Catalog Description
Mobile applications, their architecture, design, and supporting technologies; Mobile device operating systems and frameworks; synchronizing mobile applications, support for inter-application data-exchange; accessing and manipulating special-purpose device capability such as location, orientation, and input modality. Programming practices for securing mobile applications, and optimizing run-time performance. (3 credits)

Pre-Requisites
SER 321 (or CSE 445).

Pre-requisites by Topic
1. Web application development,
2. Developing distributed applications in a high-level language, such as Java, with events, serialization, sockets, and threads.
3. Experience developing applications having window-based user-interfaces (GUI); such as, FLTK, Qt for C++, and AWT or Swing for Java.
4. Experience learning new programming languages -- largely on your own. Swift is likely a new language for most students in the class, and will be required for programming exercises and/or on exams. Very little class time is devoted to teaching the Swift, but we do look at its less common features in class.

1. Contact Information
Tim Lindquist (Tim.Lindquist@asu.edu)
Office Phone: 480 727 2783;
Class Web Site: http://quay.poly.asu.edu/Mobile
Zoom: https://asuengineering.zoom.us/j/5931499831

2. Office Hours
Office Hours: T,Th 1-3pm
Office Location: Peralta 230D

Contact the instructor via email should you be unable to make contact during office hours. The instructor uses Zoom as linked from the class home page (and above) and tries to be available via zoom during all of his office hours. Also, Canvas Site Messaging, and email are usually the best contacts. Send him an email if you have questions or concerns.

3. Course Objectives and Expected Learning Outcomes
a) Students are able to: Learn sufficient developer techniques, and are able to select an appropriate mobile-device operating system and configuration to meet the requirements of a mobile application, knowing the tradeoffs involved such as performance, security, and available framework support. Program Student Outcome supported: ABET-7.
b) Students have knowledge of programming practices that are specific to developing efficient native applications for mobile devices, and knowledge of host and target development tools including emulators and simulators, as well as device runtime environments. Program Student Outcome supported: SER2.

c) Students have knowledge of and experience in developing applications with extensive user-interfaces in the context of limited display and various user input capabilities. Program Student Outcome supported: SER2.

d) Students are able to: Analyze, design and realize applications that synchronize mobile databases with information stores on other devices. Program Student Outcome supported: SER2.

e) Students are able to: Develop applications that communicate and synchronize among mobile and non-mobile devices, such as game applications. Program Student Outcome supported: SER2.

**Topics Covered**

a) Prerequisite review and introduction to course objectives.

b) Introduction to build tools Xcode and Android Studio, and to the Swift Programming Language.

c) Mobile app build phases; Mobile App Life-Cycle and corresponding call-back methods.

d) Model, View, and Control as applied to Mobile Apps.

e) User interfaces their controls, and layout managers.

f) User interfaces, navigation among views, sharing information among views.

g) User interfaces: composite view controls such as lists and pickers. Data sources, and delegates.

h) Persistence for Mobile Apps; internal versus external, sharing and protection; cloud and backup.

i) Persistence with databases (SQLite) and iOS Core Data.

j) Media playback, Mapping, and Location services

k) Settings for Mobile Apps – iOS versus Android

l) Content Sharing for Mobile Apps; sharing contact and calendar data. Sharing Vendor-Supplied App UI views for searching, adding and removing contacts and calendar entries.

m) Using the network for Mobile Apps, and resulting concerns for doing operations in the background rather than on the primary/UI thread.

4. **Grading Policies**

Final grades are assigned in the course based on the typical scale of 90% and above is an A, 80% to less than 90% is a B, 70% to less than 80% is a C, and 60% to less that 70% is a D. Below 60% is failing. The instructor reserves the right to lower the cut-offs for letter grades based on student performance, but the cut-offs will not be higher than listed above. A student’s overall percentage in the course is calculated based on the percentages listed below. Note that Grades Center on Blackboard/Canvas may not reflect this weighting. Grades may or may not be awarded using the +/- system as deemed appropriate by the instructor.

