

DIG4634 Wearable and Mobile App Development

Instructor

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Office Location

CSE E428

Office Hours

TBA

Course Number

DIG4634

Semester/Year

Fall 2020

Course Credits

3 credits

Course Location

ONLINE - Sync

Course Meeting Times

MON Periods 8/9

WED Period 9

Course Description

This course will cover the software development protocols for wearable and mobile electronics such as head-mounted displays, watches and cell phones. Several embedded input/output interfaces will be studied including, position and orientation sensors, hand trackers, holographic and stereoscopic displays. The students will practice the covered material by developing prototype software applications for such devices.

Pre-Requisites

DIG3878 Applied Digital Media Protocols

Objectives: By the end of this course, students will be able to:

- Understand the characteristics and design elements required for wearable devices and systems to be widely adopted by the mainstream population for use in everyday life.
- Develop software development skills for wearable and mobile devices.
- Use the technologies embedded in contemporary wearable and mobile devices.

Required Materials

- Joseph L. Dvorak (2008). "Moving Wearables into the Mainstream: Taming the Borg", Publisher: Springer. ISBN: 978-1441943392 (Available to download as PDF through UF Libraries)

Recommended Materials

- Dawn Griffiths, David Griffiths (2017). "Head First Android Development: A Brain-Friendly Guide", Publisher: O'Reilly Media; 2 edition, ISBN-10: 9781491974056

Course Schedule

This class follows the “**flip the classroom**” model, which is shown to be advantageous compared to the traditional model. **There will be no lectures during our class sessions**; instead, you will have to watch lecture videos before class. **There are no homeworks**; instead, the majority of the weekly assignments will be completed during our live sessions (called “Labs”) with the live assistance of the instructor and peers.

Week 1		
	Lab Session A	Lab Session B
LIVE	3:00pm We will talk about the syllabus and the content of this class. 4:05pm-4:45pm: We will watch videos on Android Studio Overview .	4:05pm-4:45pm: You will be asked to install Android Studio, create an Android Virtual Device, and create a new Project. 10pts
LATER	Watch the videos on Programming Review : Introduction, Variables, Conditionals, Loops, Methods, Object Oriented Programming, Conclusion Watch the videos on Introduction to Wearables I . Read: Chapter 1 from the textbook. Due: Watch these videos by the end of this week.	

Week 2		
	Lab Session A	Lab Session B
LIVE	3:00pm: Canvas Quiz on Week 1 videos . 3:15pm: Read and start working on the Lab Assignment 3:30pm-4:45pm: Zoom Q&A. You may be asked to share your screen with the class.	4:05pm-4:45pm: Zoom. You will be asked to demonstrate your basic programming knowledge using Android Studio.
LATER	Watch the videos on Android Layouts and Views : Introduction, Layouts, Accessing GUI from the code, Button Listeners, Custom Icons, Custom Color Theme, Custom Design, Conclusion Watch the video on Introduction to Wearables Part II . Read: Chapter 1 from the textbook. Due: Watch these videos by the end of this week.	

Week 3		
	Lab Session A	Lab Session B
LIVE	3:00pm: Canvas Quiz on Week 2 videos . 3:15pm: Read and start working on the Lab Assignment 3:30pm-4:45pm: Zoom Q&A. You may be asked to share your screen with the class.	4:05pm-4:45pm: Zoom. You will be asked to create the layout of a calculator App and test in an emulated Android device. 10pts

LATER	<p>Watch the videos on Android Activities: Introduction, The concept of Activities, The Life Cycle of Activity, Creating New Activities, Transitioning between activities, Exchanging Data between Activities, Using global settings object, Conclusion</p> <p>Watch the video on Wearable System Applications.</p> <p>Read: Chapter 2 from the textbook.</p> <p>Due: Watch these videos by the end of this week.</p>
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Week 4		
	Lab Session A	Lab Session B
LIVE	<p>3:00pm: Canvas Quiz on Week 3 videos.</p> <p>3:15pm: Read and start working on the Lab Assignment</p> <p>3:30pm-4:45pm: Zoom Q&A. You may be asked to share your screen with the class.</p>	<p>4:05pm-4:45pm: Zoom. You will be asked to create a unit converted App and test in an emulated Android device. 10pts</p>
LATER	<p>Watch the videos on GPS and Location Services: Introduction, What is GPS, Simulating Location in Virtual Device, Keyhole Markup Language, Simulating Movement between places, Implementing Location Listener, Configuring Manifest File, Handling Permission Scenarios, Receiving Location Data, Calculating Distances, Treasure Hunt Example, Communicate extra data between activities, Conclusion</p> <p>Due: Watch these videos by the end of this week.</p>	

