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: [http://www.cde.state.co.us/coscience/computerscience](http://www.cde.state.co.us/coscience/computerscience). Districts: apply!

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 an additional small fee, college credit is available for each of the workshops listed. The amount of credit depends on the number of hours in the PD training (approximately 0.5 credit per day of training).

For Colorado teachers who do not have access to other funding, training scholarships, travel scholarships, and teacher stipends exist. Application process for this funding will open in January.

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](mailto:tcamp@mines.edu)

Plans for Summer 2019 (dates listed are estimates and will be finalized by Jan 1st)

June 11-13, 2019
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 100% new to programming (e.g., before learning Java) OR for those planning to do a Beauty and Joy of Computing (BJC) training.

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.
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 10-12th, 2019
CS Pedagogy at Mines (mainly for Type #1 and #3 Teachers, though Type #2 welcome)
This 3-day workshop will concern CS pedagogy and how to broaden participation in computing.

July 15-17th, 2019
CS Unplugged at Mines (mainly for Type #1 elementary/middle school Teachers, others welcome)
A 3-day PD program 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://csunplugged.mines.edu

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

July 22-26, 2019
Bootstrap: 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.
July 22-26, 2019 (plus 4 days during the year AND 5 days in summer 2020 TBD)
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).

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/course 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.