# UNIVERSITY OF SOUTHERN CALIFORNIA
# CHAN DIVISION OF OCCUPATIONAL SCIENCE AND OCCUPATIONAL THERAPY

*Last updated December 6, 2022*

**OT 699: Building Innovative Technologies that Promote Health and Occupational Engagement**
**Credits: 2**
**Spring 2023:** Fridays at 11:00am, CHP 139
**Location:** Asynchronous lectures + in person hands-on tutorials

**Instructor:** Dr. Sook-Lei Liew
**Course Instructional Assistant:** Miranda Donnelly, MS, OTR/L
**Office Hours:** By appointment
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**Course Description**
This course aims to equip students with the ability to harness technology to create innovative solutions to healthcare challenges encountered in their local, national and international communities. The course includes a high-level overview of different technologies and how they can be used to meet different needs, along with hands-on exercises for students to begin to learn how each technology works and what each technology requires. Specifically, students will gain knowledge and skills in the basics of innovation, including software development (e.g., introduction to basic computer programming, game engines, and app development), hardware development (e.g., basic arduinos, 3D printing and prototyping), user interface/experience design (UI/UX), and business practices (e.g., intellectual property, business development). The class will culminate in use of these skills in final project with basic prototype development and project pitches.

**Course Objectives**
By the end of this course, students will be able to:
1. Identify, describe, and develop innovations that promote improved health and well-being.
2. Create a business development plan for a technology that meets a clinical need, identify the appropriate software, hardware and/or user interface skills that are needed to implement the concept.
3. Design and pitch an initial prototype of a concept.

Note: This course is meant to provide a high-level overview of different technologies, with the expectation that students may take additional time on their own to learn how to implement specific technologies for their own needs.

**Description of Teaching Methods and Learning Experiences:**
This course contains will provide both information and basic skill training. As such, this course introduces students to the software, hardware, and UI/UX most relevant to translating ideas into physical reality. The course is roughly divided in half between lectures, which introduce various software, hardware, UI/UX design, legal, and procedural concepts associated with innovation in today's high-tech world, and hands-on practice and tutorials. These will allow students to learn by designing small projects themselves, learning to seek out information from various sources and having the ability to request

guidance from experts in each area. The teaching methods will include aspects of a flipped classroom, so that students can learn programming and other skills by asynchronously watching video tutorials and trying hands-on exercises at home, and then work together with the instructors and TAs during synchronous class for hands-on troubleshooting, guidance, discussion and support.

**Prerequisite(s):** None
**Co-Requisite(s):** None
**Recommended Preparation**: Basic computer programming, but no experience is necessary. Download Slack https://slack.com/ and watch this video on how to use Slack: https://www.youtube.com/watch?v=tJAeHlDh1fY

**Required Materials**
Laptop or desktop computer
Software: Slack, and other software that will be downloaded during the course
Hardware: Arduino kit ($36.99): https://www.amazon.com/ELEGOO-Project-Starter-Compatible-Arduino/dp/B09RDZBY9G/ref=sr_1_2_sspa

**Grading Breakdown**

| Assignment | Points | % of Grade |
|---|---|---|
| Weekly Quiz/Assignment | 39 (3 points per week) | 39% |
| Participation | 13 (1 point per week) | 13% |
| Final Participation | 3 | 3% |
| Final Project | 45 | 45% |
| | | |
| **TOTAL** | **100** | **100%** |

**Grading Scale**
Course final grades will be determined using the following scale

| | |
|---|---|
| A | 93-100 |
| A- | 90-92 |
| B+ | 87-89 |
| B | 83-86 |
| B- | 80-82 |
| C+ | 77-79 |
| C | 73-76 |
| C- | 70-72 |
| D+ | 67-69 |
| D | 63-66 |
| D- | 60-62 |
| F | 59 and below |

**Grading Timeline**
Grading will be completed the week after an assignment is submitted. Quizzes and in-class assignments will be assessed the same day.

**Additional Grading Policies**

Students are given a pass on up to 5 missed questions on weekly quizzes (e.g., up to 5 missed questions across quizzes will be dropped). In addition, students can earn extra credit up for up to 5 additional points by completing an optional assignment by the last day of class (April 28; extra credit assignment possibilities will be discussed in class but are generally extended versions of any of the tutorials).

**Additional Policies**
In-class programming will require that students bring or have access to laptop or desktop computers. Laptops can be provided for students who cannot provide their own. In case of missed classes, students should contact the instructor to determine if make-up work is required.

