FALL 2019 | SENSOR AND ELECTRONICS-BASED ART | ART4645C

INSTRUCTOR: Katerie Gladdys
EMAIL: kgladdys@ufl.edu
CLASS MEETING TIME: M +W 8:30-11:30
CLASS LOCATION: FAC306
OFFICE HOURS: M - 3-6:00 or by appointment
OFFICE LOCATION: FAC301
CREDIT HOURS: 3
****Class announcements, homework assignments, critique dates, and special events are communicated verbally in class, through email, and on our class website in the announcement section. Supplementary resources and extra credit opportunities are also noted on the website. Assignments will be submitted through as assignments and discussions, are accessible from the course website.

TOPICS
HCI, electronics, serial, parallel, Maker culture, microcontrollers, soldering, programming, Arduino, memory, C programming, variables, hex,decimal, binary, virtual, analog, performance and responsive objects, interactivity as dynamic, socially engaged, and collaborative processes, robots, aesthetics of interactive artifacts with respect to discourses in the visual arts, communications and performance, representation, visual language, link, rhizome, multiplicity, network, documentation, storage, performance, schematics, meters, components, input, output, memory, variables, serial communication, motors, analog and digital sensors, sound, data logging, breadboarding, circuit design, adaptation (in no particular order and this list is subject to change)

COURSE DESCRIPTION
Physical computing/HCI (Human Computer Interaction) explores how devices respond to and interact with human physical action. In this 3 credit class, students will create artwork that explores physical interfaces beyond mouse/keyboard/screen interactions through the use of microcontrollers and sensors. This course introduces students to basic electronics and programming, microcontrollers and sensors. We will examine what works in terms of the conceptual content as well as how it works technically. Through readings, discussions, practical exercises, individual and collaborative projects, students will develop an articulate, theoretical basis for conceptualizing and discussing works presented in class as well as their own creative projects. Emphasis will be placed on the ways that the technology and interactivity relate to the content of the work. Physical computing takes a hands-on approach, which means that you spend a lot of time building circuits, soldering, writing programs, building structures to hold sensors and controls, and figuring out how best to make all of these things relate to a person's expression.

OBJECTIVES
Students will demonstrate understanding of the following concepts and techniques both through creative and written assignments:
• Explore recent and current trends in maker culture
• Learn techniques of basic electronics

• Create art work that that explores interactions between humans and processes such as motion,
mapping, sound, position, gesture recognition
• Learn to solder and wire circuits
• Demonstrate skills in basic C/C++ programming with Arduino and Processing to facilitate the interface between humans, objects, and sensors
• Integrate tools and concepts from science & technology into art making
• Articulate theoretical perspectives relevant to cultural experimentation with embodiment, physical
computing, motion detection, gesture recognition, activated objects and alternative interfaces
• Generate and develop ideas and concepts from personal research related to the concept and content of assigned projected.
• Develop visual literacy and critical thinking skills through participating in critiques.
• Experience diverse approaches to develop art practice within a studio environment.
• Learn about artists past and present who work with documentary, including film, video, sound, installation, sculpture, and performance.
• Develop an awareness of your personal artistic process and vision while working with both the medium and the theoretical.

METHOD OF INSTRUCTION
The method of instruction for this course is comprised of lectures, screenings, demonstrations, hands-on in-class exercises, readings/research, response papers, assigned projects, and critiques. Students should expect to spend a minimum 6-8 hours weekly outside class to work on circuits and programming, read, write, work on projects and do both technical and art-based research.

COURSE DESCRIPTION
- WEEKS 1-4 introduction to programming electronics, microcontrollers, digital input and output, serial output, memory and variables, analog input, analog output, a little sound
- WEEKS 5-8   digital output, motors, more sound, USB and serial communication, shift registers
- WEEKS 9-12 buses, wireless communication, data logging, connecting to the internet?
- WEEKS 13-16 project development and critique

REQUIRED COURSE MATERIALS
Your lab fees cover most of the materials and supplies for this course. You may have to spend around $100.00 or more on other supplies for your final project.
Many of these items are supplied to you as part of your lab fees in the form of a "kit". This class has two types of kits. One that has tools which will be inventoried and collected back at the end of the semester and another that includes the following consumables: arduino micrpprocessor, 5V voltage regulator, 3.3V voltage regulator, LEDs, solderless breadboard, resistors, potentiometer, trimmer potentiometers, momentary switches, toggle switches, ceramic capacitors, electrolytic capacitors, thermistor, photocell, 1N4001 diodes, zenner diodes,

transistors, DC power jack, photocell, AA battery holder, 9V battery snap, servo motor, dc motor, gearbox kit, H bridge, reed relay, screw terminals.

