George Mason University
College of Education and Human Development
Secondary Education Program

EDCI 597.A04 – Special Topics in Education: Project-Based Learning in Computer Science
3 Credits, Summer 2021
Online Class

Faculty

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Prerequisites/Corequisites

There are no prerequisites.

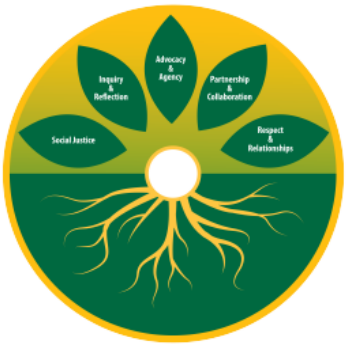
University Catalog Course Description

Provides advanced study on selected topic or emerging issue in American or international education. Notes: May be repeated for credit with GSE permission.

Course Overview

Project – Based Learning (PBL) engages learners in exploring authentic, meaningful and relevant questions of real concern to students. Through a dynamic process of inquiry and collaboration and using the same practices that computer scientists and engineers use, students work in teams to identify computing problems, develop multiple solutions, and optimize their artifacts through using iterative design methods. Students learn fundamental computing and STEM concepts and practices that they apply to their daily lives. PBL promotes equitable and diverse participation and engages students in learning. This course is designed to familiarize secondary STEM and computer science teachers with the Project-Based Learning. Course participants will examine a variety of computing concepts and tools (e.g. Artificial Intelligence, Physical Computing), and a variety of other resources to support the teaching of pre-college stand-alone CS courses and/or CS integrated STEM instruction. Throughout the course, teacher candidates will be introduced to freely available resources and/or other online interfaces to explore and model issues around computing. Prior CS experience is not required.

Learner Outcomes or Objectives



At the conclusion of this course, participants will:

1. Demonstrate an ability to develop a Project-Based Learning (PBL) computer science mini unit plan
2. Engage in CS learning within hands-on activities and identify how these activities might be implemented in secondary CS classrooms.
3. Build confidence in performing design thinking process in CS and STEM classrooms.
4. Identify current issues related to CS education and pose possible solutions to those issues.
5. Create computational artifacts that apply various content standards.
6. Reflect on learning experiences through discussion posts.
7. Differentiate and defend different levels of CS concepts.
8. Discuss, critique, and reflect on the applications of PBL as it relates to CS and STEM teaching and learning.
9. Prepare, implement, and reflect on instructional unit planning addressing both teacher directed and inquiry-based inclusive of evidence promoting equitable and diverse participation.
10. Describe, evaluate, and use various instructional technologies relevant to the CS and STEM classrooms.

Course Delivery Method

The delivery format of the course will be online. Course sessions will be delivered online using an asynchronous format, with optional office hours for one-on-one discussion to determine the next steps, and optional lab time for designing unit plans, developing CS inventions, and completing the class activities. Course will be delivered via the Blackboard Learning Management system (LMS) housed in the MyMason portal. You will log in to the Blackboard (Bb) course site using username and password.

Special activities, such as creating a network of collegial support, may be arranged to provide additional exposure to community building. The course site will be available no later than one week before first day of semester.

Under no circumstances, may candidates/students participate in online class sessions (either by phone or Internet) while operating motor vehicles. Further, as expected in a face-to-face class meeting, such online participation requires undivided attention to course content and communication.

Technical Requirements

To participate in this course, students will need to satisfy the following technical requirements:

• High-speed Internet access with standard up-to-date browsers. To get a list of Blackboard's supported browsers see: https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support#supportedbrowsers

To get a list of supported operation systems on different devices see: https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support#tested-devicesand-operating-systems

• Students must maintain consistent and reliable access to their GMU email and Blackboard, as these are the official methods of communication for this course.
• Students will need a headset microphone for use with the Zoom web conferencing tool.
• Students may be asked to create logins and passwords on supplemental websites and/or to download trial software to their computer or tablet as part of course requirements.
• The following software plug-ins for PCs and Macs, respectively, are available for free download:
  o Adobe Acrobat Reader: https://get.adobe.com/reader/
  o Windows Media Player: https://support.microsoft.com/en-us/help/14209/get-windows-media-player
  o Apple Quick Time Player: www.apple.com/quicktime/download/

