

# COSC 4355/6355: Ubiquitous Computing

Fall 2023

## WELCOME TO UBIQUITOUS COMPUTING - COSC 4355/6355

The Ubiquitous Computing course was the first of its kind, when it was created back in 2003. Its goal is to train students in app development. Initially, the course used the Windows mobile platform; programming included not only smartphones, but also custom-made sensors, such as 3D accelerometers that were Bluetooth enabled. With the introduction of the iPhone in 2008, the UC course switched platforms. The iPhone brought a revolution in mobile computing by redefining the user-interface and incorporating several sensors, such as 3D accelerometer and GPS, in the device itself.

## TEACHING PHILOSOPHY

This is an advanced programming course and thus, time-consuming by its nature. If you do not have the necessary time, you are advised not to take this course. Given the direction the software industry has taken, this is also one of the most important courses for your professional career and thus, it needs special attention.

We believe that in an advanced programming course having merely a formal lecture series is the equivalent of reading a tedious manual from A to Z. It can be done, but it is neither smart nor cool. The best way for someone to become a good programmer is by doing things. Accordingly, I apply an educational methodology that is known as scaffolding, to build up the students' mobile programming prowess. In scaffolding, the instructors demonstrate how to develop an app, and then step back and let the students practice on their own, while everything is still fresh in their minds. During practicing, the instructors render a bit of help, if needed.

## Weekly Class Session & App Assignment

Students need to read and practice the designated online material before each class. The first 5 minutes of the class will be quiz time, to check basic understanding of the day's lesson. In the first part of the class, the instructors will deliver a lecture. In the second part of the class, the instructors will develop a relevant app step-by-step. In the third part of the class, the students will start developing a similar app on their own, asking questions if they encounter problems (i.e., scaffolding). The students will continue working on the app at home. The submission deadline for the weekly app would be at 10 pm the following Monday.

## Monthly In-Class App Development Exam

Every month there will be an in-class app development exam, lasting three hours. The exam will be an amalgamation of the previous 2-3 weekly app assignments. The purpose of the exam is to check how well students internalized skills they have repeatedly practiced. Importantly, the exams are meant to prepare students for similar screening tests employed by many technology companies during interviews.

## Semester-Long App Project

Students need to develop a major app during the semester. They may choose to do this by themselves or in pairs. The student (or duo) may choose to pursue an app project of their liking or go with the default app project that will be given by the instructors. In either case, the students need to follow the timeline and milestones outlined in the syllabus, that is, specification, beta version, and production version. Each milestone is graded separately.

## ATTENDANCE POLICY

The class has both in-person and synchronous online sections. All classes are recorded on TEAMS and are freely available as online educational materials.

## READING MATERIAL

[Apple Developer Library](#)

[Swift Documentation](#)

## HARDWARE RESOURCES

You will need a MacBook for this course with the latest software installed. If you do not have a Mac, then you can rent a Mac on the cloud (<https://www.macincloud.com>) for a very affordable price.

## DAY, TIME, AND ROOM

Thursday, 4:00-7:00 pm @ 315-Health and Biomedical Sciences Building 1 and @ TEAMS

## INSTRUCTORS

- Prof. Ioannis Pavlidis [[ipavlidis@uh.edu](mailto:ipavlidis@uh.edu)] Office Hour: Thu 3-4 pm @ TEAMS
- Vitalii Zhukov [[zhuko.v.italy@gmail.com](mailto:zhuko.v.italy@gmail.com)] Office Hours: Mon 12-1 pm @ TEAMS
- Fettah Kiran [[ftth05@gmail.com](mailto:ftth05@gmail.com)] Office Hours: Fri 11-12 pm @ TEAMS

#### Week 1 - 08/24

- Introduction to iOS and Swift

\*\*\*\*Reading for the Week\*\*\*\*

- ⇒ <https://docs.swift.org/swift-book/documentation/the-swift-programming-language/guidedtour/>
- ⇒ <https://developer.apple.com/swift-playgrounds/>
- ⇒ <http://online.swiftplayground.run/>