Although the kit that comes with this class has its own small case, please think about purchasing a larger box or a case to haul your components and breadboard circuits to and from class. You may also want to purchase another plastic box to keep your breadboard and prototype safe.

Another item important for this class is the camera attached to your phone. The best way to record that you did a practice assignment is to take a short video of your circuit working and then posting it as an assignment.

There are also components that you are welcome to use are located in the Electronics Studio between FAC302 and the FAC306 lab. Depending on what you make, you may need to purchase extra components for your projects or if you let me know soon enough, I can look into purchasing if there are available funds.

If you create a project which uses other types of sensors, you can also purchase them from the vendors listed on the resource page.

required texts
Exploring Arduino: Tools and Techniques for Engineering Wizardry by Jeremy Blum 2013 ISBN-1118549368

recommended texts
Circuit Playground App by AdaFruit Industries
Beginning Arduino by Michael McRoberts 2013 ISBN 978-1430250166 This book is also can be accessed as an e-book from the UF library.
Manga Guide To Electricity by Kazuhiro Fujitaki and Matsuda 2012 ISBN-1593271972

Getting Started in Electronics by Forrest Mims 2003 ISBN-0945053282

Getting Started with Arduino. Massimo Banzi. O'Reilly Media, 2008 ISBN 10: 0-596-15551-4 | ISBN 13: 9780596155513

Making Things Talk: Practical Methods for Connecting Physical Objects. Tom Igoe. Make Books, 2007.
Physical Computing: Sensing and Controlling the Physical World with Computers. Tom Igoe and Dan
O'Sullivan. Course Technology PTR, 2004.)

access to software
All software is open source and can be found in the FAC306 lab and can also be downloaded onto your computer free of charge. XCode (or CodeBlocs if using PC), Arduino, and perhaps Processing
Required registration with:
LINKED IN LEARNING formerly knows as LYNDA.COM TUTORIALS
https://www.linkedin.com/learning/

ONLINE VIDEO AND AUDIO HOSTING AND STORAGE SERVICES

vimeo.com or youtube.com

Access to Equipment and Facilities

Here is a URL with the FAC306 Lab Hours and Cage Equipment Checkout Schedule. This is subject to change. The latest schedule is on the door.

http://plaza.ufl.edu/mchristo/306-schedule.html

ONE OF PERKS OF THIS CLASS IS THAT YOU HAVE 24/7 ACCESS TO FAC306

Please use the following URL to access scheduler to sign up for Blackbox Studio and Sound Studio.

https://ufl.instructure.com/courses/369006

Other Recommended Materials

A Linux or Mac or Windows laptop. I will be working on a Mac and the lab has Mac computers. If you choose to use your own laptop, access to XCode or CodeBlocs(PC), Arduino and maybe Processing

GRADING AND EVALUATION

The purpose of grading is to clearly and accurately pinpoint the strengths and weaknesses of your progress. You will receive grades on all assignments and meet with me individually at midterm. This report will evaluate progress, note strengths and areas for improvement. This is also a time for you if you feel comfortable to give me feedback in addition to office hours. Your overall grade will be based on your understanding of the information and ideas discussed, and your formal, technical, and conceptual progress as demonstrated in projects and exercises, and professionalism during the course.

