W210 Survey of Computer-Based Education

2019 Fall

Indiana University Bloomington

Location: EDUC-2015

Instructor: Minji Jeon | jeonmin@iu.edu

Time: Tu, Th, 5:00 pm – 6:15 pm

Office Hour: Wed, 12:00 pm – 1:00 pm @TTL

1. Course Description

We live in a digital age and our future is full of digital advantages and unfathomable advances. The challenge we tackle within this course is how to teach specifically Computer Science (CS). At the conclusion of this course you will:

- Survey a diverse group of technology that fosters computer-based education.
- Secondly, we will evaluate the current material.
- Lastly, we will question and design the educational contexts of learning CS.

This class is intentionally designed to delve into the topics of Algorithms, Computational Thinking, HTML & CSS, Scratch, and Robotics. While we are being introduced to these technologies and actively engaging and designing with them we will develop as teachers by creating websites, applications, and other instructional materials.

2. Course Materials

There is no required books for this course. Bringing your own laptop is recommended.

3. Projects

A. Programming: Developing Scratch learning applications (30)

As an individual project, students will develop a learning application using Scratch. The program should be relevant to the learning objectives and attuned to the level of target students. The developed program will be evaluated in terms of the following criteria:

i. Usefulness (5): the program helps to achieve the learning objectives.
ii. Degree of completion (5): the program lacks errors and demonstrates logical procedures of computing.
iii. Requirements (15): the program contains CS principles (variables, loops, conditionals, operators, functions, message-passing, initialization, termination). *The rubric for evaluating the application is suggested below.
iv. Rationale (5): Students should demonstrate the purpose and target of the application, what CS constructs are used in the development process, and how the app operates.

* Below rubric is obtained from Basu, S. (2019). *Using Rubrics Integrating Design and Coding to Assess Middle School Students' Open-ended Block-based Programming Projects*. In Proceedings of the 50th ACM Technical Symposium on Computer Science Education (pp. 1211-1217). ACM.

CODING & CS CONSTRUCTS				
	Lack of use **0 point**	**Simplistic use** **1 point**	**Proficient use** **2 points**	**Exceeding grade level proficiency** **3 points**
Use of Variables	No use of user-created variables	Variables were created and used, but not named meaningfully or not initialized explicitly	1-2 variables were created with meaningful names, initialized correctly, and used appropriately	More than 2 variables were created with meaningful names, initialized correctly, and used appropriately
Use of Loops	No use of loops	Use of forever loops or simple loops that repeat a constant number of times	Use of 1-2 complex loops. Complex loops include repeat-until loops and loops involving variables to indicate the number of repetitions.	More than 2 uses of complex loops. Complex loops include repeat-until loops, and loops involving variables to indicate the number of repetitions.
Use of Conditionals	No use of conditionals	Use of simple IF-THEN or IF-THEN-ELSE not involving any variables in the condition	Use of 1-2 nested conditionals, or use of 1-2 conditionals involving variables and expressions in the condition	More than 2 nested conditionals, or more than 2 conditionals involving variables and expressions in the condition
Use of Operators & Expressions	No use of operators	Use of only arithmetic and/or relational operators (No Boolean operators), and no evidence of nested operators in an expression	Use of 1-3 operators, with at least one Boolean operator, or one instance of nested operators in an expression	More than 3 operators, with at least one Boolean operator or one instance of nested operators in an expression
Message – Passing	No use of "Broadcast" or use of "Broadcast" with no "When I receive"	Use of "Broadcast" with 1 "When I receive" per "Broadcast"	1-2 instances with multiple "When I receive" per "Broadcast" message	More than 2 instances with multiple "When I receive" per "Broadcast" message
Use of Procedures	No procedures defined or used	Procedures defined and called once	1 procedure defined and used more than once	More than 1 procedure defined and used more than once
Program Initialization	Incorrect initialization or did not attempt to initialize when required	Partially correct initialization or initialization not applicable	Initialization required and correctly done	
Program termination	Program does not terminate	Program terminates		

B. Web Development: Internet, HTML, and CSS (20)

Students will create a website about the CEL program or different learning technologies for K-12. The website will be assessed at the end of the course and the evaluation criteria are:

i. Requirements (10) : contain HTML elements and CSS styles that are covered in class.
* The detailed rubric will be noticed in the coming weeks.

ii. Systematic organization (4) ,
iii. Aesthetics (2), and
iv. An introductory statement that defines the purpose, theme, learning contexts, and target readers of the Website (4).

You can use the one you already created for W200 or you can create a new one. Students are encouraged to use various types of media formats from writings to audios, videos, graphics, texts, etc.