#### Week 2 - 08/31

- XCode, UIKit (text fields, buttons, labels), UIAlertController

\*\*\*\*Reading for the Week\*\*\*\*

- ⇒ <https://developer.apple.com/documentation/uikit>
- ⇒ <https://developer.apple.com/documentation/uikit/uialertcontroller>

#### Week 3 - 09/07

- Protocol & Delegation, View Controllers, Segue, Navigation Controllers

\*\*\*\*Reading for the Week\*\*\*\*

- ⇒ [https://developer.apple.com/library/content/documentation/Swift/Conceptual/Swift\\_Programming\\_Language/Protocols.html](https://developer.apple.com/library/content/documentation/Swift/Conceptual/Swift_Programming_Language/Protocols.html)
- ⇒ [https://developer.apple.com/library/content/featuredarticles/ViewControllerPGforiPhoneOS/index.html#//apple\\_ref/doc/uid/TP40007457-CH2-SW1](https://developer.apple.com/library/content/featuredarticles/ViewControllerPGforiPhoneOS/index.html#//apple_ref/doc/uid/TP40007457-CH2-SW1)
- ⇒ [https://developer.apple.com/library/content/featuredarticles/ViewControllerPGforiPhoneOS/PresentingaViewController.html#//apple\\_ref/doc/uid/TP40007457-CH14-SW1](https://developer.apple.com/library/content/featuredarticles/ViewControllerPGforiPhoneOS/PresentingaViewController.html#//apple_ref/doc/uid/TP40007457-CH14-SW1)

#### Week 4 - 09/14

- Tab Bar Controller, UIStackView, and Auto Layout

\*\*\*\*Reading for the Week\*\*\*\*

- ⇒ <https://developer.apple.com/documentation/uikit/uitabBarController>
- ⇒ <https://developer.apple.com/documentation/uikit/uistackview>
- ⇒ <https://developer.apple.com/library/content/documentation/UserExperience/Conceptual/AutolayoutPG/index.html>

#### Week 5 - 09/21

- In-Class App Development Exam 1

#### Week 6 - 09/28

- App Specification

## Week 7 - 10/05

- Interacting with Web Services, UITableView, UserDefaults

\*\*\*\*Reading for the Week\*\*\*\*

- ⇒ <https://developer.apple.com/documentation/foundation/nsurlconnection>
- ⇒ <https://developer.apple.com/documentation/uikit/uitableview>
- ⇒ <https://developer.apple.com/documentation/foundation/userdefaults>

## Week 8 - 10/12

- Location, MapKit, Gesture Recognizer, Local Notifications

\*\*\*\*Reading for the Week\*\*\*\*

- ⇒ <https://developer.apple.com/documentation/mapkit/>
- ⇒ <https://developer.apple.com/documentation/mapkit/mkmapview>
- ⇒ <https://developer.apple.com/documentation/corelocation>
- ⇒ <https://developer.apple.com/documentation/corelocation/cllocationmanager>
- ⇒ [https://developer.apple.com/library/content/documentation/NetworkingInternet/Conceptual/RemoteNotificationsPG/SchedulingandHandlingLocalNotifications.html#//apple\\_ref/doc/uid/TP40008194-CH5-SW1](https://developer.apple.com/library/content/documentation/NetworkingInternet/Conceptual/RemoteNotificationsPG/SchedulingandHandlingLocalNotifications.html#//apple_ref/doc/uid/TP40008194-CH5-SW1)

## Week 9 - 10/19

- In-Class App Development Exam 2

## Week 10 - 10/26

- Beta App

## Week 11 - 11/02

- imagepicker, Camera, CoreImage - Filters, Apple Watch Programming (optional)

\*\*\*\*Reading for the Week\*\*\*\*

- ⇒ <https://developer.apple.com/documentation/uikit/uiimagepickercontroller>
- ⇒ <https://developer.apple.com/documentation/coreimage>
- ⇒ [https://developer.apple.com/documentation/watchconnectivity/using\\_watch\\_connectivity\\_to\\_communicate\\_between\\_your\\_apple\\_watch\\_app\\_and\\_iphone\\_app](https://developer.apple.com/documentation/watchconnectivity/using_watch_connectivity_to_communicate_between_your_apple_watch_app_and_iphone_app)