In-class and Homework Assignments

In-class and homework assignments are considered participation and are 30% of your grade. You will be evaluated through exercises, participation, research, presentations, and technical proficiency with the various software applications, their aesthetic application, and problem solving. In-class and homework exercises become part of the weighted total. Most of these assignments will be you recording your breadboarding of circuits and learning programming. It is critical that you keep up so that you can create a successful final project. These assignments are graded using values ranging from 5-20 points depending on the complexity of the activity. Reading/writing assignments are graded on their completeness and expression of thought, as well as their demonstration of critical consideration regarding the readings and artworks under discussion. Here is a link to the rubric for how written assignments are evaluated. Electronics homework assignments are based upon uploaded videos of a built and working breadboarded circuits or my physical checking of your circuits in class. In-class exercises weighted point values range from 5-20 points depending on the complexity of the activity.

Projects

Projects are worth 60% of your grade. Projects will be formally critiqued by the class and then graded by me. Projects will be graded on their success in the following areas: concept development, risk-taking, experimentation, excellent design, craftsmanship, ambition, technical competency, and meeting project deadlines.

Regularly posting to the the project discussion is required for developing sketches, diagrams, reflective notes and concepts. My goal is that you are building an studio/design practice/habit

that takes you through school and beyond. Process work as well as each project must be finished within the specified deadlines. Every post should have the date followed by the title of the project.

Each project will have its own Canvas discussion. You will begin discussion thread and add process work and research related to the project to the discussion not unlike an online sketchbook. Each group or person will have their own discussion thread for each project. Use the discussion as a way to develop a vision of your work that engages with the readings, screenings and exercises that we do in class. Write with clarity and purpose. Some of the writing will be more formal and receive a discrete grade which then becomes part of the total grade of your project. Examples of this are project proposals, circuit schematics, code associated with the project and a project artist statement. Some of the writing will be more stream of consciousness when you are ideating for a project or responding to work that you in the midst of making. All process counts towards your grade for each project. You are expected to document your research and write at least four reflections for for the mini-project project and 8-10 for the final project. In addition to writing, discussions should and can contain images, links to websites, tutorials, pieces of code, video and even sound that you feel relates to your projects. If you function more as a physical sketchbook person, you are also welcome to scan in pages from your sketchbook and post to the discussion. Be aware that all posts must be visible and legible. I need to be able to easily read just just by looking at your post, without manipulation such as rotation, excessive zooming in and out. Each student is also invited to comment on the discussion posts of fellow students; it is assumed that all comments are civil, respectful, and constructive.

All assignments and projects must be submitted on the date due. Projects **will not be accepted after the due date without prior permission.** Students who miss class must obtain information from peers; handouts can be obtained from class website.

Make-up of assigned work due to extenuating circumstances must be completed within 1 week of absence.

_____

Grading Scale
A   100–94: superior work, all criteria have been surpassed in a distinguished manner
A-   93–90: superior work, all criteria have been surpassed
B+ 87-89: very good work, all criteria have been surpassed
B   83-86: above average work
B-   80-82: slightly above average work
C+ 77-79: adequate, average work
C   73-76, adequate work
C-   70-72, less than adequate work
D+ 67-69: barely meeting criteria
D   63-66 barely meeting criteria
D-   60-62 barely meeting criteria
E   59–0: failure to meet criteria

Projects and reading notes are due before class on the day they are due. Each day that they are late, you lose 10% from the maximum possible grade. Work turned in after class on the due date is counted as one day late (-10%).

A grade of C- or below will not count toward major requirements. For more information on UF policies on grade points, see
http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html .

Distribution of Grades

Projects - Total 60% = 1 group mini-project (1@ 20%) + Final Project - (40%)

Attendance - Total 10% - Our class meets 28 days over the course of the semester. Each class is worth .35 points with attendance at the final critique worth .55 point

Assignments and Participation - Total 30% (weighted) = participation in class discussions, reading responses, asking/answering questions, coming to class with all materials, general preparation, in-class experiments, keeping up with process work on blog, assignments, homework, quizzes, and exercises

PARTICIPATION + ATTENDANCE

What constitutes participation?

- complete readings the associated assignment prior to class
- contribute to class discussions
- ask relevant questions
- respond thoughtful
- be consideration for classmates
- attend every class period
- positive attitude and open mind

Expectations for Class Participation

Participation by all members is critical to the success of this class. Participation includes contributing to ongoing discussions and critiques, suggests alternative ways of approaching projects, along with a thoughtful process and strong work ethic. Participation is evaluated with respect to both quality and quantity.

