form their own questions about the world around them, learn how to analyze data critically and carefully to find answers, and write a complete research paper about their findings.

CSPdWeek Option #2: Exploring Computer Science (ECS) (5 days) at Mines (mainly for Type #1 high Teachers) This course provides a high school introduction to the world of computer science and problem solving. This PD is for high school teachers planning to teach ECS (an Intro to CS course) during the 2019-20 academic year. This PD is a 2-year commitment and is especially valuable for current K-12 teachers who are new to CS (for Type #1 high school Teachers). Participating high school teachers need to commit to teaching ECS in 2019-20, 4 days of PD during the academic year, AND 5 days in summer 2020 (TBD)

CSPdWeek Option #3: Mobile CSP (5 days) at Mines (best for Type #2 high school Teachers, though Type #1 can be included if we augment with extra online training). In this course teachers will learn CS by building socially useful mobile apps. In addition to CS principles, the course is project-based and emphasizes writing, communication, collaboration, and creativity. This course provides a broad and rigorous introduction to CS based on App Inventor, a mobile programming language for Android devices and iOS devices (coming fall 2018). During the AY, teachers will meet online monthly for support while teaching (or preparing to teach) the course. This PD can replace an APSI.

CSPdWeek Option #4: Counselors for Computing (1 day: July 22nd): C4C provides professional school counselors with information and resources they can use to support ALL students as they explore computer science education and careers.

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Version dated: April 4th, 2019

CS Courses at Mines (all are 3 credit hours)

For teachers looking to take *college level courses* to learn computer science, the following types of courses are often offered at Colorado School of Mines during the summer term and/or online. The cost is $999/credit and will include optional face-to-face meetings for enrolled teachers.

CSCI-101 - Introduction to Computer Science (taught on Mines campus)
An introductory course to the building blocks of Computer Science. Topics include conventional computer hardware, data representation, the role of operating systems and networks in modern computing, algorithm design, relational databases, structured queries, and computer simulations. A popular procedural programming language will be learned by students and programming assignments will explore ideas from algorithm development, optimization, and computer simulation.

CSCI-250 - Python-Based Computing: Building a Sensor System (taught on Mines campus)
This course will teach students the skills needed for data collection, analysis, and visualization on a small embedded device (e.g., Raspberry Pi). Students will learn basic Linux, Python, and the programming skills needed to control the hardware and associated sensors. This hands-on course includes a baseline project, four introductory projects (e.g., acoustic, acceleration, magnetic field, optical), and a final Capstone project. The Capstone project will have students create their own application using the techniques learned during the first half of the semester; students will then present their Capstone project through a formal presentation, write-up, and demonstration.

CSCI-261 - Programming Concepts (taught online or on Mines campus)
This course introduces fundamental computer programming concepts using a high-level language and a modern development environment. Programming skills include sequential, selection, and repetition control structures, functions, input and output, primitive data types, basic data structures including arrays and pointers, objects, and classes. Software engineering skills include problem solving, program design, and debugging practices.

CSCI-262 - Data Structures (taught online or on Mines campus)
Defining and using data structures such as linked lists, stacks, queues, binary trees, binary heap, hash tables. Introduction to algorithm analysis, with emphasis on sorting and search routines. Language skills: abstract data types, templates and inheritance.

CSCI-303 - Introduction to Data Science (taught online or on Mines campus)
This course will teach students the core skills needed for gathering, cleaning, organizing, analyzing, interpreting, and visualizing data. Students will learn basic SQL for working with databases, basic Python programming for data manipulation, and the use and application of statistical and machine learning toolkits for data analysis. The course will be primarily focused on applications, with an emphasis on working with real (non-synthetic) datasets.