

CEN 4725 / CEN 5726 Natural User Interaction

Course Syllabus, v1.0, last revised 1/4/2023

Course Logistics

Meeting Times:

- MWF Period 4 (10:40am – 11:30am)
- Final Exam: 5/02/2023 @ 3:00 PM - 5:00 PM

Meeting Location:

- Little Hall 0121 (LIT 0121)

Instructor Information

Instructor: Jaime Ruiz, PhD

- E-mail address: jaime.ruiz@ufl.edu (put 'NUI' in the subject)
- Course Questions: Use canvas discussions
- Office hours: Tuesday 10-11, Thursday 10-11
or by appointment
- Office location: CSE Building, E572

Teaching Assistant: Joseph Isaac

- Office hours: TBD, E309

Course Information

Catalog Descriptions:

CEN4725 - Natural User Interaction -- Credits: 3.

CEN5728 - Natural User Interaction -- Credits: 3.

Introduces the design, development and evaluation of Natural User Interaction (NUI) technologies (e.g., non-keyboard and mouse technologies such as touchscreen interaction, gesture interaction, speech interaction, etc.). Discussion of the hardware-to-software NUI pipeline and key considerations when developing NUI software, including existing platforms, toolkits and APIs used to create NUI software.

Course Overview:

This is a cross-listed undergraduate and graduate course that introduces students to the field of Natural User Interaction (NUI). NUI focuses on allowing users to interact with technology through the range of human abilities, such as touch, voice, vision and motion; some examples of NUI are touchscreen interactions with iPads and whole-body interactions with the Microsoft Kinect.

This class will serve as an introduction to the design, development, and evaluation of a range of current NUI technologies. In this course, students interact with the material through reading relevant literature, participating in group discussions, creating relevant presentations, working

on an individual or group project, and listening to guest speakers. Students will apply their knowledge in a research project where they design, implement, and evaluate a NUI prototype.

Comfortable experience with one or more of the following languages is recommended for this course: Java, C#, or Objective C. Students who have taken Human-Computer Interaction and/or User Experience Design will be more comfortable in this course, but it is not a prerequisite.

This course will be taught by Dr. Jaime Ruiz, an assistant professor in the Department of Computer and Information Science and Engineering (CISE) at UF.

Pre-requisites and Co-requisites:

- COP 3530 with minimum grade of C.

Course Components:

This course involves the following core components:

- Lectures – core NUI concepts will be presented and discussed.
- Research paper reading – recent HCI research conference and journal publications related to NUI will be read and discussed in class.
- Creation and evaluation of an interface – in groups, students will (1) create a NUI using one of the covered NUI platforms (e.g., touch/gesture, voice, motion), and (2) evaluate the NUI with their peers using HCI methods.

Course Objectives:

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

- Identify and characterize what is meant by the term “natural user interaction” as it is used in the field today.
- Compile and run “Hello World” level introductory applications in each of the covered NUI platforms (e.g., touch/gesture, voice, motion).
- Develop and evaluate a prototype application that uses a NUI paradigm.

Course Materials

Material and Supply Fees:

A small supply fee has been applied to help support a library of devices students may check out and borrow throughout the semester. These include google minis, amazon alexa dots, Microsoft Kinect v2 Cameras, Smart Phones, Amazon Fire Tablets

Textbooks and Software Required:

No textbook is required for this course. To provide students with access to the latest, most cutting-edge research developments in the field of NUI, weekly assigned readings will be posted to the course website one week prior to the due date. Students will be responsible for downloading the readings from the ACM Digital Library (<http://dl.acm.org/>). Access to readings on the ACM Digital Library are free when accessing the library on campus or via the UF VPN.