Attendance is also 10% of the 40% of the participation part of your grade. If you do not show up and are not present for the entire class, you lose points. The 10 points awarded for participation is not weighted. you receive a point value for every class.

This class is very experiential and experimental in nature. We will do a lot of in class activities for which you will get credit. Many of these activities cannot be "made up" outside of class. You will miss out on a great deal if you do not come. There is a correlation in studio classes between attendance and final grades. You have a better chance of doing well if you come to class. Only three (3) absences will be allowed. Every unexcused absence beyond this will lower your grade by a letter grade. Four latenesses equal one absence. A total of seven absences will result in a grade of "E" for the class. Absences can include sickness, religious holidays, and doctor's appointments in addition to not attending class for personal reasons. It is your responsibility to come and talk with me if there are extenuating circumstances that would result in more than three absences.

Lateness and Leaving Early

I will take attendance at the beginning of each class. If you are not present at that time, you will be marked as absent unless you see me at the end of class letting me know that you came so I can correct my attendance sheet. You are expected to stay for the entire class period. I

generally check to see who is around after the break. If you leave, your attendance will be recorded as late. Four late marks count as an unexcused absence. If you know that you will be late or absent, please let me know in advance by contacting me at kgladdys@ufl.edu. Both lateness and absence will also have an effect on your participation grade.

Late Assignments

The two mini projects and two major projects for this class need to be completed on time. If you turn a project after the deadline, 10% will be deducted for each day the project is late. In-class assignments that are 10 points or less may not be made up unless you have contacted me in advance. If you arrive late and miss the better part of an in-class assignment, you are welcome to do the assignment on your own time, but I will not give credit for it. It is not fair to the students who were on time.

Keeping and Making Up

If you are having difficulties for any reason in understanding the material and completing the work for this class, you need to make an appointment to meet and talk with me. Do not wait until the last minute (right before an assignment is due) or until you are totally lost to contact me. Requirements for class attendance and make-up exams, assignments, and other work are consistent with university policies that can be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx.

ENGAGING WITH ONE ANOTHER

In our structured and unstructured discussions and dialogue, we also will have many opportunities to explore some challenging issues and increase our understandings of different perspectives. Our conversations may not always be easy; we sometimes will make mistakes in our speaking and our listening; sometimes we will need patience or courage or imagination or any number of qualities in combination to engage our texts, our classmates, and our own ideas and experiences. Always we will need respect for others. Thus, an additional aim of our course necessarily will be for us to increase our facility with the sometimes difficult conversations that arise as we deepen our understandings of multiple perspectives – whatever our backgrounds, experiences, or positions.

I want this class to be fun and meaningful with everybody feeling comfortable to contribute to the dialogue. This is how we learn. Effective learning/teaching is a creative and co-constructed experience with give and take between teacher and student and between student and student. Key to facilitating an environment for learning is respect. Disruptive and disrespectful actions make for stressful atmosphere which is not conducive to learning.

Here are some thoughts and suggestions for cultivating community.
- Treat every program interaction, both in and out of class and critique, as if you were professional colleagues who need to work together to be successful.
- Be an active listener who seeks to understand.
- Honor multiple perspectives and experiences that others bring to the program.
- Take responsibility (for your statements, actions, interactions, academic performance).
- Assume good intent on the part of others.
- Pause and reflect before reacting.
- Use every class session and every interaction with peers to think about your future as an artist and teacher.

- Conduct yourself with personal integrity and honesty. See UIUC student code policies below.
- Communications outside of class with individuals as well as the class are done via email, please check your @ufl.edu email account regularly for updates and additional course information.
- When collaborating with others for group projects, you are expected to do your share of the work and communicate effectively with others in your group i.e. providing correct contact information to the rest of the group, responding to emails and phone calls regarding the group project, attending meetings to work out assignments and schedules.

It is my intent that students from all diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that the students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender identity, sexuality, disability, age, socioeconomic status, ethnicity, race, nationality, religion, and culture.

