INTRODUCTION TO COMPUTER SCIENCE (CS) EDUCATION RESEARCH

CIS 4930- Section 27C4
CIS 6930 - Section 27C9
Credits: 3
Class Periods: Wednesdays 4:05pm -7:05pm
Location: CSE E222
Academic Term: Fall 2018

The future of computer science education isn't trying to repeat educational experiences we've already experienced. It is about leveraging current computing innovations, proven educational and CS ED practices, and understanding of learner needs to enhance CS learning for all learners.

Instructor:
Name: Dr. Christina Gardner-McCune
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Office Phone Number: 352.505.1547
Office: CSE E548
Office Hours: Wednesdays immediately following class or by appointment.
  Please contact by email gmccune@ufl.edu at least 24 hours in advance for appointments.

Student Instructor:
Role: PhD student who will assist with course instruction and planning as part of her preparation to become a faculty member. She is not a TA but can assist if you have content questions. All course related questions should be directed toward the instructor.
- Yerika Jimenez, jimenyer@ufl.edu

Course Description
This course aims to introduce students to the field of Computer Science Education Research. The course will cover major issues and findings from Computer Science Education Research and opportunities for future research in Undergraduate and K-12 education. The course will also cover the use of innovative computer science research (e.g., machine learning, data analytics, modeling & simulations, and natural language processing) in the development of technologies and resources for transforming CS teaching. The course is organized around in-class discussions and hands-on projects where students will read journal and conference papers and then identify a problem they would like to explore and design a prototype and study to evaluate the effectiveness of the tool for fostering better CS learning. This course will benefit students who want to teach computer science, conduct research in a CS classroom/course, or just have an interest in improving the quality of Undergraduate and K-12 CS education.

Course Pre-Requisites / Co-Requisites
No Prerequisites. All content you need will be taught in the course.

Purpose of the Course
In this course we will explore key ideas from CS research and learning sciences to discover how to design systems to promote learning or to study learning. In addition, this course provides students with the unique opportunity to look under the hood of their CS educational experience and think about what made it outstanding, what could be improved, and give them a chance to make those improvements.

Course Objectives
By the end of this course, students will have
- *Knowledge of challenges in CS Education*
- *Knowledge of CS research areas*
- *Knowledge of CS Pedagogy and CS Learning technologies*
- *Knowledge of recent Computer Science Education Reports*

- *Knowledge of diverse computing degrees and curriculum (ABET Accreditation)*
- *Knowledge of current research in K-12 and UG CS degree programs,*
- *Knowledge of efforts to broaden participation in computing*
- *How to create a CS learning activity*
- *How to design a system to foster CS learning*
- *Knowledge of Computing Education Conferences, Workshops, Journals, Magazines, societies/organizations*

Materials and Supply Fees: N/A

Required Textbooks and Software
There is no textbook for this class. I will post readings and assignments for class weekly on Canvas.

Recommended Materials
Laptop or Tablets are required in class daily as well as paper and something to write with.

Teaching Philosophy:
I am a firm believer that learning is a process where students are actively engaged in course content and make connections between course content, their interests, and previous experiences. Thus, all course content will be designed to facilitate the learning process where you will be required to actively participate in class discussions, activities, and projects and to think beyond completing assignments for the sake a grade. While we learn about how people learn and how to help people learn through computing, I want you to reflect on your personal approach to learning. I strongly encourage you cultivate a deeper understanding of your own CS educational experience and to think about the implications of what you are learning has to bear on your future and the learning of others.

Instructional Methods:
Class time (Once a Week – 3 Hours)
- **In Class Reading Discussions** – Throughout the semester we will read and discuss papers to learn about computer science education research topic areas and computational tools and techniques to solve educational and CS ED problems
- **Mini-Lectures** – Sprinkled across our meeting says I will provide structured mini-lectures where I will give context to readings, projects, activities, and other course content
- **In Class Activities** - Opportunities to try out techniques in the classroom that will help you better understand readings or prepare you for projects
- **In Class Project Lab Time** – In-class opportunities to work on class projects and get feedback from peers and the professor
- **Guest Lectures** to enhance course content and provide alternate perspectives on CS Education and the role of CS research in education

Reading Discussions
Readings will focus on
1. Overview of How People Learn
2. Themes and Challenges in CS Education Research – including historical and current reports, conference and journal papers
3. CS Tools & Systems
4. Computer Science Education K-12 & Undergraduate Curriculum
5. CS Pedagogy, Activities, & Best Practices

Discussion will focus on
1. Discussing techniques, best-practices, and implications from the readings
2. Connecting readings to other previous readings
3. Connecting readings to students' own work inside or outside of class

In-Class Activities
In-Class activities have been designed to expose you to new CS Education Research Technology/Learning Environments and Computing tools and techniques that will help foster CS learning or learning in general.

