
 FLORIDA ATLANTIC UNIVERSITY	COURSE CHANGE REQUEST Graduate Programs		UGPC Approval _____ UFS Approval _____ SCNS Submittal _____ Confirmed _____ Banner _____ Catalog _____
	Department CEECS College Engineering and Computer Science		
Current Course Prefix and Number CNT 6108		Current Course Title Embedded Networked Sensor Systems	
Syllabus must be attached for ANY changes to current course details. See Guidelines . Please consult and list departments that may be affected by the changes; attach documentation.			
Change title to: Change prefix From: _____ To: _____ Change course number From: _____ To: _____ Change credits* From: _____ To: _____ Change grading From: _____ To: _____ Academic Service Learning (ASL) ** Add <input type="checkbox"/> Remove <input type="checkbox"/>		Change description to: Change prerequisites/minimum grades to: None Change corequisites to: Change registration controls to:	
* Review Provost Memorandum ** Academic Service Learning statement must be indicated in syllabus and approval attached to this form.		Please list existing and new pre/corequisites, specify AND or OR and include minimum passing grade.	
Effective Term/Year for Changes: Spring 2021		Terminate course? Effective Term/Year for Termination:	
Faculty Contact/Email/Phone Hanqi Zhuang/zuang@fau.edu/ 297-3413			
Approved by Hanqi Zhuang Department Chair _____ College Curriculum Chair Francisco Presuel-Moreno College Dean  UGPC Chair _____ UGC Chair _____ Graduate College Dean _____ UFS President _____ Provost _____		Date _____ _____ 10/25/2020 _____ _____ _____ _____	
<small>Digitally signed by Hanqi Zhuang Date: 2020.10.21 15:44:01 -04'00'</small>		<small>Digitally signed by Francisco Presuel-Moreno DN: cn=Francisco Presuel-Moreno, o=Florida Atlantic University, ou=Ocean and Mechanical Engineering, email=fpresuel@fau.edu, c=US Date: 2020.10.21 15:04:51 -04'00'</small>	
<small>Digitally signed by M. Cardei DN: cn=M. Cardei, ou=Florida Atlantic University, ou=College of Engineering, email=cardei@fau.edu, c=US Date: 2020.10.21 15:46:27 -04'00'</small>			

Email this form and syllabus to UGPC@fau.edu 10 days before the UGPC meeting.

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1. Course title/number, number of credit hours	
Embedded Networked Sensor Systems / CNT 6108	3 credit hours
2. Course prerequisites, corequisites, and where the course fits in the program of study	
Prerequisites: None	
3. Course logistics	
Term: Location & Time:	
4. Instructor contact information	
Instructor's name Office address Office Hours Contact telephone number Email address	
5. TA contact information	
TA's name Office address Office Hours Contact telephone number Email address	
6. Course description	
This course introduces the technical foundations of embedded networked sensor systems, the building blocks of the Internet of Things. Both theory and implementation are emphasized, covering concepts, software foundations, basic embedded circuits, communication protocols and network algorithms.	
7. Course objectives/student learning outcomes/program outcomes	
Course objectives:	<p>Upon completing the course, students will</p> <ul style="list-style-type: none"> • <i>Understand the concepts that underlie the Internet of Things</i> • <i>Understand the applications of IoT technology</i> • <i>Achieve competency in embedded programming using an ARM-class processor</i> • <i>Understand the construction and operation of basic sensors and actuators</i> • <i>Achieve competency in using some of the most common embedded peripherals</i> • <i>Be capable of reasoning about and applying some of the most common sensor networking algorithms</i> • <i>Have a basic understanding of embedded circuits</i> • <i>Be capable of integrating IoT devices with upper-tier cloud services</i>