Students will do in-class work on their projects during the Friday meetings, and are therefore **required to bring a laptop to class**¹. The following free and open-source software packages may be necessary to be installed by students on their laptops over the course of the semester, depending on the project you choose:

- Android SDK (Java): <https://developer.android.com/sdk/index.html>
- Microsoft Kinect SDK (C#): <https://www.microsoft.com/en-us/kinectforwindows/>
- CMU Sphinx 4 SDK (Java): <http://cmusphinx.sourceforge.net/>
- Microsoft 5.1 Speech SDK (C#): <https://www.microsoft.com/en-us/download/details.aspx?id=10121>

Recommended Reading:

- How to set up the Android SDK bundle: <https://developer.android.com/sdk/installing/bundle.html>
- Android API Guides: <https://developer.android.com/guide/components/index.html>
- Learning Resources for the Microsoft Kinect SDK: <https://www.microsoft.com/en-us/kinectforwindows/develop/learn.aspx>
- CMU Sphinx Wiki: <http://cmusphinx.sourceforge.net/wiki/>
- Microsoft Developer Network – Speech API: <http://msdn.microsoft.com/en-us/library/ee125663%28v=vs.85%29.aspx>
- Microsoft Developer Network – Speech with the Kinect: <http://msdn.microsoft.com/en-us/library/jj131034.aspx>
- Microsoft Developer Network Homepage: <http://msdn.microsoft.com/en-us/library/ee125663%28v=vs.85%29.aspx>

Course Outline

Course Topics:

- Natural User Interaction as a field and how it relates to Human-Centered Computing / Human-Computer Interaction.
- Touch and Gesture Interaction on smart surfaces (e.g., touchscreen smartphones, tablet computers, etc.).
- Whole-body Interaction using 3D scanners/sensors (e.g., Microsoft Kinect).
- Speech and Voice Interaction using natural language input.
- NUI applications and active research areas.
- Evaluating prototypes with end-users.

¹ Consistent with UF College of Engineering computer requirements: “The University of Florida requires students to have access to a computer. The College of Engineering further requires that students have access to and on-going use of a laptop/mobile computer.” For more information, see <http://www.eng.ufl.edu/students/career-resources/computer-requirements/>

Grading

The following items will contribute to students' grades in this course:

Course Project <ul style="list-style-type: none">• Project Outline (video) 2.5%• Prototype Demo (presentation only) 5%• User Study Report (presentation + paper) 7.5%• Final Presentation + Demo 5%• Final Paper 15%	35%
Reading Summaries <p>You are expected to read the assigned papers for each class and write up your reflections on the research discussed in class. These are due the night before class at 11:50pm via canvas. See below for format of summaries.</p>	10%
Assignments <p>Includes programming assignments and quizzes.</p>	30%
Exams <ul style="list-style-type: none">• Midterm 10%• Final 14%	24%
Research Participation <p>See Research Participation and Extra Credit policy below</p>	1%

Grading Scale:

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

This course will use the Canvas e-Learning course management system to post grades and to communicate with class members. If you have a question about the course that other students could benefit from hearing the answer, please post to the appropriate discussion thread on Canvas rather than sending individual emails to the instructor/TA.

More information on UF grading policy may be found at:

[Grades and Grading Policies](#)

Expectations for Graduates vs. Undergraduates in this Course:

Graduate-level sections of this course require more work than the undergraduate sections.

Graduate students enrolled in this course must:

- Design and develop a more complex NUI prototype, and evaluate it with more users in the user study assignment.
- Complete one additional reading per week

Course Policies

Research Participation and Extra Credit

As part of this course, you are required to participate in one study and are eligible to earn extra credit by participating in an additional CISE human-subjects research studies. Each study participated in will be worth 1-2%, and students can earn up to 1% extra credit on their final course grade. Participation in human-subjects studies will be handled by the CISE department's Research Participant System which can be accessed at <https://ufl-cise.sona-systems.com>. To view and sign up for a study, log in to the system using your GatorLink username and password. Once you have successfully logged in, you will be able to see a list of studies with available timeslots. If there are no studies listed, there are currently no opportunities to participate, and you should check back later. Since the system works on a first-come basis, it is recommended you do not wait until the end of semester when the number of timeslots is limited.

