Idaho State University | Albion Center for Professional Development

Computer Science Programming and AI for K-12 Educators

Course Syllabus

Course Description

This course will take you on an engaging journey through the essential principles of computer science and artificial intelligence (AI) pedagogy. By exploring how these fields intersect with effective teaching strategies, you will gain practical tools to integrate cross-curricular opportunities into your classroom, making learning more dynamic, engaging, and impactful for your students.

Through carefully selected articles, videos, and case studies, you will not only build foundational knowledge but also develop a deeper understanding of how AI and computer science can be conveyed through various pedagogical approaches. We will illustrate how the relationship between technology and education can enrich any educational program, offering innovative ways to spark your students' curiosity.

The course will conclude by addressing the critical question: Why is this important? You will discover how integrating computer science and AI into your curriculum can help students become more technologically literate and culturally aware, preparing them to positively impact the world—fostering a future where innovation and equity are the norms.

Join us and explore how the power of computer science and AI pedagogy can captivate and educate, setting your students up for success in today's rapidly evolving world.

This course enhances classroom teaching effectiveness and supports improved student outcomes by introducing new knowledge in computer science and artificial intelligence (AI) pedagogy, with an emphasis on integrating effective, equitable, and engaging instructional strategies for K–12 learners.

Course Objectives

At the end of this course you should be able to:

1. Apply concept mapping, non-programming activities, practical examples, and context-driven pedagogy to help students make complex computing ideas accessible.
2. Design activities using Cognitive Load Theory, PRIMM (Predict, Run, Investigate, Modify, Make), Universal Design for Learning (UDL), 21st Century Skills, and the ABC approach.
3. Apply principles of culturally responsive computing to increase accessibility in computer science learning for students.

4. Demonstrate a basic understanding of concepts, responsible and ethical use, and communication of expectations for artificial intelligence (AI) use in K-12 classrooms.
5. Develop projects that leverage collaboration such as pair programming, collaborative problem solving and encouraging talk to foster inquiry-based learning and interdisciplinary connections in K–12 computer science settings.
6. Apply pedagogical tools that motivate and support student mastery of coding and programming such as Code Tracing, Read Before you Write, Parson's Problems, and the Block Model.
7. Evaluate student misconceptions on computer programming to diagnose and support student learning needs and progress toward mastery of computer science standards.
8. Develop applications of project-based learning, physical learning, and other varieties of pedagogy to further engage and support students in computer science learning.

Modules

- Module 1: Lead with Concepts: Introducing Students to Computing, Quiz 1
- Module 2: Teaching Strategies for Computer Science Programming, Quiz 2
- Module 3: Culturally Responsive Computing, Quiz 3
- Module 4: Artificial Intelligence (AI) use in K-12 computing classrooms., Quiz 4
- Module 5: Inquiry-based learning and interdisciplinary connections in teaching K-12 collaborative computing, Quiz 5
- Module 6: Pedagogical Tools in Teaching Computer Science, Quiz 6
- Module 7: Diagnosing and Supporting CS Misconceptions, Quiz 7
- Module 8: Student engagement through CS pedagogical applications, Quiz 8

Grading

Each quiz must be passed at an 80% or higher (three attempts allowed).

Format

This is a self-paced, asynchronous (no required live meetings) course. Throughout the PD course, you will find it helpful to take notes along the way to assist with the quizzes. Within each module, you will find reflection assessments that are not graded but will help in your journey through the course. There is an interactive forum in the course to help you connect with peers and instructors, share ideas, and collaborate on best practices throughout your learning journey.