FAU FLORIDA ATLANTIC UNIVERSITY	**COURSE CHANGE REQUEST** **Undergraduate Programs**	UUPC Approval _4-25-22_ UFS Approval _____ SCNS Submittal _____ Confirmed _____ Banner Posted _____ Catalog _____
	Department Electrical Engineering and Comp Science **College** Engineering & Computer Science	

Current Course **Prefix and Number**	CDA 4630	*Current* Course Title Intro to Embedded System Design

*Syllabus must be attached for **ANY** changes to current course details. See Checklist. Please consult and list departments that may be affected by the changes; attach documentation.*

Change title to:	**Change description to:**
Change prefix	
From: To:	
Change course number	**Change prerequisites/minimum grades to:**
From: To:	CDA 4240C /minimum grade C
Change credits*	
From: To:	
Change grading	**Change corequisites to:**
From: To:	
Change WAC/Gordon Rule status** Add ☐ Remove ☐	**Change registration controls to:**
Change General Education Requirements* Add ☐ Remove ☐ *Review Provost Memorandum **WAC/Gordon Rule criteria must be indicated in syllabus and approval attached to this form. See WAC Guidelines. ***General Education criteria must be indicated in syllabus and approval attached to this form. See GE Guidelines.	Please list existing and new pre/corequisites, specify AND or OR and include minimum passing grade (default is D-).

Effective Term/Year for Changes:	Summer 2022	**Terminate course? Effective Term/Year for Termination:**

Faculty Contact/Email/Phone Hanqi Zhuang, zhuang@fau.edu, 561-297-3413

Approved by		*Date*
Department Chair	_____	4/6/2022
College Curriculum Chair	Hongbo Su _____ *Digitally signed by Hongbo Su DN: CN=Hongbo Su, OU=FAU, E=xsu@fau.edu, C=US Reason: I am the author of this document Location: your signing location here Date: 2022.04.12 23:24:52-04'00' Foxit Reader Version: 10.1.1*	
College Dean	_____	4/11/22
UUPC Chair	Ethlyn Williams	4-25-22
Undergraduate Studies Dean	Dan Meeroff	4-25-22
UFS President	_____	_____
Provost	_____	_____

Email this form and syllabus to mjenning@fau.edu seven business days before the UUPC meeting.

CDA 4630-001 CRN15807, -002 21184

Intro to Embedded System Design

Lecture and Lab
W 4:00-6:50, Distance Learning
3 credits

Fall 2022
Prof. Bassem Alhalabi
Office: EE512
Office hours: TWR 2:00-3:30 pm
Telephone: 561-297-3182
Mobile: 561-239-1849
Email: alhalabi@fau.edu

TA name	Sasha Fung
Office	EE 203
Office hours	See Canvas
Telephone	See Canvas
Email	Sasha Fung <sfung2017@fau.edu>

Course Description

A system level software and hardware integration from design concepts to practical implementation covering both analog and digital signal conditioning and interface. The course projects include the design and interface of various sensors including basic ones such as temperature, humidity, motion, and pressure, and advanced ones such as accelerometers, compasses, Gyros, GPS. On the output side, students explore with LED arrays, key pads, servo and step motors, low voltage and high voltage SSR and actuators, etc. Communication between components is achieved at various levels, such as I2C, ISP, USB, RF, GSM, Bluetooth, Zbee, Wi-Fi, IoT, and others. Many of the course projects target home automation but it is always open for all other general acquisition and control application. The microcontroller platform is dynamically changed over the semesters to stay up-to-date with latest technologies in the market.

Class Theme
To keep the course technically diverse and interesting for everyone, multiple themes will be discussed in class covering several pragmatic areas of application, such as medical innovations, automotive applications, home automation, etc.

Students are encouraged to build their own hot and challenging ideas, but they should stay within the established themes which will be discussed in the class.

This course has several design contents.

COVID-19 Statement

Due to the surge in COVID-19 cases and the delta variant, all students regardless of vaccination status are expected to wear masks while indoors in any FAU facilities, including classrooms and laboratories. Students experiencing flu-like symptoms (fever, cough, shortness of breath), or students who have come in contact with confirmed positive cases of COVID-19, should immediately contact FAU Student Health Services (561-297-3512). Symptomatic students will be asked to leave the classroom to support the safety and protection of the university community. For additional information visit https://www.fau.edu/coronavirus/. In classes with face-to-face components, quarantined or isolated students should notify me immediately as you will not be able to attend class. I will not be able to offer an online version of the class but will make reasonable efforts to assist students in making up the work. Vaccinated students have much lower chances of needing to quarantine and a much lower chance of missing class time.

Instructional Method

This class is a mixed classroom/lab lecture course with midterm project to establish the basic skills, and then the term project with advanced sensors and actuators.

