

## COURSE SYLLABUS

### TED UNIVERSITY, COURSE SYLLABUS

<b>Faculty</b>	Engineering	<b>Department</b>	CMPE
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<b>Course Code &amp; Number</b>	CMPE453	<b>Course Title</b>	Embedded Systems
<b>Type of Course</b>	<input checked="" type="checkbox"/> Compulsory <input type="checkbox"/> Elective	<b>Semester</b>	2023-2024 <input checked="" type="checkbox"/> Fall <input type="checkbox"/> Spring <input type="checkbox"/> Summer
<b>Course Credit Hours</b>	(3+0+0) 3	<b>Number of ECTS Credits</b>	6
<b>Pre-requisite</b>	N/A	<b>Co-requisite</b>	N/A
<b>Mode of Delivery</b>	<input checked="" type="checkbox"/> Face-to-face <input type="checkbox"/> Distance learning	<b>Language Instruction of</b>	<input checked="" type="checkbox"/> English <input type="checkbox"/> Turkish
<b>Course Coordinator</b>	Assoc. Prof. Muhammad Awais	<b>Course Lecturer(s)</b>	Prof. Saiful Islam Assoc. Prof. Muhammad Awais Asst. Prof. Yücel Çimtay
<b>Required Reading</b>	1- Make: AVR Programming, Third Edition, by Elliot Williams.  2- LPC2148 Datasheet	<b>Recommended Reading</b>	1- The AVR Microcontroller and Embedded Systems Using Assembly And C, 2nd ed. By Muhammad Ali Mazidi, Sepehr Naimi, Sarmad Naimi. 2- ARM System Developer's Guide, Designing and optimizing System Software, by Andrew N. Sloss, Dominic Symes, Chris Wright

<b>Course Catalog Description</b>	Basic components of a single-board computer. Microprocessors and micro controllers. Microcontroller based systems. AVR and ARM Microcontrollers, Embedded C coding. Input and output (I/O) ports. Basic I/O protocols. Serial communication, Interrupts.
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<b>Course Objectives</b>	The objective of this course is to provide knowledge of the types of embedded systems, their hardware components and the programming languages used for developing software on them.
<b>Course Learning Outcomes</b>	<p>Upon successful completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Identify the components of an embedded system</li> <li>2. The properties of different types of microprocessors used in embedded systems</li> <li>3. Recognize Embedded C to write programs for embedded systems</li> <li>4. Analyze the use of ports on embedded systems</li> <li>5. Recognize the use of input/output protocols</li> <li>6. Analyze the serial communication units on Embedded Systems</li> <li>7. Underline the use of interrupts on embedded systems</li> </ol>
<b>Course Contents</b>	Basic components of a single-board computer. Microprocessors and micro controllers. Microcontroller based systems. AVR and ARM Microcontrollers, Embedded C coding. Input and output (I/O) ports. Basic I/O protocols. Serial communication, Interrupts.

<b>Teaching Methods &amp; Learning Activities</b>	<input checked="" type="checkbox"/> Telling/Explaining <input type="checkbox"/> Discussions/Debates <input checked="" type="checkbox"/> Questioning <input checked="" type="checkbox"/> Reading <input type="checkbox"/> Peer Teaching <input type="checkbox"/> Scaffolding/Coaching <input type="checkbox"/> Demonstrating <input checked="" type="checkbox"/> Problem Solving <input type="checkbox"/> Inquiry <input type="checkbox"/> Collaborating <input type="checkbox"/> Think-Pair-Share <input type="checkbox"/> Predict-Observe-Explain <input type="checkbox"/> Microteaching <input type="checkbox"/> Case Study/Scenario Analysis	<input type="checkbox"/> Simulations & Games <input type="checkbox"/> Video Presentations <input checked="" type="checkbox"/> Oral Presentations/Reports <input type="checkbox"/> Concept Mapping <input type="checkbox"/> Brainstorming <input type="checkbox"/> Drama/Role Playing <input type="checkbox"/> Seminars <input type="checkbox"/> Field Trips <input type="checkbox"/> Guest Speakers <input type="checkbox"/> Hands-on Activities <input type="checkbox"/> Service Learning <input type="checkbox"/> Web Searching <input checked="" type="checkbox"/> Experiments <input type="checkbox"/> Other(s): .....
<b>Assessment Methods</b> (Formal & Informal)	<input checked="" type="checkbox"/> Test/Exam <input checked="" type="checkbox"/> Quiz/Homework <input checked="" type="checkbox"/> Lab Assignment <input type="checkbox"/> Oral Questioning <input type="checkbox"/> Performance Project <div> <input type="checkbox"/> Written             <input type="checkbox"/> Oral           </div>	<input type="checkbox"/> Observation <input type="checkbox"/> Self-evaluation <input type="checkbox"/> Peer Evaluation <input type="checkbox"/> Portfolio <input type="checkbox"/> Presentation (Oral, Poster) <input type="checkbox"/> Other(s): .....