Expectations

• Course Week: This course offers optional lab hours on Wednesdays between 05:30 to 6:30 pm. Because asynchronous courses do not have a "fixed" meeting day, our week will start on Monday morning and finish on Sunday night.
• Log-in Frequency: Students must actively check the course Blackboard site and their GMU email for communications from the instructor, class discussions, and/or access to course materials daily.
• Participation: Students are expected to actively engage in all course activities throughout the semester, which includes viewing all course materials, completing course activities and assignments, and participating in course discussions and group interactions.
• Technical Competence: Students are expected to demonstrate competence in the use of all course technology. Students who are struggling with technical components of the course are expected to seek assistance from the instructor and/or College or University technical services.
• Technical Issues: Students should anticipate some technical difficulties during the semester and should, therefore, budget their time accordingly.
• Workload: Please be aware that this course is **not** self-paced. Students are expected to meet *specific deadlines* and *due dates* listed in the **Class Schedule** section of this syllabus. It is the

student's responsibility to keep track of the weekly course schedule of topics, readings, activities and assignments due.
• Instructor Support: Instructor will offer lab hours. Additionally, students may schedule a one-on-one meeting to discuss course requirements, content or other course related issues. Students should email the instructor to schedule a one-on-one Zoom session, including their preferred meeting method and suggested dates/times.
• Netiquette: The course environment is a collaborative space. Experience shows that even an innocent remark typed in the online environment can be misconstrued. Students must always re-read their responses carefully before posting them, so as others do not consider them as personal offenses. *Be positive in your approach with others and diplomatic in selecting your words*. Remember that you are not competing with classmates, but sharing information and learning from others. All faculty are similarly expected to be respectful in all communications.
• Accommodations: Online learners who require effective accommodations to insure accessibility must be registered with George Mason University Disability Services.

Professional Standards
This course is aligned to the professional standards as outlined by the Computer Science Teachers Association (CSTA) and the International Society for Technology in Education (ISTE). Upon completion of this course, students will have met certain elements of the CSTA/ISTE professional standards 1, 3, 4, and 5.

CSTA/ISTE Standard 1. CS Knowledge & Skills

CSTA/ISTE Standard 3. Professional Growth and Identity

CSTA/ISTE Standard 4. Instructional Design for CS

CSTA/ISTE Standard 5. CS Classroom Practice

Required Texts

Access to the following materials is required:

Boss, S., & Larmer, J. (2018). *Project based teaching: How to create rigorous and engaging learning experiences*. ASCD.

You will also complete additional readings as assigned. All additional readings will be uploaded to Blackboard.

Course Performance Evaluation
Candidates are expected to submit all assignments on time in the manner outlined by the instructor (e.g., Blackboard, Tk20, hard copy).
Course Requirements:

- Complete 40 contact hours
- Develop a PBL mini unit plan
- Design a CS invention
- Complete assignments and respond to all discussion questions

Assignments and/or Examinations

Your final grade in this course will reflect the quality of your work across the semester. It is my goal to help you learn as much as possible from this course. All the assignments are/will be listed online. Directions and rubrics for all the assignments are/will be listed online too.
Please read the directions and rubric for each assignment carefully. All assignments must be submitted online unless otherwise indicated (Assignments Folder in Blackboard). You must save all your work electronically and also in hardcopy format for your records before submitting it. I'm always happy to answer questions on an assignment, please don't hesitate to ask. All written assignments are individual assignments unless otherwise indicated. Please submit all assignments in **Word format**. Written assignments should be proofread and edited carefully before submission. Whenever applicable, assignments should be submitted in **APA** form according to the **7th** edition of the **APA Style Manual**.