Week 5		
	Lab Session A	Lab Session B
LIVE	<p>3:00pm: Canvas Quiz on Week 4 videos.</p> <p>3:15pm: Read and start working on the Lab Assignment</p> <p>3:30pm-4:45pm: Zoom Q&A. You may be asked to share your screen with the class.</p>	<p>4:05pm-4:45pm: Zoom. You will be asked to create a GPS-based Treasure Hunt App and test in an emulated Android device. 10pts</p>
LATER	<p>Watch the videos on SurfaceView and Orientation Sensors: Introduction, Overview of motion sensors, Reading accelerometer data, Emulating accelerometer in AVD, SurfaceView, Combining Accelerometer and SurfaceView, Making a simple game, Simple Drawing in SurfaceView, Animating Content, Touch events in SurfaceView, Conclusion</p> <p>Watch the videos on Overview of wearable systems: Overview of wearable systems, What is mainstream wearable, Characteristics of wearable system, User Wearable Interaction Modes, Form Factors overview, Conversation with a skeptic</p> <p>Read: Chapter 3 from the textbook.</p> <p>Due: Watch these videos by the end of this week.</p>	

Week 6		
	Lab Session A	Lab Session B
LIVE	<p>3:00pm: Canvas Quiz on Week 5 videos.</p> <p>3:15pm: Read and start working on the Lab Assignment</p> <p>3:30pm-4:45pm: Zoom Q&A. You may be asked to share your screen with the class.</p>	<p>4:05pm-4:45pm: Zoom. You will be asked to create a 2D game using SurfaceView and Accelerometer sensors and test in an emulated Android device. 10pts</p>

LATER	<p>Watch the videos on Building a fully developed App: Introduction, Transferring components between projects, Full Screen Apps with Constrained Orientation, Multiple Activities, Communicating Variables, Advanced Methods, Object-Oriented Structure, Review, Conclusion</p> <p>Watch the videos on Mainstream wearable systems: Transparent use design, System Design Principles</p> <p>Read: Chapter 4 from the textbook.</p> <p>Due: Watch these videos by the end of this week.</p>
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Week 7		
	Lab Session A	Lab Session B
LIVE	<p>3:00pm: Canvas Quiz on Week 6 videos.</p> <p>3:15pm: Read and start working on the Lab Assignment</p> <p>3:30pm-4:45pm: Zoom Q&A. You will be asked to share your screen with the class.</p>	<p>4:05pm-4:45pm: Zoom. Midterm project proposals and discussion</p>
LATER	<p>Watch the videos on Wear OS: Introduction, Wear OS, Creating and running a virtual watch, Navigation and gestures, Creating a new project, Testing Multiple Activities, Testing a SurfaceView, Creating a face, Creating a custom face, Conclusion</p> <p>Due: Watch these videos by the end of this week.</p>	

Week 8		
	Lab Session A	Lab Session B
LIVE	<p>3:00pm: Canvas Quiz on Week 7 videos.</p> <p>3:15pm: Read and start working on the Lab Assignment</p> <p>3:30pm-4:45pm: Zoom Q&A. You may be asked to share your screen with the class.</p>	<p>4:05pm-4:45pm: Zoom. You will be asked to design a custom face for Wear OS and test it in an emulated watch. 10pts</p>
LATER	<p>Watch the videos on 3D graphics using GLSurfaceView Part I: Introduction, GLSurfaceView Make a custom renderer, Defining a 3D model, Animating 3D Models, Texturing 3D Models, Adding Normals to 3D Models, Conclusion</p> <p>Watch the videos on Mainstream wearable design in detail: Transparent Use Design Principles, Activity Task Analysis, Output Information Density, Applying the design principles</p> <p>Read: Chapter 5 from the textbook.</p> <p>Due: Watch these videos by the end of this week.</p>	

Week 9		
	Lab Session A	Lab Session B
LIVE	<p>3:00pm: Canvas Quiz on Week 8 videos.</p> <p>3:15pm: Midterm Project Presentations</p>	<p>4:05pm-4:45pm: Zoom. Midterm Project Presentations</p>