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	<ul style="list-style-type: none"> • <i>Have completed a research-oriented experimental evaluation of system performance and/or a new system peripheral</i>
8. Course evaluation method	
<p>Projects - 65 %</p> <ul style="list-style-type: none"> • Project #1 – 15% • Project #2 – 25% • Project #3 – 15% • Project #4 – 10% <p>Midterm - 15 %</p> <p>Final Examination - 20 %</p> <p><i>I reserve the right to adjust the percentage weight within each category by up to 15%</i></p>	<p>Each project involves a significant software implementation for an ARM-based development board with associated add-on boards for sensing and communication. The first project is completed independently, and the last three projects are completed in groups of two to three. The final project involves experimental evaluation of system performance. Each project culminates in the submission of a video demonstration of the implementation. The final project includes a written report of experimental findings.</p>
9. Course grading scale	
<p>Grading Scale (%):</p> <ul style="list-style-type: none"> • > 90.00 : A • 85.00 – 89.99 : A- • 82.00 – 84.99: B+ • 77.00 – 81.99: B • 75.00 – 76.99: B- • 72.00 – 74.99: C+ • 67.00 – 71.99: C • 65.00 – 66.99: C- • < 65.00: F <p><i>I reserve the right to make the grading scale more lenient (i.e., in your favor).</i></p>	
10. Policy on makeup tests, late work, and incompletes	
<p>All deliverables must be submitted at the beginning of the class period on their due date. Late work will not receive any credit. Similarly, failure to attend class on the day of a scheduled presentation or exam will result in an automatic zero for the work. If a student arrives late on the day of a scheduled presentation or exam, he/she will be allowed to participate, but will not be given additional time to compensate for being tardy. Make-up work will be granted only with a written medical or university excuse. It is the student's responsibility to give me the written excuse and to arrange for the make-up work within one week of the absence.</p> <p>If you are having difficulties with the course material, or would like to suggest improvements to the course, please do not hesitate to make an appointment with me to chat.</p>	
11. Special course requirements	
N/A	

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12. Classroom etiquette policy

Students are expected to attend every class. If you must miss a class, it is your responsibility to get any missed lecture notes, handouts, and assignments from your fellow students. **As a courtesy to me, when you do attend class, please show up on time.**

If I am more than ten minutes late to class, you should assume that I am dealing with an emergency, and that I will not be able to make it to class. In such a rare case, class is automatically canceled, and you are free to leave.

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 in class sessions.

This is a discussion-oriented course. For us to maximize the benefit of our time together, students are expected to actively engage in classroom discussions.

13. Attendance policy statement

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.

14. Disability policy statement

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/

15. 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/>

16. Code of Academic Integrity Policy Statement

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

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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](#).

17. Required texts/reading

There are no required textbooks for this course.

18. Supplementary/recommended readings

Students will be required to read portions of the following documents:

http://ww1.microchip.com/downloads/en/DeviceDoc/Atmel-42023-ARM-Microcontroller-ATSAM4L-Low-Power-LCD_Datasheet.pdf

http://infocenter.arm.com/help/topic/com.arm.doc.dui0553a/DUI0553A_cortex_m4_dgug.pdf

http://www.atmel.com/Images/Atmel-42103-SAM4L8-Xplained-Pro_User-Guide.pdf

http://www.atmel.com/images/atmel-42078-io1-xplained-pro_user-guide.pdf

http://www.atmel.com/images/atmel-42028-lightweight-mesh-developer-guide_application-note_avr2130.pdf

19. Course topical outline, including dates for exams/quizzes, papers, completion of reading

The content of this course evolves from one semester to the next to keep pace with the current state of the art. The syllabus is not fixed. Hence, the following topic list should be considered tentative:

The **approximate** ordering of topics is as follows:

- **Week 1**
 - *Introduction to the Internet of Things*
 - *Introduction to the development tool-chain*
- **Week 2**
 - *Introduction to embedded programming*
 - *Introduction to the ARM Cortex-M4*
- **Week 3-4**
 - *Programming the ARM Cortex-M4*
 - **Project deadline**
- **Week 5-6**
 - *Serial communication protocols*
 - *UART, SPI, I2C*
- **Weeks 7-8**
 - *Introduction to analog and digital sensing*
 - *Programming embedded sensors*
 - **Project deadline**
 - **Midterm exam**
- **Weeks 9-10**
 - *Embedded event scheduling*

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- *Programming embedded radios*
- **Week 11-12**
 - *Convergecast routing protocols*
 - ***Project deadline***
- **Week 13-14**
 - *Time synchronization protocols*
 - ***Project deadline***
- **Week 15**
 - *Cloud integration*
- **Final Exam**