The following assignments will help us to gauge your development throughout the course:

Assessment	**Percentage of Grade (Graduate)**
Participation and Preparation • including weekly PBL discussion posts • Weekly Computer Science Activities (including weekly hands-on activities submitted through discussion posts)	50%
Mini Unit Plan Assignment and Presentation	25%
CS Invention Convention Assignment	25%

PLEASE USE THE ASSIGNMENT INSTRUCTIONS THAT ARE POSTED ON BLACKBOARD – THE INSTRUCTIONS GIVEN ON THE SYLLABUS ARE FOR DESCRIPTIVE PURPOSES ONLY

Mini PBL Unit Plan Assignment (25%)

Throughout the course, you will explore many issues related to the teaching and learning of CS through PBL. In this culminating assignment, you will have the opportunity to use the knowledge, skills, and understandings you have gained in the creation of a PBL mini unit plan. Each participant prepares a PBL mini unit to be taught in the secondary CS or a STEM class of their choice. It is required that the unit be prepared to meet curricular objectives and CS and/or state and national standards, student understanding of CS content, and PBL. Students will develop their PBL mini units using the guidelines and rubrics attached. Mini units should also stress inclusivity and appeal to a diverse group of students. Additional information regarding requirements for this assignment will be provided.

CS Invention Convention Assignment (25%)

Participants will undergo the inventive process and design an original invention that implements computing to solve a personal problem or pet peeve. CS inventors will also design an advertising

campaign to sell their invention to their peers. Additional information regarding requirements for this activity will be provided.

Participation and Preparation (50%)
EDCI 597 operates under the assumption that knowledge is socially constructed and the most meaningful learning opportunities include those where learners have the opportunity to offer and explore diverse perspectives with peers. To do this, it is expected that you will regularly contribute to and engage in discussion forums, as well as to genuinely 'listen' to peers as they do the same. While agreement is not mandatory, consideration and respect for others are. Thus, you must be "present" throughout all discussions and activities. It is expected that you actively build upon your prior knowledge to connect, question, and extend the discussion with all new posts by citing readings, material in the weekly modules content, and augment these with your personal and educational experiences. In addition to quality participation in discussion forums, each week will include tasks to be completed.

Online Classroom Environment
As a student at George Mason University, the free discourse of ideas should be expected. I believe the open exchange of ideas is necessary to learning. I have opinions, and I will express those opinions, but you are free to express either agreement or disagreement without fear of consequences. Please be sure to treat all members of the class with courtesy and respect at all times. The goal is to create a psychologically safe space in which all class members feel comfortable and confident as they participate in the on-line discussion and activities. Additionally, I am requesting that students exercise professional judgment when discussing problems of local school systems while attempting to highlight a point they are presenting. It is inappropriate to mention the names of administrators, teachers, students, or parents in class discussions. The professional integrity of all our colleagues in education and the privacy of children and their families should be respected.

**Please note: As this is an online course, the majority of our class discussion will be in the form of the electronic discussion board. Each module will begin on a Monday and run through the following Sunday. To this end, initial postings for each discussion forum should be completed by 11:59 pm on Friday (EST) so that class members will have until Sunday evening to interact with the posted material and engage in "conversation."

We will use Blackboard to communicate regularly in this class. You will be asked to post assignments and responses, read classmates' postings, and actively participate in discussions. Blackboard serves as an important vehicle for discussing ongoing work on your major project with group members. Please refer to the Participation Rubric in the Blackboard for evaluation criteria.

General Requirements
A. Please note that this online course is **NOT self-paced**; it consists of weekly lessons that progress sequentially through the semester. You will be expected to complete online learning modules each week. It is critical that each student complete all readings and activities on a weekly basis so that learning is adequately scaffolded and that students develop rapport with the content and their colleagues. Class 'attendance' is both important and required. If, due to an

emergency, you will not be participating in course activities on time, please contact your instructor prior to due dates or time. Please note that learners with more than two 'absences' risk a letter grade drop or can lose course credit.
B. All assignments are due no later than 11:59 PM EST of the date indicated in each week's assignments published in the COURSE SCHEDULE section of this Syllabus. Due dates are also posted on our Bb course site.

Assignments earning less than a passing grade may be rewritten and resubmitted so that the assignment is satisfactorily completed. In fact, because mastery learning is our program's goal, we may ask (or require) you to redo an assignment that is far below expectations. Our goal for all learners is mastery, so we thank you, in advance, for making genuine learning your goal.

C. Please adhere to the assignment submission instructions listed in the Blackboard. Only assignments submitted as indicated will be graded; incorrect submissions may result in a grade of zero for those assignments.

a. All assignments should be submitted in Word and should have the filename format as follows: Last name-Assignment Title. Please do not upload written assignments in PDF format. Other editable formats are acceptable (i.e., .doc, .docx, .rtf, .ppt, .pptx, .xlsx, .xlsx). If there are supporting documents for assignments, they may be submitted in PDF format.