LATER	<p>Watch the videos on 3D graphics using GLSurfaceView Part II: Introduction, Test 3D Model in Wearable Device, Handle Touch Events, Modify Variables Using Touch Events, Simple Physics, Making a level, Endless Running Level, Adding Collectibles, Demo in Augmented Reality, Overview of the code, Conclusion</p> <p>Watch the videos on Awareness and Immersion: Pervasive Computing, Context Awareness</p> <p>Read: Chapter 6 from the textbook.</p> <p>Midterm project submission.</p> <p>Due: Watch these videos by the end of this week.</p>
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Week 10		
	Lab Session A	Lab Session B
LIVE	3:00pm: Canvas Quiz on Week 9 videos. 3:15pm: Read and start working on the Lab Assignment 3:30pm-4:45pm: Zoom Q&A. You may be asked to share your screen with the class.	4:05pm-4:45pm: Zoom. You will be asked to code a 3D model in GLSurfaceView. 10pts
LATER	<p>Watch the video on Collaborate with Git in Android Studio: Introduction, Version Control Systems, Git and applications, Sharing Android Studio Project in Github, Working in a group project, Conclusion</p> <p>Watch the video on How to develop a 3D App for Wear OS: Introduction, Review of previous project, Transitioning to Wear OS, Testing, Conclusion and next steps</p> <p>Watch the video on Brain Computer Interfaces: Theory 01 Brain Computer Interfaces</p> <p>Due: Watch these videos by the end of this week.</p>	

Week 11		
	Lab Session A	Lab Session B
LIVE	3:00pm: Canvas Quiz on Week 10 videos. 3:15pm: Read and start working on the Lab Assignment 3:30pm-4:45pm: Zoom Q&A. You may be asked to share your screen with the class.	4:05pm-4:45pm: Zoom. You will be asked to create a simple 3D app for Wear OS and test it in an emulated watch. 10pts
LATER	<p>Watch the videos on Developing Apps for Oculus Quest: Introduction, Oculus Quest Oculus SDK, OVR in Android Studio, Background 360 Images, Coding 3D Models, Student Examples, Shaders in GLSL, A few more features, Conclusions</p> <p>Due: Watch these videos by the end of this week.</p>	

Week 12		
	Lab Session A	Lab Session B
LIVE	3:00pm: Canvas Quiz on Week 11 videos. 3:15pm: Read and start working on the Lab Assignment 3:30pm-4:45pm: Zoom Q&A. You may be asked to share your screen with the class.	4:05pm-4:45pm: Zoom. Final project concept design and team making.

LATER	<p>Watch the videos on Cameras in Android: Introduction, Camera in the Emulator, Using Camera for Augmented Reality, A basic camera activity example, Sceneform Example, AR Core, Conclusion</p> <p>Watch the videos on Special Topic – CameraX and Machine Learning: Introduction, What is a camera, Android camera API, Android camera HAL, CameraX Use Cases, What is machine learning, Machine learning on Android, What is Kotlin, Camera and ML, Frame by Frame Analysis, Putting Everything Together, Live DEMO, Conclusion</p> <p>Due: Watch these videos by the end of this week.</p>
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Week 13		
	Lab Session A	Lab Session B
LIVE	<p>3:00pm: Canvas Quiz on Week 12 videos.</p> <p>3:15pm: Team meetings</p> <p>3:30pm-4:45pm: Zoom Q&A. You may be asked to share your screen with the class.</p>	<p>4:05pm-4:45pm: Final project Milestone 1</p>
LATER	<p>Watch the videos on Special Topic – Writing and Reading from Files in Android: Introduction, Internal Storage Example, Internal and External Storage, External Storage Example, Conclusions, Write data to internal storage, Use custom file format</p> <p>Due: Watch these videos by the end of this week.</p>	

Week 14		
	Lab Session A	Lab Session B
LIVE	<p>3:00pm: Canvas Quiz on Week 13 videos.</p> <p>3:15pm: Team meetings</p> <p>3:30pm-4:45pm: Zoom Q&A. You may be asked to share your screen with the class.</p>	<p>4:05pm-4:45pm: Zoom. Final project Milestone 2</p>
LATER	<p>Watch the videos on Special Topic – User Experience Research on Wearable Devices: Introduction, VR Conducting, VR Kayaking, Conclusion</p> <p>Due: Watch these videos by the end of this week.</p>	

Week 15		
	Lab Session A	Lab Session B
LIVE	<p>3:00pm: Canvas Quiz on Week 14 videos.</p> <p>3:15pm: Zoom. Final project presentations</p>	<p>4:05pm-4:45pm: Zoom. Final project presentations</p>
LATER	<p>Final project submission</p> <p>Due: By the end of this week.</p>	

Evaluation of Grades

Assignment	Total Points	% of Grade
Individual project (midterm): Towards the middle of the semester each student is expected to work on an individual project on mobile and/or wearable app development. The app developed by each student will be evaluated in terms of originality and complexity and demonstrated in class.	30	30%
Weekly assignments: There will be weekly or bi-weekly assignments, in which the students will be asked to perform an app development task, such as develop a small-scale app for a mobile device.	30	30%
Attendance and Participation: Students are expected to actively participate in the live sessions.	10	10%
Final project (group project): Final project is the final result of the semester long effort in learning. It is expected that in this final assignment, students organized in groups manifest their knowledge on the matter, and successfully deploy this knowledge in the practical format.	30	30%