If you schedule an appointment for a study, it is your responsibility to show up or cancel at least 24 hours before the appointment. Multiple unexcused absences will lock you out of the system. In addition, it is your responsibility to assign earned credits to the correct course. At the end of the semester, your instructor will be provided a history of your participation for grading purposes. For assistance with the Research Participation System, please view the Frequently Asked Questions located at https://ufl-cise.sona-systems.com/faq_view.aspx.

Participation in a study for extra credit is optional, but strongly encouraged. A replacement extra credit activity of a 500-word essay on a real-world example of very good or very bad natural user interaction (with justification as to why it's good or bad based on concepts from the class) will be worth 1%.

Research Summaries

Research papers will be made available throughout the semester on various NUI topics. Students are required to summarize the readings in two paragraphs for each paper. The first paragraph should summarize the paper. The second paragraph should analyze and critique the paper. Students should not copy sentences or phrases from the paper. All submissions will be run through plagiarism software and any violations will be reported. More information about research summaries will be made available in the second class meeting. Refer to these slides for more detail.

Attendance Policy, Class Expectations, and Make-Up Policy

(CEN 4725) Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

(CEN 5726) Excused absences must be consistent with university policies in the Graduate Catalog (<https://catalog.ufl.edu/graduate/regulations>) and require appropriate documentation. Additional information can be found here: <https://gradcatalog.ufl.edu/graduate/regulations/>

Late Assignments:

Unless otherwise specified, assignments are to be submitted to canvas before the start of class. Specifics will be included in each assignment. Always check the assignment page for due dates. You lose 25% of the maximum possible grade for each extra day. After 2 days, you won't get any credit for the assignment unless you obtain prior permission from the instructor. Electronic submission is closed 48 hours after assignments are due; students not having submitted programs receive an automatic zero on the assignment. The only exception to this rule is if students contact the instructor **in writing before the assignment due date**.

Attendance:

Attendance will not be graded. Engagement in class discussions is graded, however, so if students must miss class, the instructor recommends increasing participation on the other days. If a student is sick or will be absent for a significant period of time, please contact the instructor to work out a way to catch up.

Make-ups:

Students who contact the professor **before the due date** with appropriate requests for extension and/or makeup assignments will be given an additional amount of time to make up late assignments equal to the time lost due to the unforeseen circumstance.

There will be no makeup for missed quizzes and students will receive a zero. If a student is unable to attend a quiz due to a **documented** illness, accommodations will be made by the instructor according to university policy (See above).

Incompletes:

Incompletes will be granted for only the most extreme circumstances, e.g. medical or family reasons. To be considered for an incomplete, the student **must** 1) let the professor know at in advance that they are seeking an incomplete, and 2) provide documentation to support the request.

Requirements for class attendance and make-up exams, assignments, and other work are consistent with university policies that can be found at:
<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Classroom Expectations:

To be courteous to your fellow students, please:

- Turn all cell phone ringers to silent and step outside to take calls.
- Turn off all audible notifications on laptops and phones.
- Refrain from texting during class.
- Use laptops only for taking notes or looking up relevant information (no Facebook, YouTube, Twitter, etc.).

Guest Lectures:

In this course, guest lecturers are invited to present material related to their research and how it relates to the course material. These are experts in their fields and are taking time out of their busy schedules to share their knowledge with you. Please respect their time and attend the guest lectures as you would any other meeting of the course.

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.

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/>.

In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

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://sccr.dso.ufl.edu/process/student-conduct-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.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

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://registrar.ufl.edu/ferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <https://counseling.ufl.edu>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the [Office of Title IX Compliance](#), located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling; <https://career.ufl.edu>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>; <https://care.dso.ufl.edu>.

On-Line Students Complaints: <https://distance.ufl.edu/state-authorization-status/#student-complaint>.