_____

WHAT YOU CAN EXPECT FROM ME
- End class on time or within two minutes of scheduled ending time unless previously notified
- Answer student email with in 24 hours or less (usually a lot less) unless I am out of the country or in a place where there is not email. My office phone is NOT the best way to reach me as I am often in the lab teaching or in my studio working. Face to face communication in class or email are the preferred methods of communication.
- Return assignments in a timely manner
- Be available during my office hours. If I am not in town, I will let you know in advance if I am not able to attend office hours.
- Listen to student concerns and questions.
- Explain, answer and research questions regarding the topics of the class. The nature of technology and learning is ever evolving. If I do not have an immediate, answer, I will research your question and get back to you in a timely fashion with a solution or a reference to a relevant resource.
- Abide by the grading scale above and not change dates for turning in assignments unless the class as a whole has agreed upon the change.

_____

Electronic Device Policy
A note on cell phones, texting, and checking one's email during class: Research has shown us that even having our cell phones on the table in front of us diminishes our ability to learn well; further, taking notes via computer diminishes one's ability to process information. Checking texts, emails, and messages is also unprofessional and disrespectful to our class community. Please put your phones on vibrate, do not check email, Facebook etc. via computer during class; I will do so as well. I appreciate your cooperation with this important aspect of creating a class of which we all want to be a part. No sound or visual recordings may be made during class time unless the recording is part of a class assignment or the instructor grants prior permission.

GENERAL UNIVERSITY POLICIES AND SERVICES

UF STUDENT GUIDE
This resource covers most policies and procedures important to students -
http://www.dso.ufl.edu/stg/

accommodations for students with disabilities
I will make every attempt to accommodate students with disabilities. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. Disability Office -—
http://www.dso.ufl.edu/OSD/

contacts for university counseling services
includes personal, academic, crisis and career services. Dial 392-1575.
http://www.counsel.ufl.edu/

contacts for student healthcare center
Dial 911 for medical emergencies.

Dial 392-1161 for urgent after-hours medical questions.

Dial 392-1171 for after-hours mental health assistance.

http://www.health.ufl.edu/shcc/

ENVIRONMENTAL HEALTH AND SAFETY

http://www.arts.ufl.edu/art/healthandsafety

Each student must complete a H&S STUDENT WAIVER FORM (available next to the copier in the SAAH office) and on-line (see address above). Waivers must be turned into the SAAH Director of Operations before the end of the 2nd week of classes. Because we use some hazardous materials as part of the electronic components that become part of our projects, please pay particular attention to the guidelines below.

Appendix I:
Area Specific Information: Art + Technology
1. Hazards of Materials
Batteries, old monitors, lamps from digital projectors if broken may release mercury.
THERE ARE NO KNOWN HEALTH HAZARDS FROM EXPOSURE TO LAMPS THAT ARE INTACT.

2. Best Practices
Though not much waste is generated, the Digital Media technician is certified for handling Hazardous Waste by the University of Florida. For installations or sculptural elements, please cross-reference with other area specific information as needed.

3. Links
n/a

4. Area Rules
All users of the studio classrooms are expected to follow studio area rules at all times. If you have any questions, ask your instructor.
• Follow all SA+AH Health and Safety handbook guidelines (the handbook should be reviewed by your instructor and can be found at: www.arts.ufl.edu/art/healthandsafety)
• Follow the SA+AH Satellite Waste Management Chart in the classroom and other health & safety guidelines posted for your media.
• In case of emergency, call campus police at 392-1111
• File an incident report (forms may be found in the SAAH H&S handbook, the SAAH faculty handbook and in the main office.) Turn completed forms into the SAAH Director of Operations within 48 hours of the event.
• Alcohol is forbidden in studios
• Familiarize yourself with the closest eyewash unit.
• No eating or drinking in computer the lab.
• Do not use spray adhesive in the studios or in the building. There is a professional and safe paint spray
booth in FAC-211A for your use.
• Shoes must be worn at all times.
• Protective equipment must be worn for hazardous work.
• Do not block aisles, halls or doors with stored items or when working. This is a violation of fire codes.
• Do not store anything on the floor. This impedes cleaning and creates a hazard.
• Installations must be removed as soon as possible after critique.
• Clean up spills immediately.
• Take items which do not fit into the trash to the dumpster, follow dumpster guidelines.
• Follow the **SA+AH CONTAINER POLICY** (see policy below)

