Computer Science Education

GRADUATE COURSE DESCRIPTIONS

NOTE:

All courses are fully online and primarily delivered in an asynchronous format.

EDG 6805C: K-12 Computer Programming Foundations I

Certificate M.A.E. Ed.D.

This is the first of a two-part series of fully online, primarily asynchronous courses focusing on K–12 Computer Programming Foundations. Developed with consideration of Advanced Placement Computer Science A (AP CSA) and state certification exam requirements (e.g., FTCE), this course aims to prepare you to teach at the AP CSA level and to sit for relevant teacher certification exams. Topics include variables, algorithms, methods, selection, repetition, and arrays, with additional coverage of commonly used text-based programming tools. Generative AI–assisted CS learning is integrated throughout the course to enhance your learning experience and cultivate an AI-enabled programmer's mindset—one that you can also pass on to your future students.

EDG 6806C: K-12 Computer Programming Foundations II

Certificate M.A.E. Ed.D.

This is the second of a two-part series of fully online, primarily asynchronous courses focusing on K–12 Computer Programming Foundations. Developed with consideration of Advanced Placement Computer Science A (AP CSA) and state certification exam requirements (e.g., FTCE), this course aims to prepare you to teach at the AP CSA level and to take the required CS teacher certification exams. This second course introduces object-oriented programming concepts, data structures, searching and sorting algorithms, and the historical and social aspects of computer science. Generative AI–assisted CS learning is integrated throughout the course to enhance your learning experience and help you develop an AI-enabled programmer's mindset—one that you can also transfer to your future students.

EME 6141: K-12 Computer Science Pedagogy I

Certificate M.A.E. Ed.D.

This is the first of two-part series fully online, primarily asynchronous courses focusing on K-12 Computer Science Pedagogy. This course will introduce students to a variety of different conceptualizations and implementations of Computer Science education for K-12. Students will discuss and analyze the rationale and purpose of CS teaching behind each case and critique the benefits and challenges from the perspective of K-12 education. This will support students in making informed decisions in their own CS teaching practice and to articulate and justify their decisions. The course will also serve to empower students to participate in future CS curriculum development in their school.

EME 6142: K-12 Computer Science Pedagogy II

Certificate M.A.E. Ed.D.

This is the second of two-part series fully online, primarily asynchronous courses focusing on K-12 Computer Science Pedagogy. This course will focus on the planning, creation and evaluation of curriculum and instructional resources for computer science aligned with national educational standards for diverse student populations. Students will select and implement appropriate instructional strategies and materials for teaching, learning and assessment of current and emerging K-12 computer science topics, including the application of AI technology. Students will continue to discuss and analyze the rationale and purpose of their designs as they develop a comprehensive unit. Students will need to continue to make informed decisions in their own CS teaching practice and to articulate and justify their decisions. The course will also serve to empower students to participate in future CS curriculum development in their school.

EDG 6807: Issues and Trends in K-12 CS Education

M.A.E. Ed.D.

Students in this course will explore current and emerging issues and trends impacting K-12 CS education. They will critically examine these areas in light of historical trends, social implications, and the future of CS education. We will explore relevant educational theories as well as topics such as social justice, accessibility, and the varying roles of teachers and students in current CS educational approaches. Students will be expected to participate in the weekly online discussions and contribute written assignments. The course will conclude with a literature review paper and presentation describing emerging issues within an area of K-12 CS education.

EME 6209: Designing Integrated Media Environments II

M.A.E. Ed.D.

Study of development and problem-solving as applied to real-world educational problems with solutions designed and implemented in various programming and scripting languages. Topics include data types, logic, relational operations, flowcharting, sequence, selection, repetition, functions, arrays, file i/o, object-orientation, relational database design, entity-relationship diagrams, design principles, testing, and debugging. Prior programming experience is neither assumed nor required. This course focuses on the design and development of web-based systems as solutions to real world educational problems. This course will feature an overview of programming concepts related to web development, while exploring how to connect these concepts with instructional design to address a broad range of challenges. What goes into the development of a learning platform? How can we connect technology and learning theory? In what ways can we design learning systems to support educational research?

EDE 6325: Guided Teacher Inquiry

M.A.E.

The purpose of this course is to explore the process of practitioner inquiry, also referred to as action research. Practitioner inquiry, or action research, refers to systematic, intentional study of one’s own educational practice. Throughout this course, students will engage in numerous readings, discussions, and activities to develop a clear understanding of each component of the inquiry process as well as a rationale for why classroom-based research is an important component of teacher leadership. In addition, students will apply their learning about the inquiry process to their own contexts through deep reflection on their current practice as the basis for the development of a plan for their own school-based inquiry. This course is designed to help you create an inquiry plan, collect data, analyze data, and write up the analysis of findings. It is the plan that every student who enrolls in this course will actually carry out many inquiries after this course is over, as it is really through living the entire process that professionals come to understand the power teacher inquiry holds for meaningful professional development, and for improving schools from within.

EDG 6415: Culturally Responsive Classroom Mgt

M.A.E.

Culturally Responsive Classroom Management (EDG 6415) is designed to help teachers create and maintain caring, respectful classroom communities in which learners feel safe, valued, cared about, respected, and empowered. The course includes a strong emphasis on developing knowledge about the culture and backgrounds of children and families in order to establish positive interactions within the classroom community. When teachers create these types of environments learners are academically engaged. The course addresses the challenges and opportunities in creating community in the increasingly diverse classrooms in U.S. public schools. Although original research in classroom management, conducted more than 30 years ago, continues to prove somewhat useful, creating inclusive, task-focused learning environments with a diverse student population requires more. In this course, we examine the role culture plays in teaching and learning. We consider what it means to be culturally responsive in order to establish a classroom in which all students can succeed academically and grow socially.