## Week 12 - 11/09

- ML, Core ML, Models, NLP

\*\*\*\*Reading for the Week\*\*\*\*

- ⇒ <https://developer.apple.com/machine-learning/>
- ⇒ <https://developer.apple.com/documentation/coreml>
- ⇒ <https://developer.apple.com/machine-learning/models/>

Week 14 - 11/16

- In-Class App Development Exam 3

Week 15 - 11/30

- Production App

**Total Period of Instruction = 15 weeks**

- 7 Quizzes
- 7 Weekly App Assignments
- 3 In-Class App Development Exams
- 3 Project Milestones

### Grading

- ☐ 7% (7 x 1%) Quizzes
  - ☐ 14% (7 x 2%) Weekly app assignments
  - ☐ 45% (3 x 15%) In-class app development exams
  - ☐ 34% Semester-long app project
- 

### Rubric and Other Details for the Semester-Long App Project

- ☐ **App Specification:** 20% of the total project grade
  - 10% description, 30% user flow, 20% wireframes, 20% mockups, 20% prototype
- ☐ **Beta App:** 30% of the total project grade
  - 50% robust functionality, 30% user interface, 20% coding excellence
- ☐ **Production App:** 50% of the total project grade
  - 50% robust functionality, 30% user interface, 20% coding excellence

The project can be done either individually or in pairs. Pairs need to be declared by the end of the second week of classes.

# UNIVERSITY OF HOUSTON SYLLABUS LANGUAGE: FALL 2023

## Required Language for All Courses

### Mental Health and Wellness Resources

The University of Houston has a number of resources to support students' mental health and overall wellness, including [CoogsCARE](#) and the [UH Go App](#). UH [Counseling and Psychological Services \(CAPS\)](#) offers 24/7 mental health support for all students, addressing various concerns like stress, college adjustment and sadness. CAPS provides individual and couples counseling, group therapy, workshops and connections to other support services on and off-campus. For assistance visit [uh.edu/caps](http://uh.edu/caps), call 713-743-5454, or visit a [Let's Talk](#) location in-person or virtually. [Let's Talk](#) are daily, informal confidential consultations with CAPS therapists where no appointment or paperwork is needed.

The [Student Health Center](#) offers a Psychiatry Clinic for enrolled UH students. Call 713-743-5149 during clinic hours, Monday through Friday 8 a.m. - 4:30 p.m. to schedule an appointment.

The [A.D. Bruce Religion Center](#) offers spiritual support and a variety of programs centered on well-being.

### **Need Support Now?**

If you or someone you know is struggling or in crisis, help is available. Call CAPS crisis support 24/7 at 713-743-5454, or the National Suicide and Crisis Lifeline: call or text [988](tel:988), or chat [988lifeline.org](https://988lifeline.org).

### Academic Honesty Policy

High ethical standards are critical to the integrity of any institution, and bear directly on the ultimate value of conferred degrees. All UH community members are expected to contribute to an atmosphere of the highest possible ethical standards. Maintaining such an atmosphere requires that any instances of academic dishonesty be recognized and addressed. The [UH Academic Honesty Policy](#) is designed to handle those instances with fairness to all parties involved: the students, the instructors, and the University itself. All students and faculty of the University of Houston are responsible for being familiar with this policy.

### Title IX/Sexual Misconduct

Per the UHS Sexual Misconduct Policy, your instructor is a "responsible employee" for reporting purposes under Title IX regulations and state law and must report incidents of sexual misconduct (sexual harassment, non-consensual sexual contact, sexual assault, sexual exploitation, sexual intimidation, intimate partner violence, or stalking) about which they become aware to the Title IX office. Please know there are

places on campus where you can make a report in confidence. You can find more information about resources on the Title IX website at <https://uh.edu/equal-opportunity/title-ix-sexual-misconduct/resources/>.

