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Office: E109, CSE building
Hours: Mondays 11:45am-1:45pm

DIG4634 WEARABLE AND MOBILE APP DEVELOPMENT

Fall 2024

Course Meetings: Mondays 7th period & Wednesdays 7-8th periods
Course Modality: Face-to-Face (F2F) Live

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.

Course Prerequisites

DIG3878 Game System Dev 2

Learning Outcomes

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.

Materials & Books

Required

- 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)

Supplemental

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

Technology Requirements

- Android Studio (free software).
- Laptop to run Android Studio (must bring in class).

Course Schedule

This schedule is only a guide and is subject to change. Unless otherwise indicated, assignments and readings are due the day they are listed on the syllabus, not the following day.

Week	Subject	Assignment Quizzes	Assignments Due
1	**Course Overview.** **Android Studio Overview.**	**Install Android Studio** **Discussion Assignments**	**In Class** **In Class**
2	**Programming Review**: Introduction, Variables, Conditionals, Loops, Methods, Object Oriented Programming, Conclusion **Introduction to Wearables I**	**Watch Videos** **Quiz on videos** **Programming Assignment 1** **Programming Review Quiz**	**Before Class** **In Class** **Wednesday 3:50pm** **In Class**
3	**Android Layouts and Views:** Introduction, Layouts, Accessing GUI from the code, Button Listeners, Custom Icons, Custom Color Theme, Custom Design, Conclusion **Introduction to Wearables Part II**	**Watch Videos** **Quiz on videos** **Programming Assignment 2**	**Before Class** **In Class** **Wednesday 3:50pm**
4	**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 **Wearable System Applications**	**Watch Videos** **Quiz on videos** **Programming Assignment 3**	**Before Class** **In Class** **Wednesday 3:50pm**
5	**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	**Watch Videos** **Quiz on videos** **Programming Assignment 4**	**Before Class** **In Class** **Wednesday 3:50pm**
6	**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 **Overview of wearable systems**: Overview of wearable systems, What is mainstream wearable, Characteristics of wearable system,	**Watch Videos** **Quiz on videos** **Programming Assignment 5**	**Before Class** **In Class** **Wednesday 3:50pm**

	User Wearable Interaction Modes, Form Factors overview, Conversation with a skeptic		
7	**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 **Mainstream wearable systems**: Transparent use design, System Design Principles	**Watch Videos** **Quiz on videos** **Midterm Project Proposal**	**Before Class** **In Class** **Wednesday 3:50pm**
8	**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	**Watch Videos** **Quiz on videos** **Programming Assignment 6** **Midterm project work in progress**	**Before Class** **In Class** **Wednesday 3:50pm** **Sunday midnight**
9	**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 **Mainstream wearable design in detail**: Transparent Use Design Principles, Activity Task Analysis, Output Information Density, Applying the design principles	**Watch Videos** **Quiz on videos** **Midterm Project Due**	**Before Class** **In Class** **Wednesday 3:50pm**
10	**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 **Awareness and Immersion**: Pervasive Computing, Context Awareness	**Watch Videos** **Quiz on videos** **Programming Assignment 7**	**Before Class** **In Class** **Wednesday 3:50pm**
11	**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 **How to develop a 3D App for Wear OS**: Introduction, Review of previous project, Transitioning to Wear OS, Testing, Conclusion and next steps	**Watch Videos** **Quiz on videos** **Programming Assignment 8**	**Before Class** **In Class** **Wednesday 3:50pm**
12	**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	**Watch Videos** **Quiz on videos** **Programming Assignment 9**	**Before Class** **In Class** **Wednesday 3:50pm**

13	**Cameras in Android**: Introduction, Camera in the Emulator, Using Camera for Augmented Reality, A basic camera activity example, Sceneform Example, AR Core, Conclusion **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	**Watch Videos** **Quiz on videos** **Final Project Proposal**	**Before Class** **In Class** **Wednesday 3:50pm**
14	**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	**Watch Videos** **Quiz on videos** **Final Project Work in Progress**	**Before Class** **In Class** **Sunday midnight**
15	**Special Topic – User Experience Research on Wearable Devices**: Introduction, VR Conducting, VR Kayaking, Conclusion	**Watch Videos** **Quiz on videos** **Final Project Due**	**Before Class** **In Class** **Wednesday 3:50pm**