Class Time and Location:
Section 001, W 04:00 PM - 06:50 PM, Room EE207
Lecture Capture Recordings

Lab location and time:
EE-203, open online lab, Mon-Sun, see lab Timetable for exact TA hours.
Some lab hours may be conducted in person if the lab (EE-203) is open.

By registering for this class, the students hereby consent to recording of the class and potential use of the class material for other purposes.

Prerequisites/Corequisites

Prerequisites: CDA 4240C with minimum grade C.
Basic knowledge of C++, Java, .NET, Visual Basic, or any combination thereof.

Course Objectives/Student Learning Outcomes

1. To learn embedded design.
2. To learn advanced hardware and software co-design issues.
3. To learn advanced concepts of computer automation systems.
4. To develop basic and advanced skills of interfacing between computing systems and real-world signals, devices and systems.
5. To acquire hands-on experience with working electronic and electromechanical sensors and actuators.
6. To demonstrate knowledge through class exercises and a main course project.

Course Evaluation Method

Midterm project -	20%
Progress Reports 1, 2, and 3	20%
Demo and PPP -	20%
Source code and Executive Summary	20%
Final Report -	20%

Course Grading Scale

90-100 for "A" and "A-"; 80-89 for "B+", "B", or "B-"; 70-79 for "C+", "C", or "C-";
60-69 for "D+", "D" ,or "D-"; 59 and below: "F"
Note: The minimum grade required to pass the course is C

Policy on Makeup Tests, Late Work, and Incompletes (if applicable)

All course requirements are needed on time and no make up for any portion is allowed. Reasonable delays with adequate justification are acceptable.

Special Course Requirements (if applicable)

Students are encouraged to build their own mini tools boxes, with basic measuring tools such as a voltmeter.

Classroom Etiquette Policy (if applicable)

University policy requires that in order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular phones and laptops, are to be disabled or allowed in class sessions as needed. ¬ High level well behavior and class discipline are expected.

Attendance Policy

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

Counseling and Psychological Services (CAPS) Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to http://www.fau.edu/counseling/

Disability Policy

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

Code of Academic Integrity

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001.

If your college has particular policies relating to cheating and plagiarism, state so here or provide a link to the full policy—but be sure the college policy does not conflict with the University Regulation.

Required Texts/Readings

1-
Book, Recommended:
Programmable Microcontrollers with Applications: MSP430 Launch Pad with CCS and Grace By Cem Unsalan, 1st Edition
http://smile.amazon.com/dp/0071830030/ref=rdr_ext_tmb
If you did not take the CDA3331 at FAU, please read Chapters 4, 5, and 6 ahead.

Required Demo Board:
http://www.ti.com/tool/MSP-EXP430G2ET

Lab Kit, Required:
Lab kit including the aforementioned demo board, a breadboard, wires and various sensors and electronic parts must be purchased directory by students from this website, which is devoted for this class only. This Lab Kit is not available anywhere else!

Please order your Lab Kit directly from this site, and make sure you use a valid address so you can receive the kit directly to you without any delays.

Supplementary/Recommended Readings (if applicable)

2-

Read about this demo board, Launchpad, ahead of time. This Launchpad may use an MSP430 microcontroller which is a different version from the one we are studying in the book, but still very much the same MSP430 family, meaning same basic architecture with different functions, memory size, and/or pin count.

Here is the TI original data sheets on the micro of the kit NSP430G2553.

http://www.ti.com/lit/ds/symlink/msp430g2553.pdf

Please keep copies of pages (3 and 5) with you all the times.

3-

Please read ahead about the compiler:

http://www.ti.com/tool/ccstudio?DCMP=PPC_Google_TI&k_clickid=7948fe70-5539-a2a8-dbbf-00002b86f10f

And download it from:

http://processors.wiki.ti.com/index.php/Download_CCS#Code_Composer_Studio_Version_8_Downloads

onto your laptop, which you should bring with you all the time when we start the labs.

If you do not have a laptop, you will need to use the one in the lab room EE203.

4-

Also below is the link for a cd you can download which has programming examples.

http://www.ti.com/general/docs/lit/getliterature.tsp?baseLiteratureNumber=SSQC028&fileType=zip

5-

Please bring with you to the lab your own small tools kit, basically a small pliers, wire cutter, and small screw drivers set. You can find small kits at Lowes, Home Depot, Radio Shack, etc.

Course Topical Outline

1. Practical Interfacing techniques to analog and digital sensors and actuators
2. Motors and robotics interface
3. Serial communication with I/O devices
4. The second half of the semester is devoted for constructing the term projects where most of the class time is spent on hands-on details. You will get individual attention in the lab.
5. Mainly the entire course is devoted for term engineering project.
6. Some fields trips may apply