

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

**OT 699: Building Technologies that Promote Health and Occupational Engagement**

**Credits: 2**

**Spring 2021 (Thursdays 12:40-3 pm)**

**Location:** remote, Zoom Link: <https://usc.zoom.us/j/98410120625> (984-1012-0625)

**Instructor:** Dr. Sook-Lei Liew, Dr. Christopher Laine

**Office Hours:** Thursdays 3-4 pm or by appointment

**Contact Info:** [sliew@usc.edu](mailto:sliew@usc.edu), [christopher.laine@chan.usc.edu](mailto:christopher.laine@chan.usc.edu)

**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 (e.g., intellectual property, business development), software development (e.g., introduction to basic computer programming, game engines, and app development), and hardware development (e.g., basic sensors, arduinos, 3D printing and prototyping). The class will culminate in use of these skills in a hackathon-styled week of development with 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 increased occupational engagement.
2. Create a business development plan for a technology that meets a clinical need, identify the appropriate software and hardware skills that are needed to implement their concept.
3. Design 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 and hardware most relevant to translating ideas into physical reality. The course is roughly divided in half between lectures, which introduce various software, hardware, legal, and procedural concepts associated with innovation in today's high-tech world, and hands-on practice via online tutorials (as well as in-person tutorials, when safe to do so). 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.

**Prerequisite(s):** None

**Co-Requisite(s):** None

**Recommended Preparation:** Basic computer programming

### **Required Materials**

Laptop or desktop computer

Software: Will be downloaded during the course

Hardware: Arduino kit (TBA)

### **Grading Breakdown**

<b>Assignment</b>	<b>Points</b>	<b>% of Grade</b>
Weekly Quiz/Assignment	44 (4 points per week)	44%
Participation	11 (1 point per week)	11%
Final Project	45	45%
<b>TOTAL</b>	<b>100</b>	<b>100%</b>

### **Grading Scale**

Course final grades will be determined using the following scale

A	95-100
A-	90-94
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 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 approximately 1 hour and 20 minutes of asynchronous content (e.g., lectures and follow-along labs) that you are expected to complete prior to our weekly 1-hour synchronous meeting via Zoom, during which we will review the lecture and lab materials and provide additional hands-on support and tutorials. Links to asynchronous content will be posted on Blackboard and emailed 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 20 minutes 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](http://arr.usc.edu/services/curriculum/resources.html).)

	Lecture Schedule	Activities	Lab Software/Hardware & Instructor(s)
<b>Week 1</b> January 21	Course Intro  Software: Computer Programming Basics I	Course overview  Basic computer inputs and outputs, navigating programming interfaces, command line (Hello World!)	<i>Hands-On Lab: Anaconda (Jupyter, Python)</i>  Dr. Liew
<b>Week 2</b> January 28	Software: Computer Programming Basics II	Simple functions, programs, practice with programming logic	<i>Hands-On Lab: Anaconda (Jupyter, Python)</i>  Dr. Liew
<b>Week 3</b> February 4	Software: App Development	Overview of app development process, app user interface principles, programming options for creating apps (web and mobile)	<i>Hands-On Lab: App User Interface Design</i>  Dr. Laine (potential guest lecturer: Dr. Cohn)
<b>Week 4</b> February 11	Software: Gamification	Introduction to gamification for apps and software; different game engines, basic GUI-based programming in Unity	<i>Hands-On Lab: Unity</i>  Dr. Liew (Guest lecturer: Ms. Phanord)
<b>Week 5</b> February 18	Hardware: Prototyping and Arduinos	Overview of prototyping process, what is prototyping, why is it useful, and main materials/tools/software that can be used. Intro to using Arduinos for prototyping	<i>Hands-On Lab: Getting started with Arduino</i>  Dr. Laine
<b>Week 6</b> February 25	Hardware: Electronic Device Data Acquisition and Design	Electronics and sensors Basic sensor types of biofeedback	<i>Hands-On Lab: Distance sensor with Arduino</i>  Dr. Laine

		How data is acquired and processed for functional use	
<b>Week 7</b> March 4	Hardware: Software Integration	Putting it all together: How to integrate sensor input using Arduinos and Unity	<i>Hands-On Lab: Making a basic game with a distance sensor, Arduino, and Unity</i>  Dr. Laine (potential guest lecturers: Ms. Phanord, Mr. Marin-Pardo)
<b>WEEK OF RESTORATIVE OCCUPATIONS (March 8-12)</b>			
<b>Week 8</b> March 18	Hardware: 3D Printing	3D printing for prototypes  Overview of how 3D printing can be used, possibilities and limitations, what is needed, types of filaments, basic software	<i>Hands-On Lab: Edit/design 3D model casings for sensor/Arduino</i>  Dr. Liew, with guest lecturers: Mr. Andy Lin, Director of Rancho's Emerging Tech Lab, and Mr. Marin-Pardo, USC biomedical engineering PhD student
<b>Week 9</b> March 25	Implementation: Innovation concepts I	Innovations and intellectual property Identifying a need	<i>Hands-On Lab: Identify need and potential solution/prototype idea</i>  Dr. Liew with videos from Stevens Center for Innovation
<b>Week 10</b> April 1	Implementation: Innovation concepts II	Completing a market analysis and making a value proposition Articulating a viable business plan	<i>Hands-On Lab: Complete basic market analysis and business plan, budget</i>  Dr. Laine with videos from Incubate USC / Grief Center
<b>Week 11</b> April 8	Capstone project design	Design a prototype for an invention that meets a clinical need and has a viable market plan	<i>Hands-On Lab: Complete prototype design and identify skills needed to create prototype (identify needed team)</i>

			Drs. Liew/Laine, students discuss progress
<b>Final Projects / Summative Experience</b> April 9	Capstone project presentations	Present project pitch	<i>Hands-On Lab: Capstone project pitches</i>  Drs. Liew/Laine to moderate student presentations

## 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.