EME 6059: Blended Learning Environments

M.A.E.

This course explores blended learning from perspectives of theory and practice and is designed for educators and instructional designers in K-12, higher education, and corporate environments as well as other professional settings. The course focuses on the application of theory and research to the design and implementation of blended learning experiences. Skills and knowledge gained from the course will enable students to make decisions to integrate appropriate content and activities for a blended curriculum with the aim of achieving synergy between the environments.

EDG 6973: Capstone for Computer Science Education

M.A.E.

This capstone course serves as the final project for the MAE in Computer Science Education. Instead of a traditional thesis, students design and complete an individual project of their choice in the context of CS Education—selecting from a teacher inquiry study, an instructional design project, or an application development project. Managed through iterative sprints, the capstone emphasizes autonomy, relevance, and practical application, allowing students to demonstrate their ability to apply what they've learned in a meaningful, real-world context.

EDG 6226: Foundations of Research in Curriculum and Instruction

Ed.D.

This course provides doctoral students with an immersive introduction to CS education research, emphasizing a rich interplay of theory, critical analysis, and reflective practice. Students will cultivate a shared professional vocabulary and explore foundational learning theories while examining the evolution of research traditions, contemporary debates, and key empirical studies in the field. Through focused literature reviews and reflective exercises, participants will interpret and evaluate scholarship to identify gaps and emerging trends aligned with their personal interests, ultimately articulating a developing scholar identity. The course also guides students in designing a personalized program development plan for their future scholarly growth in CS education research.

EDG 6648 Research Design in Curriculum and Instruction

Ed.D.

This course introduces students to a variety of topics and issues in computer science education research design, including study planning, data collection strategies, research designs, issues of validity and reliability, basic descriptive and inferential statistics, ethics in research, socially responsible research, and research proposal development. Students complete several activities to master the learning outcomes. The course culminates with an authentic research proposal for a computer science education research problem centered on a student's professional context.

EDG 6229 Qualitative Research in Curriculum and Instruction

Ed.D.

This course provides graduate students with methods for collecting and analyzing data for qualitative research in educational settings. Students will develop and engage with various techniques for coding, analyzing, and representing qualitative data such as interview, observation, and video data. By the end of the course students will be able to: Critically reflect on research in education and the qualitative methodologies that researchers deploy in these settings; Demonstrate both conceptual and technological tools for coding and analyzing qualitative data; Collect qualitative data including interview, observation, and video data that is aligned to stated research questions; Develop coding schemes for analysis of qualitative data; Articulate IRB guidelines for qualitative research that involves research participants; Critically assess the strengths and limitations of qualitative studies in educational settings; and Effectively write, communicate, and present qualitative data.

EME 6480: Quantitative Research Methods in Educational Technology Research

Ed.D.

This is an applied quantitative methods course focused on examining computer science education research examples and problems. This course will provide you with the knowledge and skills needed to apply appropriate statistical methods to datasets, interpret results from statistical analyses of the datasets, and write the results in a manner appropriate for scholarly publication. Topics include a review of basic descriptive statistics, the logic of hypothesis testing, assumptions of statistical tests, various forms of t-tests, Analysis of Variance (ANOVA), Analysis of Covariance (ANCOVA), factorial and repeated measures ANOVA, correlation, simple and multiple regression, Exploratory Factor Analysis (EFA), and reliability analysis. All statistical techniques are explored with real-world datasets addressing research problems in computer science education.

EDG 6047: Teacher Leadership for Educational Change

Ed.D.

In this class we will explore the role of teachers as leaders for school change. We begin by studying recent thinking on educational change – why some school reforms “stick” and others do not. Then we will look at the historical evolution of the concept of “teacher leadership” as well as the current context in which teachers and principals play major roles in bringing about meaningful and lasting change. Students will examine their own role(s) in school change efforts or the role(s) of leaders with whom they work in order to gain a deeper understanding of how leadership and change theory translate into practice. Finally, students will synthesize learning from across course readings to produce an espoused platform of teacher leadership and a reflective action paper in order to chart a course for future actions related to reform efforts.

EDG 7359: Professional Development and Teacher Learning

Ed.D.

It has long been argued that teachers cannot create the conditions for student success unless similar conditions are put into place for teacher learning and teacher success (Sarason, 1972). Current educational reform hinges on improving teacher practice, which requires intense commitment to enhancing and transferring teacher knowledge and skills into classroom and other educational contexts. In this course we will critically examine theoretical and conceptual foundations of adult learning and professional development, essential elements of high-quality professional development, impact measures of professional development, and the variety of ways in which professional development is being enacted in district, state, and national contexts.

EME 6651: Learning Analytics Concepts and Techniques

Ed.D.

This course is designed to equip students with the ability to leverage educational data collected from technology-enhanced learning environments. In addition to the basic concept and process of learning analytics, students will explore cutting-edge data mining techniques. Students will also have opportunities to process and analyze educational data to discover useful insights and knowledge to inform educational practice. The ultimate goal of this course is to prepare students to be a successful educational researcher and practitioner who is able to use learning analytics in their specific subject area.