Project Lab time
1. Project status updates (whole class)
2. Work on projects in class and get feedback from peers and the professor

Course Schedule *(Subject to change. Check Canvas for official assignments and due dates)*

	Dates	*Topics*	*Discussion Questions*	*Submissions*
Week 1	*August 20-26*	Course Overview & Overview of CS Education Research Community	Introductions What is Computer Science? Computing? What challenges you've encountered in a CS Course, Degree program, community	
Week 2	*August 27-Sept 2*	What is CS Education? What is CSForAll?	Why Should Everyone learn CS? What are the goals of CS ED Research?	Reading Reflection/Summary #1
Week 3	*Sept 3 - 9*	Computer Science Education Research Grand Challenges	What are the goals of CS Education? What are the goals of CS ED research moving forward? What are the open research questions?	Reading Reflection/Summary #2
Week 4	*Sept 10 -16*	How People Learn & Fostering learning communities & Best Practices	How do people learn? Other CS Learning Challenges: Interest, Enrollment & Retention & Engagement What are the best practices?	Reading Reflection/Summary #3
Week 5	*Sept 17-23*	Learning Challenges in CS, Pedagogies, & Best Practices	What are the common programming & problem-solving challenges novice programmers encounter? What are the best practices? Assessing student learning & challenges	Reading Reflection/Summary #4

Week 6	Sept 24-30	Supporting Learning & Assessment with Technology	How can technology be designed to support learning? How can technology be designed to assess learning? How can learning environments be designed to foster better learning?	Reading Reflection/Summary #5
Week 7	Oct 1-7	CS in K-12	CS K-12 & Exploration of K-12 CS ED Systems Demos Lit Review	Mini-Project on CS Systems Due
Week 8	Oct 8-14	CS in Undergraduate Curriculum	Explorations into the Undergraduate Curriculum (Student presentations)	Mini project on UGrad Curriculum
Week 9	Oct 15-21	Project Speed Dating & Proposal Workshop	Project Proposals & In-Class Project Work day Everyone will pitch their projects and recruit people to work on their project Work as a group on a proposal for one of the ideas or combine the ideas	Project Proposal Due
Week 10	Oct 22- 28	CS Professional Identity Project Work Day	How are CS students developing their professional identities? How is the curriculum supporting CS Professional Identity Development? Project feedback from instructor & peers	
Week 11	Oct 29- Nov 4	CS ED Research @ UF Project Work Day	Guest Speakers from UF CS ED Research Labs Project feedback from instructor & peers	Draft Final Project Submission Due
Week 12	Nov 5 -11	Project Work Day	Project feedback from instructor & peers	
Week 13	Nov 12-18	Final Presentations	UGRAD	
Week 14	Nov 19 - 25	No Class	No Class	
Week 15	Nov 26 - Dec 2	Final Presentations	UGRAD	
Week 16	Dec 3 – 9	Final Presentations	GRAD	Final Project Submissions Due

Course Policies

Attendance Policy & Class Expectations
Your attendance in class is mandatory. It is impossible to learn everything needed to pass this course from just reading papers and completing assignments. We will be actively engaged in discussion and deeper exploration of course content in class. Lectures will not be recorded and notes of the experience will not provide enough context to successfully course complete assignments. Attendance will be monitored through participation in the class discussion and in-class assignments. Excused absences must be consistent with university policies in the undergraduate catalog (https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx) and require appropriate documentation.

Assignment & Exam Policy
All assignments will be posted on the class website in Canvas. You are expected to complete assignments by the deadline and upload them to Canvas. If you are unable to complete assignment by the deadline, a 10% penalty will be applied each day up to 5 days. If an assignment is more than 5 days late it will be marked as a zero. There are no exams for this class only project.

Course Technology:
We will be using a variety of Computer Science Educational tools that are free to download. I will provide links to the resources and instructions for installation where applicable. To use these tools you will need a windows or Mac laptop/desktop. Some systems may be compatible with linux and a few may work on iPads or Android tablets.

Evaluation of Grades - Undergraduate – CIS 4930

Assignment	Total Points	Percentage of Final Grade
Project	100	40%
Readings & Reading Reflections	10 pts each	30%
Mini-Assignments	20 pts each	20%
Class Participation	100	10%
		100%

Evaluation of Grades- Graduate & Certificate Students – CIS 6930

Assignment	Total Points	Percentage of Final Grade
Projects	100	50%
Readings & Reading Reflections	10 pts each	30%
Mini-Assignments	20 pts each	10%
Class Participation	100	10%
		100%

Grading Policy: Final grades will be assigned based on the following scale

Percent	Grade	Grade Points
93 - 100	A	4.00
90.0 – 92.9	A-	3.67
86 - 89.9	B+	3.33
80 - 86.9	B	3.00
76 - 79.9	C+	2.33
70 – 75.9	C	2.00
60 - 69.9	D	1.00
0 - 59.9	E	0.00

More information on UF grading policy may be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

UF Policies

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://www.dso.ufl.edu/drc) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu/evals. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html

Campus Resources:

<u>*Health and Wellness*</u>

U Matter, We Care:
Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

<u>*Academic Resources*</u>

E-learning technical suppor*t***, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. https://www.crc.ufl.edu/.

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

Writing Studio, 302 Tigert Hall*,* 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

Student Complaints Campus*:* https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints*:* http://www.distance.ufl.edu/student-complaint-process.