<b>Student Workload</b> (Total 184 Hrs)	<input checked="" type="checkbox"/> Lectures .....28.. hrs <input checked="" type="checkbox"/> Course Readings .....42.. hrs <input type="checkbox"/> Workshop ..... hrs <input type="checkbox"/> Online Discussion ..... hrs <input type="checkbox"/> Debate ..... hrs <input type="checkbox"/> Work Placement ..... hrs <input type="checkbox"/> Field Trips/Visits ..... hrs <input type="checkbox"/> Observation ..... hrs <input type="checkbox"/> Lab Applications .....32 hrs <input type="checkbox"/> Hands-on Work ..... hrs <input checked="" type="checkbox"/> Quizzes and Homeworks.....8.. hrs <input checked="" type="checkbox"/> Midterm I.....20.. hrs <input type="checkbox"/> Midterm II..... hrs <input checked="" type="checkbox"/> Final.....20.. hrs	<input type="checkbox"/> Resource Review ..... hrs <input type="checkbox"/> Research Review ..... hrs <input type="checkbox"/> Report on a Topic ..... hrs <input type="checkbox"/> Case Study Analysis ..... hrs <input type="checkbox"/> Oral Presentation ..... hrs <input type="checkbox"/> Poster Presentation ..... hrs <input type="checkbox"/> Demonstration ..... hrs <input type="checkbox"/> Web Designs ..... hrs <input type="checkbox"/> Mock Designs ..... hrs <input type="checkbox"/> Team Meetings..... hrs <input type="checkbox"/> Other ..... hrs
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COURSE ASSIGNMENTS
<b>A. Midterm [18 %]</b>
<b>C. Quizzes [20%]</b>
There will be 2 quizzes, each quiz worth 10% of the overall grade.
<b>D. Labs [%32]</b>
There will be 8 labs each worth 4% of the overall grade.
<b>D. Final [30%]</b>
<b>RULE: Up to final exam, the students who do not have 52 out of 70 points will fail the course.</b>

COURSE POLICIES
<b>I . Attendance</b>
Attendance to the lectures is not mandatory. <b>The students who do not attend a min. of 5 labs will fail the course.</b>
<b>II . Missed Work</b>
Makeup for the midterm exam will be provided if the student can provide a legal document confirming a life threatening health issue at the time of the exam, or with the consensus of the CMPE faculty. <i>There will be no makeup labs and quizzes.</i>
<b>III. Late Assignment Submission Policy</b>
Late submissions will not be graded.
<b>IV. Extra Credit</b>
Extra credits will not be offered.
<b>V. Assignment Rules</b>
All assignment works must be done individually. A student can submit only one work. In case of multiple submissions, only

the latest submission will be considered. Students cannot submit work on other students' behalf.

## VI. Plagiarism

All of the following are considered plagiarism:

1. turning in someone else's work as your own
2. copying words or ideas from someone else without giving credit
3. failing to put a quotation in quotation marks
4. giving incorrect information about the source of a quotation
5. changing words but copying the sentence structure of a source without giving credit
6. copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not" ([www.plagiarism.org](http://www.plagiarism.org))

Plagiarism is a very serious offense and will be penalized accordingly by the university disciplinary committee. The best way to avoid accidentally plagiarizing is to work on your own before you ask for the help of other resources.

## VII. Cheating

Cheating has a very broad description which can be summarized as "acting dishonestly". Some of the things that can be considered as cheating are the following:

- Copying answers on examinations, homework and laboratory works,
- Using prohibited material on examinations,
- Lying to gain any type of advantage in class
- Providing false, modified or forged data in a report
- Plagiarizing
- Modifying graded material to be regraded.
- Causing harm to colleagues by distributing false information about an examination, homework or laboratory

Cheating is a very serious offense and will be penalized accordingly by the university disciplinary committee.

## VIII. Class Readings

Class readings are necessary but not mandatory. The material covered in class by your instructor will only provide a fundamental understanding of the general context. These materials alone are **definitely not** sufficient for learning the subject. If you are willing to effectively learn something, you must actively work on it yourself. Reading is one of the most successful ways of learning about a topic.

Weeks	Date	Topics	Readings	Assignments
1	Oct. 2-6	Architecture of AVR microcontroller (ATMEGA328p)	Elliot, Ch.1	No Lab
2	Oct. 9-13	Programming AVR microcontroller-1	Elliot, Ch.2-4	No Lab
3	Oct. 16-20	Programming AVR microcontroller-2	Elliot, Ch.2-4	No Lab
4	Oct. 23-27	Serial Communication: USART, SPI, I2C	Elliot, Ch.5	Lab-1
5	Oct. 30-Nov.3	Serial Communication: USART, SPI, I2C	Elliot, Ch.5	No Lab
6	Nov. 6-10	Analog-to-Digital Conversion (ADC)	Elliot, Ch.7	Lab-2 Quiz-1
7	Nov. 13-17	Analog-to-Digital Conversion (ADC)	Elliot, Ch.7	No Lab
8	Nov. 20-24	Interrupts	Elliot, Ch.8	Lab-3

9	Nov. 27-Dec. 1	Timers/counters	Elliot, Ch.9	Lab-4 <a href="#">Midterm</a>
10	Dec. 4-8	PWM	Elliot, Ch.10	Lab-5
11	Dec. 11-15	Basics of LPC2148 (ARM7), Pin Select Register	LPC2148 Datasheet	Lab-6
12	Dec. 18-22	GPIO Configuration and Led Blinking	LPC2148 Datasheet	No lab
13	Dec. 25-29	Timer Mode	LPC2148 Datasheet	Lab-7 <a href="#">Quiz-2</a>
14	Jan. 1-5	PWM for LPC2148	LPC2148 Datasheet	Lab-8

<b>Prepared By &amp; Date</b>	Dr. Yücel Çimtay 22/09/2023	<b>Revision Date</b>	
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