C. Weekly Posts (30)

Each weekly post will be created based on practice and products in the class. Therefore, absence may result in deductions of grade values. It is the learners' responsibility to catch up on missed information and missed assignments.
10 posts * 3 pts = 30 pts

D. Volunteering in CS classrooms (10)

Students in W210 will have the opportunity to not only use cutting edge equipment but they will also be able to see how an exemplary school is using resources well. We will be visiting schools to see how they do CS education. Students must participate in helping for 5-10 hours in a local 6th-grade class.

E. Participation (10)

Class participation is important. Unexcused absences may result in deducted points. About excused and unexcused absences, students are encouraged to read the Grading Policy Section.

3. Course Topics & Schedules

A. Programming: 9 weeks

1. Introduction to programming
    a. Block-based Programming (BBP): Scratch Jr. & Scratch
    b. Indiana CS standards: K-6
    c. Hands-on unplugged activities: *my first coding book, primo cubetto playset*
2. Make sprites dance.
    a. Sequence: identifying a series of steps for a task
    b. Loops: running the same sequence multiple times
    c. Parallelism: making things at the same time
3. Create a maze game.
    a. Events: one thing causing another thing to happen
    b. Conditionals: making decisions based on conditions
    c. Operators: support for mathematical and logical expressions
4. Catch and score.
    a. Variables/Parameters: a characteristic that can change and thus is expressed using more than one value, or in various categories.
    b. Data: storing, retrieving, and updating values
5. Create a quiz game.
    a. Functions
6. Create a jumping game.
    a. Include all the CT concepts.
7. Apply BBP in instructions: developing lesson plans, materials, educational applications
8. Evaluate Scratch projects based on the rubric
9. Robotics: Sensors (input, output) –*Little Bits, and work up to Sphero or Cue*

B. Web Development: 6 weeks

10. How does the internet work
    a. FTP, HTTP – *Cyberduck, Code.org CSP*
    b. Mercury & Page
11. HTML (Indiana standards; Khan Academy Resource)
    a. Make a web document and upload it.
        i. web browsers and web editors
        ii. structure of HTML documents
        iii. page and file structure
    b. Make a list.
        i. Text tags
    c. Make a table.
    d. Add images.
    e. Use links.
12. CSS
    a. Fundamentals of CSS: Style sheets (e.g., Microsoft Word)

b. Style texts: fonts, text styles, paragraphs, lists, links
c. Colors and backgrounds
d. Layout: margin, border, padding, height/width

Details regarding weekly schedules and assignments can be found or here in the spreadsheet.

Course Schedule

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✓	Date	Topic	Assignment
		Week 1	
	8/27	**Introduction to course** course topics making personal wikis at Canvas	post 1: introduce myself (needs, expectations, strengths, weakness)
	8/29	**Introduction to programming** Block-based Programming (BBP): Scratch Jr. & Scratch Indiana CS standards: K-6 Hands-on unplugged activities: my first coding book, primo cubetto playset	
		Week 2	
	9/3	**Make sprites dance.** Sequence: identifying a series of steps for a task Loops: running the same sequence multiple times Parallelism: making things at the same time	post 2-1: submit sb files or links of your projects on Canvas wikis.
	9/5	Share, evaluate, and revise	post 2-2: based on feedback from the instructor and peers, improve your projects and resubmit it.
		Week 3	
	9/10	**Create a maze game.** Events: one thing causing another thing to happen Conditionals: making decisions based on conditions Operators: support for mathematical and logical expressions	post 3-1
	9/12	Share, evaluate, and revise	post 3-2

	Week 4	
9/17	**Catch and score.** Variables/Parameters Data: storing, retrieving, and updating values	post 4-1
9/19	Share, evaluate, and revise	post 4-2
	Week 5	
9/24	**Create a quiz game.** Functions	post 5-1
9/26	Share, evaluate, and revise	post 5-2
	Week 6	
10/1	**Create a jumping game.** Include all the CT concepts (sequence, loops, parallelism, events, conditionals, operators, variables, data, and function).	post 6-1
10/3	Share, evaluate, and revise	post 6-2
	Week 7	
10/8	**Apply BBP in instructions:** developing lesson plans, materials, educational applications	
10/10	Studio day: decomposition, design, development, debugging	post 7: decomposition worksheet
	Week 8	
10/15	Studio day: decomposition, design, development, debugging	
10/17	Studio day: decomposition, design, development, debugging	Project A: submit a Scratch program
	Week 9	
10/22	**Evaluate Scratch projects based on the rubric 1/2**	
10/24	**Evaluate Scratch projects based on the rubric 2/2**	Project A: submit an improved program and write a reflection about the developing process.
	Week 10	