### Reasonable Academic Adjustments/Auxiliary Aids

The University of Houston is committed to providing an academic environment and educational programs that are accessible for its students. Any student with a disability who is experiencing barriers to learning, assessment or participation is encouraged to contact the Justin Dart, Jr. Student Accessibility Center (Dart Center) to learn more about academic accommodations and support that may be available to them. Students seeking academic accommodations will need to register with the Dart Center as soon as possible to ensure timely implementation of approved accommodations. Please contact the Dart Center by visiting the website: <https://uh.edu/accessibility/> calling (713) 743-5400, or emailing [jdcenter@Central.UH.EDU](mailto:jdcenter@Central.UH.EDU).

### Excused Absence Policy

Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston [Undergraduate Excused Absence Policy](#) and [Graduate Excused Absence Policy](#) for reasons including: medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Under these policies, students with excused absences will be provided with an opportunity to make up any quiz, exam or other work that contributes to the course grade or a satisfactory alternative. Please read the full policy for details regarding reasons for excused absences, the approval process, and extended absences. Additional policies address absences related to [military service](#), [religious holy days](#), [pregnancy and related conditions](#), and [disability](#).

### Recording of Class

Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the [Justin Dart, Jr. Student Accessibility Center](#). If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructor's recordings for their own studying and notetaking. Instructor's recordings are not authorized to be shared with anyone without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.

## Recommended Language and Guidance

### Resources for Online Learning

The University of Houston is committed to student success, and provides information to optimize the online learning experience through our [Power-On](#) website. Please visit this website for a comprehensive set of resources, tools, and tips including: obtaining access to the internet, AccessUH, Blackboard, and Canvas; using your smartphone as a webcam; and downloading Microsoft Office 365 at no cost. For questions or assistance contact [UHOnline@uh.edu](mailto:UHOnline@uh.edu).

### UH Email

Please check and use your CougarNet email for communications related to this course. Faculty use the CougarNet email to respond to course-related inquiries such as grade queries or progress reports for reasons of FERPA. To access your CougarNet email, [login](#) to your Microsoft 365 account with your CougarNet credentials. Visit [University Information Technology \(UIT\)](#) for instructions on how to connect your CougarNet e-mail on a mobile device.

### Webcams

Access to a webcam is required for students participating remotely in this course. Webcams must be turned on (*state when webcams are required to be on and the academic basis for requiring them to be on*). (Example: *Webcams must be turned on during exams to ensure the academic integrity of exam administration.*)

### Security Escorts and Cougar Ride

UHPD continually works with the University community to make the campus a safe place to learn, work, and live. The security escort service is designed for the community members who have safety concerns and would like to have a Security Officer walk with them, for their safety, as they make their way across campus. Based on availability either a UHPD Security Officer or Police Officer will escort students, faculty, and staff to locations beginning and ending on campus. If you feel that you need a Security Officer to walk with you for your safety, please call [713-743-3333](tel:713-743-3333). Arrangements may be made for special needs.

Parking and Transportation Services also offers a late-night, on-demand shuttle service called “Cougar Ride” that provides rides to and from all on-campus shuttle stops, as well as the MD Anderson Library, Cougar Village/Moody Towers and the UH Technology Bridge. Rides can be requested through the UH Go app. Days and hours of operation can be found at <https://uh.edu/af-university-services/parking/cougar-ride/>.

### Syllabus Changes

Please note that the instructor may need to make modifications to the course syllabus. Notice of such changes will be announced as quickly as possible through (*specify how students will be notified of changes*).



## **Additional Recommended Issues to Address in the Syllabus**

### Artificial Intelligence

Instructors are recommended to develop language that will guide students in their use or prohibition of use of AI related tools. If an instructor allows the use of AI tools, they should clearly indicate in what ways they can be used, how they should be cited/reported, and for which assignments they are allowed. Note that Turnitin currently has a filter for ChatGPT, although there is approximately 2% rate of false positives. The following is a collection of classroom policies from a variety of universities for AI generative tools: [Classroom Policies for AI Generative Tools \(google.com\)](https://www.google.com).

### Online Exams

The Office of the General Counsel has recommended to make sure students are aware that: (1) students are permitted to take their online tests or quizzes in a computer lab or other open space; and (2) there is no requirement that a student use their own personal computer or that they complete exams and quizzes in any specific location (e.g., their home). The Office of the General Counsel has advised that students be made aware in advance that an environmental scan may be conducted as a part of an online exam.