Computer Science (CS) is a topic worthy of study by all students, not only because of its powerful role in shaping technologies that are central to contemporary society, but also because it offers new possibilities for creative self-expression. However, very few youth currently learn about CS, and opportunities for study are not equitably distributed. Thus, most researchers in CS education at the K-12 levels focus on two goals:

• To understand the ways (i.e. processes) that students can learn to think computationally and to learn CS, including how to design new tools and curricula to enable this; and

• To understand how to create CS learning environments that broaden participation by women and other under-represented groups.

Students in this course will learn about what computational thinking (CT) is, how CT relates to CS, current inequities in CS, tools and approaches for enabling CS learning, and specific theories and approaches to making CS accessible to all learners.

Students will read papers and books describing theories of what CT and CS are and how they can benefit learners; empirical work, recent and historical, describing what the current state of CS education is (including how inequities manifest); as well as theoretical and design studies on how learning environments can be created to broaden participation. Students will complete projects using a variety of programmable tools for learning, including tools that are intended to teach about specific scientific ideas through computation, and tools that have been purposely constructed to broaden participation in computing through culturally-relevant pedagogies. Students will investigate how students already learn CS or CT in an existing setting, or how to spark learning in a new setting, through a collaborative final project.

Course codes
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More information: ben.shapiro@colorado.edu
No prior programming experience necessary