D. Please Note: All written work should be carefully edited for standard grammar and punctuation, as well as clarity of thought. All submitted work should be prepared through word processing and reflect APA style (7th edition), as well as be double- spaced, with 1" margins, and 12-point font (Times New Roman).

APA Style: Additional Resources
All papers should follow APA style for format and references. Degree seeking graduate students should purchase the style guide and learn how to use APA style.
General information: http://www.apastyle.org/
Tutorial for new users: http://www.apastyle.org/learn/tutorials/basics-tutorial.aspx
Answers to frequently asked questions: http://www.apastyle.org/learn/faqs/index.aspx
Other resources I have found useful:
• http://owl.english.purdue.edu/owl/resource/560/01/
• http://www.uwsp.edu/psych/apa4b.htm
• https://writing.wisc.edu/Handbook/DocAPA/DocAPA.html

Instructor Role
Your professor will read online discussion forums regularly; however, their active role as faculty is to support the discussion development and not so much to "enter into each one" so that the dialogue is authentic among participants engaging in this community of practice. Please note that during this time, your professor will be noting the quality and extent of your participation.

I will adhere to a 24-hour turnaround time for emails during the week and 48-hours on weekends and holidays.

Student Expectations

- Students are also requested to adhere, to the extent possible, to a 24-hour turn-around time for emails.
- Students are expected to visit our Blackboard site at least three times during the week: thus, once at the beginning of each week, once in the middle of the week, and then again at the end to read any new posts and replies. Please note that you can subscribe to forums/threads to be notified when new posts are added; access the posted directions in Blackboard for doing this.
- Students are expected to read all posted/emailed Course Announcements. These contain important information from your instructor. In addition to being sent by email, these will be available in the Course Announcements link in Blackboard.
- It is also expected that you will monitor your participation so that you remain timely and responsive and are able to complete all tasks on-time, without reminder. Successful students in an online learning environment are proactive, self-regulated, and manage their time well. You should expect to spend 8-10 hours a week on this 3-credit course, including reading, engagement in other content, reflection, and posting. This commitment is commensurate with the commitment expected for F2F classes, which also includes preparation, class time, and assignments.

• Questions are welcome, and your professor is available to respond to individual class members as needs might arise.

Grading

High quality work and participation is expected on all assignments and in class. Attendance at all classes for the entire class is a course expectation. For each unexcused absence, the course grade will be reduced by 5% points. All assignments are graded and are due at the beginning of class on the day they are due.

A = 95-100%;
A- = 90-94%;
B+ = 87-89%;
B = 83-86%;
B- = 80-82%;
C = 70-79%;
F = Below 70%

If circumstances warrant, a written contract (there is a form that CEHD provides) for an incomplete must be provided to the instructor for approval prior to the course final examination date. Requests are accepted at the instructor's discretion, provided your reasons are justified and that 80% of your work has already been completed. Your written request should be regarded as a contract between you and the instructor and must specify the date for completion of work. This date must be at least two weeks prior to the university deadline for changing incompletes to letter grades.

Assignments will be graded using a Mastery approach. All work must be completed to a satisfactory level. An incomplete ("I") will be given if any requirements are not finished or deemed less than satisfactory. Students will be permitted to resubmit assignments or to extend

the course timeframe with instructor approval.

Professional Dispositions
See https://cehd.gmu.edu/students/polices-procedures/

Core Values Commitment
The College of Education and Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles: http://cehd.gmu.edu/values/.

GMU Policies and Resources for Students
Policies

1. Students must adhere to the guidelines of the Mason Honor Code (see https://catalog.gmu.edu/policies/honor-code-system/).
2. Students must follow the university policy for Responsible Use of Computing (see http://universitypolicy.gmu.edu/policies/responsible-use-of-computing/).
3. Students are responsible for the content of university communications sent to their Mason email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students **solely** through their Mason email account.
4. Students with disabilities who seek accommodations in a course must be registered with George Mason University Disability Services. Approved accommodations will begin at the time the written letter from Disability Services is received by the instructor (see http://ods.gmu.edu/).
5. Students must silence all sound emitting devices during class unless otherwise authorized by the instructor.