Grading Criteria

Assignment / Assessment	Total Points	% of Grade
Programming 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. These assignments will be mainly completed in class with the assistance of the instructor.	30	30%
Homeworks: Students are expected to read chapters from the book and watch video resources as part of their homework. The reading and video homework must be completed before class and will be assessed in the form of quizzes as part of the in-class participation activities. Failure to complete these homeworks will result in poor performance in the in-class programming assignments and quizzes.	0	0%
Attendance and Participation: Students are expected to actively participate in the live sessions and respond to in class blog-type discussion assignments and in class quizzes on the material covered in the video resources.	10	10%
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%
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
A	94 – 100%
A-	90 – 93%
B+	87 – 89%
B	84 – 86%
B-	80 – 83%
C+	77 – 79%
C	74 – 76%
C-	70 – 73%
D+	67 – 69%
D	64 – 66%
D-	60 – 63%
E, I, NG, S-U, WF	0 – 59%

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 are 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 Policies

Attendance Policy, Class Expectations, and Make-Up Policy

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. The UF Digital Worlds Institute is committed to the idea that regular student engagement is essential to successful scholastic achievement. No matter if the class is held in a traditional classroom, an online classroom, or a combination of the two, interaction with your peers and the instructor will empower you to greater achievement.

Attendance is mandatory in this class and will be taken daily. 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.

In general, acceptable reasons for absence from or failure to participate in class include illness, serious family emergencies, special curricular requirements (e.g., judging trips, field trips, professional conferences), military

obligation, severe weather conditions, religious holidays, and participation in official university activities such as music performances, athletic competition, or debate. Students must provide appropriate documentation in advance of the absence when possible. No documentation is needed for an absence due to religious observation.

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 Modality

Course modality is the way in which a class is offered/delivered to students by the instructor. All students, regardless of the modality, will achieve the same learning objectives. Students can check their class schedules or reference the top of this syllabus to see the format(s) available for each of their individual classes. The modality of a course does not vary during a semester, and students are expected to adhere to the instructor-defined attendance guidelines for that format. Use the guide below to familiarize yourself with the various ways classes are offered at the Digital Worlds Institute.

Know Your Course Modality

<table>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td>Face-to-Face (F2F)</td><td>Online Asynchronous (OA)</td><td>Online Synchronous (OS)</td></tr>
<tr><td>Students attend class F2F in a classroom. Class sessions may be recorded for students to view later.</td><td>Students watch the posted recording of the class session or studio recording online at their convenience.</td><td rowspan="2">Students participate in a class in real-time through Zoom.</td></tr>
<tr><td colspan="2">Hybrid refers to a course that is partially Face-to-Face (F2F) and Online Asynchronous (OA)</td></tr>
<tr><td colspan="3">In a HyFlex Model, students have the flexibility of moving across all three modalities as needed or desired.</td></tr>
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Course Technology

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

The University of Florida and Digital Worlds requires that students have access to and ongoing 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 DAS major's laptop computer to meet certain minimum specs for heavy graphics use, the requirements documented below must be met. https://digitalworlds.ufl.edu/programs/ba-in-digital-arts-sciences/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

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.

Creation of Original Content Ethics

For original projects and all assignment deliverables, students should remember that representations of acts of violence, coarse and offensive language, sexual behavior, bodily function and ability, neurodiversity, and personal identity are likely to cause extreme audience response, regardless of the creator's intentions. In addition, the recreation of such actions and subjects for fictional purposes may unintentionally traumatize or negatively impact those who collaborate in the creation of the images. While the university encourages students to explore themes and tell stories that may include this difficult subject matter, they should be cautioned against modes or styles of representation that might be considered unnecessarily offensive or potentially triggering. Instructors, faculty, and university administrators reserve the right to not show or share any student work they feel is inappropriate for their classroom or for public exhibition, as there may be concerns about the impact of such work on the community. We encourage students to consult with their faculty when producing work that might be considered controversial, and to err on the side of being cautious when it comes to making decisions about a project's content - in other words, make the PG-13 version of your story, not the R version, and certainly not the "unrated" version. This is also to help students understand that most professional creative situations have strict guidelines and limitations on such content and how it is produced: your ability to tell stories effectively with "less" is a strong professional skill that will aid in the dissemination of your work to a broader audience.

Course Technology Support

Technology Support Center

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 requests please email support@digitalworlds.ufl.edu.

UF Computing Help Desk

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.

University 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 by visiting https://disability.ufl.edu/students/get-started/. 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: https://catalog.ufl.edu/UGRD/academic-regulations/ferpa-confidentiality-student-records/

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. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. 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 https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/

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.

Online 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.