Grading Scale

Letter Grade	% Equivalency	GPA Equivalency
A	94 – 100%	4.0
A-	90 – 93%	3.67
B+	87 – 89%	3.33
B	84 – 86%	3.00
B-	80 – 83%	2.67
C+	77 – 79%	2.33
C	74 – 76%	2.00
C-	70 – 73%	1.67
D+	67 – 69%	1.33
D	64 – 66%	1.00
D-	60 – 63%	.67
E, I, NG, S-U, WF	0 – 59%	0.00

More information on grades and grading policies is here:

<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

Materials and Supply Fees

Material and supply and equipment use fee information is available from the academic departments or from the schedule of courses (Florida Statutes 1009.24). The total course fee for this class is \$0.00.

The total course fee for each course is listed on the UF Schedule of Courses. (<https://registrar.ufl.edu/soc/>).

Course Polices

Attendance Policy, Class Expectations, and Make-Up Policy

We value participation more than mere attendance. The instructor is responsible for communicating the specific details of what percentage of your grade (if any) will be assigned to participation, and how class participation will be measured and graded. Interaction with your peers and the instructor will empower you to greater achievement.

Students are allowed three unexcused absences. If you miss more than three classes during the semester, each additional absence will lower your overall grade by 100 points. If you miss more than six classes, you will fail the course. Exempt from this policy are only those absences involving university-sponsored events, such as athletics and band, and religious holidays, family emergencies, and health issues for which you must provide appropriate documentation in advance of the absence.

Additionally, tardiness will not be tolerated. If you are tardy for three class periods, you will receive an unexcused absence.

Unless discussed at least 72 hours in advance of the deadline, late assignments will not be accepted. Excluded from this policy are any assignments missed due to medical emergencies.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

Course Technology

The students will be required to have access to and use a personal computer with the access to the Internet. Word editing software will be required for written assignments. Android Studio is required for the programming assignments.

The University of Florida and Digital Worlds requires that students have access to and on-going use of a laptop/mobile computer for DIG courses in order to be able to function in the current learning environment. Digital Worlds requires each student's laptop computer to meet certain minimum specs for heavy graphics use, the requirements documented below must be met.

[DW Technology Requirements](#)**Course Communications**

Students can communicate directly with the instructor regarding the course material through the course management system (CANVAS) using "Canvas Mail".

Course Recordings

Some of our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live.

The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

Course Technology Support

The [Technology Support Center](#) provides computer support for Digital Worlds students who access Zoom, lecture recordings, student equipment, facilities and other technology-based resources.

<http://digitalworlds.ufl.edu/support>

For computer assistance related to Zoon, lecture recordings, student equipment, and facilities request please [Submit a Help Ticket](#) or email support@digitalworlds.ufl.edu.

For support related to account services, technical consulting, mobile device services, software services, administrative support, application support center, and learning support services, please contact the [UF Computing Help Desk](#) available 24 hours a day, 7 days a week at 352-392-4357 or helpdesk@ufl.edu.

UF Policies

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Class Demeanor

Students are expected to arrive to class on time and behave in a manner that is respectful to the instructor and to fellow students. Please avoid the use of cell phones and restrict eating to outside of the classroom. Opinions held by other students should be respected in discussion, and conversations that do not contribute to the discussion should be held at minimum, if at all.

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center. [Click here to get started with the Disability Resource Center](#). It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Netiquette Communication Courtesy

All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats, more information can be found at: <http://teach.ufl.edu/wp-content/uploads/2012/08/NetiquetteGuideforOnlineCourses.pdf>

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see:

<http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. [Click here for guidance on how to give feedback in a professional and respectful manner](#). Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via ufl.bluera.com/ufl/. [Summaries of course evaluation results are available to students here](#).

Campus and Academic Resources

U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit [U Matter, We Care website](#) to refer or report a concern and a team member will reach out to the student in distress.

Counseling and Wellness Center: [Visit the Counseling and Wellness Center website](#) or call 352-392-1575 for information on crisis services as well as non-crisis services.

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or [visit the Student Health Care Center website](#).

University Police Department: [Visit UF Police Department website](#) or call 352-392-1111 (or 9-1-1 for emergencies).

UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; [Visit the UF Health Emergency Room and Trauma Center website](#).

E-learning technical support: Contact the [UF Computing Help Desk](#) at 352-392-4357 or via e-mail at helpdesk@ufl.edu.

Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.

Library Support: Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.

Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.

Student Complaints On-Campus: [Visit the Student Honor Code and Student Conduct Code webpage for more information.](#)

On-Line Students Complaints: [View the Distance Learning Student Complaint Process.](#)

Disclaimer: This syllabus represents the instructor's current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected.