

METROPOLITAN STATE UNIVERSITY OF DENVER
Office of Academic and Student Affairs

REGULAR COURSE SYLLABUS

College of: Letters, Arts, and Sciences

Department: Mathematical and Computer Sciences

Prefix & Course Number: CS 3013 Crosslisted With*:

Course Title: Software Development for Mobile Devices

Transcript Course Title (30 characters): Sftware Dev for Mobile Devices

Check All That Apply: Required for Major: Required for Minor: Specified Elective:

Required for Concentration: Elective: Service Course:

To receive Title IV financial aid funds, all institutions of higher education must comply with the federal definition of a credit hour. The Higher Learning Commission requires institutions to maintain policies and procedures for verifying compliance with this definition.

Federal Credit Hour Definition: A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than:

(1) one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or (2) at least an equivalent amount of work as required in paragraph (1) of this definition for other activities as established by an institution, including laboratory work, internships, practica, studio work, and other academic work leading toward to the award of credit hours. 34CFR 600.2 (11/1/2010)

Credit Hours: 4 (4+0) Schedule Type: L Grade Mode: L

Face-to-Face or Equivalent Hours per course:

Lecture 60 Lab Internship Practicum Other (please specify type and hours):

Additional Student Work Hours per course: 120

Variable topics umbrella course: No Yes If Yes, number of credit hours allowed

Specified repeatable course: No Yes

Prerequisite(s): CS 2050 with a grade of "C" or better, or permission of instructor

APPROVED:

<u>A. J. [Signature]</u>	<u>10/1/2015</u>
Department Curriculum Committee	Date
<u>[Signature]</u>	<u>10.1.2015</u>
Department Chair OR Program Director	Date
<u>[Signature]</u>	<u>10/28/15</u>
Dean OR Associate Dean	Date
<u>[Signature]</u>	<u>1.15.17</u>
Associate VP, Academic Affairs	Date

*If crosslisted, attach completed Course Crosslisting Agreement Form

Corequisite(s): none

Prerequisite(s) or Corequisite(s): _____

Banner Enforced Coding:

Prerequisite(s): CS 2050 with a grade of "C" or better

Corequisite(s): _____

Prerequisite(s) or Corequisite(s): _____

Registration restrictions: Level UG Class _____ Program/Major _____ Student attribute _____

Catalog Course Description:

Mobile-device programming must address issues related to the characteristics of each device. The mobile device might have a small screen; limited memory; no hard drive; multiple radios; effectors such as vibrator, sound, and light; uses a multi-touch interface; and incorporates hardware sensors such as GPS, accelerometer, gyroscope, compass, and camera. In this course the students investigate issues involving mobile platforms and develop software for mobile platforms using multiple programming technologies.

Specific Variable Topics Course Description (if applicable, umbrella course description included above):

Required Reading and Other Materials will be equivalent to:

Brian Hardy and Bill Phillips (2013), "Android Programming: The Big Nerd Ranch Guide", Big Nerd Ranch Guides

Current appropriate papers such as:

Jon Oberheide and Farnam Jahanian, When Mobile is Harder Than Fixed (and Vice Versa): Demystifying Security Challenges in Mobile Environments. in *The Eleventh International Workshop on Mobile Computing Systems and Applications* February 22, 2010

R.C. Weih, Jr., M. Gilbert, J. Cross, and D. Freeman, Accuracy Assessment of Recreational and Mapping Grade GPS Receivers, in *Journal of the Arkansas Academy of Science*, Vol. 63, 2009, pp163-168

iOS User Interface guidelines:

<https://developer.apple.com/library/iOS/documentation/userexperience/conceptual/mobilehig/>

Designing User Experience of Mobile operator Apps - Windows Mobile User-interface Guidelines:

<http://www.microsoft.com/en-us/download/details.aspx?id=30697>

Android Design Guidelines: <http://developer.android.com/design/index.html>

Tizen UX Guidelines: <https://developer.tizen.org/documentation/ux-guide>

Albrecht Schmidt, *Context-Aware Computing*, in *The Encyclopedia of Human-Computer Interaction*, 2nd Ed, Chapter 14, http://www.interaction-design.org/encyclopedia/context-aware_computing.html

Specific, Measurable Student Behavioral Learning Objectives:

Upon completion of the course the student should be able to:

1. load original programs into a mobile device
2. write a mobile-device program that uses sensor input
3. write a mobile-device program that manages its own memory
4. write a mobile-device program that interacts with a program on the same device
5. write a program that interacts with a program on another device
6. develop a website that uses capabilities of mobile devices
7. articulate human-computer interface issues involved with designing software for a small touch screen
8. analyze security issues related to mobile-device software
9. articulate issues related to context-sensitive computing

Detailed Outline of Course Content (Major Topics and Subtopics):

- I. Overview of mobile computing
- II. Programming for a modern environment (For example: Android, iOS, Tizen, Windows, ...).
- III. Event-driven programming
- IV. Mobile hardware technology
 - A. Sensors: accelerometer, gyroscope, GPS, thermometer, light sensor, humidity sensor, etc.
 - B. Media input: camera, microphone, etc.
 - C. Radios: WiFi, cell, Bluetooth, Bluetooth LE, etc.
 - D. Touch Sensors
 - E. Response mechanisms: vibration, sound, light, etc.
- V. Programmatic use of sensors and response mechanisms
 - A. Motion sensing
 - B. Location sensing
 - C. Touch sensing
 - D. Initiating hardware action programmatically
- VI. Application interaction: write an application that interacts with another application such as a web browser, mapping application, photograph application, etc.
- VII. Security and privacy for mobile devices
- VIII. Device cooperation: write an application that interacts with another device such as: a remote computer, a remote sensor, another mobile device, etc.
- IX. Context aware computing
- X. Webpage development for mobile devices: Using an appropriate technology (such as JQuery Mobile), develop a website that uses some capabilities of the mobile device such as location sensing, motion sensing, etc.

Evaluation of Student Performance:

At least three of the following:

1. Programming assignments and projects.
2. 1 or more Mid-term exams
3. Writing assignment
4. Final exam