Campus Resources

6. Support for submission of assignments to Tk20 should be directed to tk20help@gmu.eduor https://cehd.gmu.edu/aero/tk20. Questions or concerns regarding use of Blackboard should be directed to http://coursessupport.gmu.edu/.
7. For information on student support resources on campus, see https://ctfe.gmu.edu/teaching/student-support-resources-on-campus

Notice of mandatory reporting of sexual assault, interpersonal violence, and stalking:
As a faculty member, I am designated as a "Responsible Employee," and must report all disclosures of sexual assault, interpersonal violence, and stalking to Mason's Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason's confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-380-1434 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance from Mason's Title IX Coordinator by calling 703-993-8730, or emailing titleix@gmu.edu.

For additional information on the College of Education and Human Development, please visit our website http://cehd.gmu.edu/students.

Class Schedule
Note: Faculty reserves the right to alter the schedule as necessary, with adequate notification to students. The dates of assignments are subject to change dependent on the progress of the course. I will not move due dates for major assignments to an earlier date, only a later date if necessary. Additional smaller assignments and readings may be made each week. Additionally, at times I may ask students to read different readings and share their understandings with the class. All readings noted with "see Bb site" will be available on Blackboard at least a week before they are to be read for class.

Date	Topic	Readings	Assignment Due
Week 1 Asynchronous – Optional Lab Time	**Course Introduction** Course Orientation **Overview of Project-Based Learning** Build the Culture Physical Computing	**Getting Started** Lesson 0 is dedicated to 'pre-course' activities to get to know the course and one another. Lesson 1 provides an overview of PBL. Lesson 2 introduces physical computing. Additionally, there will be hands-on robotics activities. Syllabus plus additional materials in BB Boss & Larmer: Read Introduction Read Chapter 1: Build the Culture	**Due Date: 05/24** **Discussion Assignment 1:** Introductions **Discussion Assignment 2:** Introduction to PBL **Discussion Assignment 3:** Physical Computing
Week 2 Asynchronous – Optional Lab Time	**Project-Based Learning:** Design and Plan Align to Standards **Design Thinking and Makerspaces** 3D Modeling	See BlackBoard Announcements Boss & Larmer: Read Chapter 2: Design and Plan Read Chapter 3: Align to Standards	**Due Date: 05/30** **Discussion Assignment 1: PBL (**Design and Plan - Align to Standards) **Discussion Assignment 2:** Design Thinking and 3D Modeling

Week 3 Asynchronous – Optional Lab Time	**Project-Based Learning:** Manage Activities Assess Student Learning **Artificial Intelligence – Part 1**	See BlackBoard Announcements Boss & Larmer: Read Chapter 4: Manage Activities Read Chapter 5: Assess Student Learning	**Due Date: 06/06** **Discussion Assignment 1: PBL (**Manage Activities - Assess Student Learning) **Discussion Assignment 2:** Artificial Intelligence - Part 1
Week 4 Asynchronous – Optional Lab Time	**Project-Based Learning:** Scaffold Student Learning Engage and Coach **Artificial Intelligence – Part 2**	See BlackBoard Announcements Boss & Larmer: Read Chapter 6: Scaffold Student Learning Read Chapter 7: Engage and Coach	**Due Date: 06/13** **Discussion Assignment 1: PBL** (Scaffold Student Learning - Engage and Coach) **Discussion Assignment 2:** Artificial Intelligence - Part 2 **Submit CS Invention Assignments**
Week 5 Asynchronous – Optional Lab Time	**Project-Based Learning: Reflections** **Cybersecurity** **Presentations:** Mini Unit Plan Presentations	See BlackBoard Announcements Boss & Larmer: Read Chapter 8: Closing Reflections CONGRATULATIONS on your completion of all Special Topics course requirements!! Have a wonderful remainder of your summer, and hopefully we'll see you in the Fall.	**Due Date: 06/17** **No Discussion Posts Focus on Mini Unit Plan** **Assignments** **Submit Mini Unit Plan Assignments and Video Recordings** **Peer-Review Assignments**