**Course Schedule: A Weekly Breakdown**

Each week, we will have 2 hours of contact time that will be delivered synchronously and/or asynchronously, depending on the week and content. You are expected to complete asynchronous content (e.g., lectures, follow-along labs, readings) complete prior to our weekly class, during which we will review the material via hands-on labs and tutorials. Links to asynchronous content will be posted on Blackboard and emailed at least the week prior.

> IMPORTANT:
> In addition to in-class contact hours, all courses must also meet a minimum standard for out-of-class time, which accounts for time students spend on homework, readings, writing, and other academic activities. **For each unit of in-class contact time, the university expects two hours of out of class student work per week over a semester: that is in addition to the 2 hours of contact time per week, which will be delivered synchronously or asynchronously.**

(Please refer to the *Contact Hours Reference* at arr.usc.edu/services/curriculum/resources.html.)

| | **Asynchronous** | **Synchronous** (In-Person) | **Activities** (4 hours per week) |
|---|---|---|---|
| **Week 1 - Jan 13** | Course overview<br><br>Programming Basics – Part I | Introductions and goals<br><br>Programming Basics (troubleshooting) | Programming practice with Python<br><br>Optional Shark Tank videos<br><br>Explore/choose a hackathon |
| **Week 2 - Jan 20** | Design thinking; Market analysis; UX basic principles; Defining user needs | Practicing UX concepts<br><br>Defining the problem | Innovation Statement – Part I<br><br>Programming practice with Python |
| **Week 3 - Jan 27** | Programming Basics – Part II | Programming Basics (troubleshooting) | Programming practice with Python |

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| **Week 4 - Feb 3** | Project ideation; Value propositions; UX continued | Discussion about project ideas and lecture content | Innovation Statement – Part II |
| **Week 5 - Feb 10** | Overview of prototyping tools; 3D printing | Edit/design 3D casings<br>*Guests: Octavio Marin-Pardo; TBD* | Working on project |
| **Week 6 - Feb 17** | Prototyping with Arduinos | Practicing with Arduinos | Working on project<br><br>Practicing with Arduinos |
| **Week 7 - Feb 24** | Prototyping with software;<br>App development | Integrating tools; planning project-specific software needs<br>*Guest: Sean Donnelly* | Applying specific software tools to project |
| **Week 8 - Mar 3** | UI design;<br>Wireframing | Practicing UI concepts<br>*Guest: TBD* | Applying specific UI concepts to project |
| **Week 9 - Mar 10** | Articulating a viable business plan | Group discussion; workshopping business plan | Innovation Statement – Part III |
| **Spring Break - Mar 17** | | | |
| **Externship (MA1 & MA2) - Mar 24** | No lecture | Extra office hours for troubleshooting, working on projects, etc. (Optional) | |
| **Externship (MA1 & MA2) - Mar 31** | No lecture | Extra office hours for troubleshooting, working on projects, etc. (Optional) | |
| **Week 10 - Apr 7** | Gamification;<br>Intro to Unity | Unity (GUI-based programming)<br>*Guest: Coralie Phanord* | Working on project |
| **Week 11 - Apr 14** | Developing project pitches; IP and legal issues | Peer feedback on pitches | Working on project |
| ***Moshayedi Competition Submissions due ~April 17*** | | | |
| **Week 12 - Apr 21** | Testing – UX methods | Testing project ideas; Discussion about OS/OT tech innovations | Working on project |
| **Week 13 - Apr 28** | No Lecture – working on projects (hackathon style week!) | Attending the Mark and Semira Moshayedi | Working on project |

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| | | Innovation Award competition | |
| **Finals Week (May 3-10)** | Final project presentations (meeting in-person for 2 hours) | | |

## Statement on Academic Conduct and Support Systems

**Academic Conduct**
Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, "Behavior Violating University Standards" https://policy.usc.edu/student/scampus/part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Discrimination, sexual assault, intimate partner violence, stalking, and harassment are prohibited by the university. You are encouraged to report all incidents to the *Office of Equity and Diversity*/*Title IX Office* http://equity.usc.edu and/or to the *Department of Public Safety* http://dps.usc.edu. This is important for the health and safety of the whole USC community. Faculty and staff must report any information regarding an incident to the Title IX Coordinator who will provide outreach and information to the affected party. The sexual assault resource center webpage http://sarc.usc.edu fully describes reporting options. Relationship and Sexual Violence Services https://engemannshc.usc.edu/rsvp provides 24/7 confidential support.

**Support Systems**
A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* http://ali.usc.edu, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* http://dsp.usc.edu provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* http://emergency.usc.edu will provide safety and other updates, including ways in which instruction will be continued by means of Blackboard, teleconferencing, and other technology.