LABELS
There are 2 types of labels used in the SA+AH-- yellow and white. Both labels are found at the red MSDS box and
are supplied by the SA+AH. Each is used for a different purpose.
White:
All new and or used products in containers (hazardous or what might be perceived as hazardous -i.e. watered down
gesso, graphite solutions, satellite containers of solvents, powders, spray paints, fixatives, oils, solvents, etc....) must
be labeled within the SA+AH to identify their contents. Labels can be found at the MSDS box in each studio and
work area. All containers must be marked with your name, contents and date opened. All secondary/satellite

containers for hazardous materials must be marked with content, your name and the date opened. All unmarked
containers will be disposed of with no notice.
Yellow:
WHEN HAZARDOUS ITEMS ARE DESIGNATED AS WASTE.
All containers must have a yellow label identifying the contents that are designated as trash for weekly EHS pick
up.
- Flammable solid containers (red flip top) must have a yellow hazardous waste label on the outside (top).
- 5 gallon jugs must have a yellow hazardous waste label on the outside.
- Fibrous containers must have a yellow hazardous waste label on the outside (top).
- Each item in the blue bin must have a yellow hazardous waste label.

Note: Hazardous Waste labels should include all constituents in the waste mixture as well as an approximate
2 percentage of the total for that item and must add up to 100%.

Labels should also include the Bldg and room number of the shop generating the waste along with the Waste
Manager for your area, this is located on the SWMA sign posted at the sink or at the Waste Management Area.

Safety and Security
University Police Department - http://police.ufl.edu/
Dial 911 for emergencies.
Dial 392-1111 otherwise.

Reading Days
The two days prior to the start of examinations in the fall and spring semesters, generally a Thursday and Friday, are designated reading days. No classes or exams are held on these days. Instead, students are encouraged to use these days for study and review.
Twelve-day Rule
Students who participate in official athletic or scholastic, extracurricular activities are permitted twelve (12) scholastic day absences per semester without penalty. In any case, it is the student's responsibility to maintain satisfactory academic performance and attendance.

Absences for Religious Holidays
Students, upon prior notification of their instructions, shall be excused from class or other scheduled academic activity to observe a religious holy day of their faith. Students shall be permitted a reasonable amount of time to make up the material or activities covered in their absence. A student who believes that he/she has been unreasonably denied an education benefit due to religious beliefs or practices may seek redress through the student grievance procedure.

Honesty Policy
An academic honesty offense is defined as the act of lying, cheating or stealing academic information so that one gains academic advantage. As a University of Florida student, one is expected to neither commit nor assist another in committing an academic honesty violation. Additionally, it is the student's duty to report observed academic honesty violations. These can include: cheating, plagiarism, bribery, misrepresentation, conspiracy, or fabrication.

http://www.dso.ufl.edu/judicial/academichonestystudent.html

Computer Use and Acceptable Use Policy
All faculty, staff, and students of the University of Florida 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.

http://www.circa.ufl.edu/computers/

http://www.cio.ufl.edu/aupolicy.htm

Disruptive Behavior
Faculty, students, Administrative and Professional staff members, and other employees [hereinafter referred to as "member(s)" of the University], who intentionally act to impair, interfere with, or obstruct the mission, purposes, order, operations, processes, and functions of the University shall be subject to appropriate disciplinary action by University authorities for misconduct, as set forth in the applicable rules of the Board of Regents and the University and state law governing such actions. A detailed list of disruptive conduct may be found at http://www.aa.ufl.edu/aa/Rules/1008.ht

Be advised that you can and will be dismissed from class if you engage in disruptive behavior. Critical Dates on the University Calendar
http://www.reg.ufl.edu/dates-critical.html

Giving Credit--Many of the ideas and resources for this class came from Rob Faludi and Tom Igoe's Physical Computing Class at NYU's ITP program http://itp.nyu.edu/physcomp/.