10/29	How does the internet work	
10/31	web browsers and web editors	
	Week 11	
11/5	Make a web document and upload it 1	
11/7	Make a web document and upload it 2	post 8
	Week 12	
11/12	Make a list.	
11/14	Make a table.	
	Week 13	
11/19	Add images.	
11/21	Use links.	post 9
	Week 14	
11/26	Fundamentals of CSS	
11/28	Style texts	
	Week 15	
12/3	Colors and backgrounds 1	
12/5	Colors and backgrounds 2	post 10
	Week 16	
12/10	Layout 1	
12/12	Layout 2	
	Week 17	
12/17	Final project	Project B: web development

4. Grading Policies

Grade Distribution
Letter Grade: Percentage(%)

A : 95-100	C+: 77-79
A -: 90-94	C : 74-76
B+: 87-89	C -: 70-73
B : 84-86	D+: 67-69
B -: 80-83	D : 64-66
	F : 0-63

Late Policy: Assignments are expected to be turned in on the dates that they are due. Failure to hand in an assignment on the due date without a valid excuse will result in a zero for that assignment.

Attendance Policy: As a developing teacher, your attendance is important to your own development and the K-12 students depending on you. Participation is extremely important in this course and when you are not in a class, you are unable to contribute your unique views to our classroom and your colleagues miss out on learning from you. In addition, punctuality is an important part of being a professional teacher and you are also expected to be punctual to class. It is very important that you attend and are punctual to ALL class sessions. This will have an impact on your participation grade.
5 or more absences (excused OR unexcused) will lead to at most a grade of "C-".

Unexcused Absences: Unexcused absences will result in a zero for the assignment(s) due that day, and you cannot complete any missed assignments for credit. You are responsible for the material that was presented on that day., and you can complete any missed work for your Teacher Website and/or E-Portfolio Website (even if you cannot earn credit, because most assignments also are part of the grades for these two websites).

Excused Absences: Excused absences must be arranged BEFORE a planned absence. If you have special circumstances surrounding your absence, discuss these with the instructor as soon as possible, preferably before the absence. Any absences should be discussed with the instructor AHEAD OF TIME, and you are expected to provide a note regarding the absence. For example if a relative passes away, we require an obituary notice or such. For all sicknesses, you MUST bring in an official doctor's note for that SPECIFIC date.

Religious Holidays: Any religious holidays should be communicated to both the lecture and lab instructor at the beginning of the semester. Certain religions may have holidays on days when class is scheduled. If this applies to you, please provide a statement from a person of authority at your place of worship (on official letterhead) the dates of the holidays, and the address and phone number of the place of worship. This statement must be given to the instructor no later than the end of the second week of instruction. [Request form for accommodating religious observances.]

Athlete or Band Member: If you are an Indiana University athlete or are a part of the band, please have your director write a statement listing the dates of events that will result in your having to miss class, and

their phone number on official letterhead. This statement should be given to the instructor by the end of the second week of instruction.

Incomplete: In addition, an "I" incomplete grade will be given only under the conditions spelled out in the Academic Guide: "The grade of Incomplete may be given 1) only when the completed work for the course is of passing quality, and 2) only upon showing of such hardship to a student as would render it unjust to hold the student to the normal time limits. A student's desire to avoid a low grade is not a legitimate reason to award an incomplete."

Withdraw: The option to "W" Withdraw from the course in the beginning or middle of the semester should be considered if you cannot manage the number of courses taken in a given semester. Withdrawing from a course could ensure avoiding an F in your official transcript. "W" grades will not be granted after the official school deadline has passed.

Disabilities: Every attempt will be made to accommodate qualified students with disabilities (e.g. mental health, learning, chronic health, physical, hearing, vision, neurological, etc.) You must have established your eligibility for support services through the appropriate office that services students with disabilities. Note that services are confidential, may take time to put into place and are not retroactive; Captions and alternate media for print materials may take three or more weeks to get produced. Please contact Disability Services for Students at http://disabilityservices.indiana.edu or 812-855-7578 as soon as possible if accommodations are needed. The office is located on the third floor, west tower, of the Wells Library, Room W302. Walk-ins are welcome from 8 AM to 5 PM, Monday through Friday. You can also locate a variety of campus resources for students and visitors that need assistance at http://www.iu.edu/~ada/index.shtml".

Academic Dishonesty: Academic dishonesty of any form will not be tolerated - whether cheating, plagiarism, having others complete work for you, or other forms. Any form of academic dishonesty will result in immediate failure of the assignment in question, and a conference with the instructor about the act of dishonesty.
Students are expected to present their own work at all times, regardless of the point value of the assignment, venue or relative importance of the assignment. Additionally, academic dishonesty in a small part of a large project, however, perceived as insignificant by the student, still qualifies as academic dishonesty. Finally, while others are allowed to tutor, guide, and offer assistance, all work must be your own and not the work of these "helpers" (ex. a class assistant can help you learn how to do something, but not do the work for you).