1. Laboratory assignments, and/or quizzes/worksheets are graded to account for 40% of the course grade.
2. A midterm exam accounts for 30% of the course grade, and
3. A final exam accounts for 30% of the course grade.
5. **Absence, Make-Up, Assignment Late Submission, and Exam Scheduling Policies**

Students are expected to adhere to the schedule posted for the course section as available on either or both of the class web site and/or Blackboard/Canvas site for the course. This includes material coverage, assignment due dates, and examination times. Students who miss class for reasons other than those described below will not be provided accommodation for exam rescheduling or late submissions. Late submission of programming assignments will receive from 0 to 50% of the total grades for the assignment, based on instructor discretion—primarily based on the criticality of the assignment to completing the remainder of course activities.

Accommodation will only be made for religious observances provided that the student notify the instructor at the beginning of the semester concerning those dates. Students who expect to miss class due to official university-sanctioned activities should inform the instructor at the beginning of the semester. Alternative arrangements will be made for any examinations and other graded in-class work affected by religious observance, and University-sanctioned activities only. The preceding policies are based on ACD 304–04, “Accommodation for Religious Practices” and ACD 304–02, “Missed Classes Due to University-Sanctioned Activities.”

6. **Readings, Assignments, Examinations, Special Materials, Required Activities**

Numerous textbook readings, instructor generated course notes, example software projects, constitute the content of this course and can be found on either the class web site, and/or the course Blackboard site. Unit-by-unit topical material is provided on the Class Schedule page of the course web site. These units are mapped to semester/session weeks by the course Blackboard site. Resources required to complete the course are explained on the Resources page of the course web site.

See the course required resources page at:
http://pooh.poly.asu.edu/Mobile/Resources/tools.html

See the Course Schedule and Detailed Topical Outline page at:
http://pooh.poly.asu.edu/Mobile/Schedule/schedule.html

7. **Classroom Behavior**

Cell phones and pagers must be turned off during class to avoid causing distractions. The use of recording devices is not permitted during class. Any violent or threatening conduct by an ASU student in this class will be reported to the ASU Police Department and the Office of the Dean of Students.

8. **Academic Integrity**

All students in this class are subject to ASU’s Academic Integrity Policy (available at http://provost.asu.edu/academicintegrity) and should acquaint themselves with its content and requirements, including a strict prohibition against plagiarism. All violations will be reported to the Dean’s office, who maintain records of all offenses. Students are expected to abide by the FSE Honor Code (http://engineering.asu.edu/integrity/).

Discussions among students on class material and laboratories are encouraged, but all students in this course must follow the AIP and must turn in their own work. That means that every source-code class
making up a laboratory app that you submit in this class must have your individual copyright, and it must have been developed by you. In addition to claiming ownership of the code you deliver in this class, you must grant the Instructor and ASU the right to build, evaluate and demonstrate your code. Any student found in violation of this policy and/or ASU’s AIP may be given a failing grade for the course. Example ways you can violate ASU’s AIP is to represent someone else's work as your own (whether you bought it or not) or if someone else represents your work as their own. Its fine to discuss concepts with others, and to help others locate and correct errors in their work. But, all graded work (exams, programming assignments, as well as any written exercises or quizzes) in this class must represent your own individual work. Grading may include executing student solutions using software that compares the structure and content of other student submissions, or other available solutions. Any cases of suspected violation of ASU’s AIP will be referred directly to the college office according to established policy. By your registration in this class, you are assumed to have read, understood and agreed to this policy.

ASU’s AIP: https://provost.asu.edu/academic-integrity

One ramification of this policy is that every student must assure that neither an electronic nor hard copy of their work is accessible to another student. If you share a computing system with someone else, you must know how to use access control to protect your files. If someone else steals your work (with or without your knowledge,) you may both get failing grade for the course.


Suitable accommodations will be made for students having disabilities and students should notify the instructor as early as possible if they will require same. Such students must be registered with the Disability Resource Center and provide documentation to that effect.

11. Sexual Discrimination

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at https://sexualviolenceprevention.asu.edu/faqs.

As a mandated reporter, The instructor and support staff are obligated to report any information they may become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, https://eoss.asu.edu/counseling, is available if you wish discuss any concerns confidentially and privately.

Notice: Any information in this syllabus (other than grading and absence policies) may be subject to change with reasonable advance notice.

Notice: All contents of this course, its lectures, including written materials distributed to the class, published on Blackboard or the class web site, and the example projects are all under copyright protection. Notes based on these materials may not be sold or commercialized without the express permission of the instructor, and adhering to any right-to-use license provided with the corresponding course artifact. [Note: Based on ACD 304-06.]