

	<b>Course name:</b> EE216– Introduction to Microprocessors		<b>Department:</b> Electrical and Electronics Engineering			<b>Semester</b>
						5
	<b>Methods of Education</b>					<b>Credit (ECTS)</b>
	Lecture	Study Time	Homework	Exam (incl. Prep.)	Total	5
42	20	60	20	142		
<b>Language</b>	English					
<b>Compulsory/Elective</b>	Compulsory					
<b>Prerequisites</b>	Math101 or Math102					
<b>Course Contents</b>	<p>Lectures will focus on microprocessor organization, assembly language, I/O techniques, real-time interfaces, applications, hardware and software. Lab sections will focus on the STM32F0 32 bit Flash microcontrollers based on the ARM Cortex M0 processor, in order to learn how to design, build, and program embedded systems. STM32F0 Cortex-M0 offers a 32 bit product range that combines very high performance, real-time capabilities, digital signal processing, and low power, low voltage operation, while maintaining full integration and ease of development. Labs during the first half of the course will focus on essential topics. The second half of the course will focus on the design and implementation of non-trivial, open-ended project involving both hardware and software.</p>					
<b>Course Objective</b>	<p>The primary goal of this course is to give students the fundamental skills needed to understand, use, and design microcontroller-based systems. The class focuses on basic computer organization and introductory microprocessor architecture. Specifically, this class will be covering the following:</p> <ul style="list-style-type: none"> <li>• Introduction to assembly language programming: basic instructions, program segments, registers and memory.</li> <li>• Control transfer instructions; arithmetic, logic instructions; rotate instructions and bitwise operations in assembly language.</li> <li>• Basic computer architecture: pin definitions and supporting chips. Memory and memory interfacing.</li> <li>• Basic I/O and device interfacing: I/O programming in assembly and programmable peripheral interface (PPI).</li> <li>• Interfacing the parallel and serial ports.</li> </ul>					
<b>Learning Outcomes and Competences</b>	<ol style="list-style-type: none"> <li>1. An ability to program a microcontroller to perform various tasks.</li> <li>2. An ability to interface a microcontroller to various devices.</li> <li>3. An ability to effectively utilize microcontroller peripherals.</li> <li>4. An ability to design and implement a microcontroller-based embedded system.</li> </ol>					
<b>Textbook and /or References</b>	<ol style="list-style-type: none"> <li>1. Daniel W. Lewis, Fundamental of Embedded Software with ARM Cortex M3, 2nd Edition, Pearson 2013, ISBN 978-0-13-291654-7</li> <li>2. Joseph Yiu, The Definitive Guide to the ARM Cortex-M0, 1st Edition, Elsevier 2011, ISBN 9780123854773</li> </ol>					
<b>Assessment Criteria</b>				<b>If any, mark as (X)</b>	<b>Percentage (%)</b>	
	<b>Midterm Exams</b>			X	30	
	<b>Quizzes</b>			X	10	
	<b>Homework</b>			X	0	
	<b>Projects</b>			X	5	
	<b>Laboratory work</b>			X	15	
	<b>Other</b>					
<b>Final Exam</b>			X	40		
<b>Instructors</b>	Assist. Prof. Dr. Enver ÇAVUŞ					
<b>Weekly Schedule</b>						
<b>Week</b>	<b>Subject</b>					
1	Introduction to embedded systems and review of digital systems and data representation					
2	Introduction to embedded systems and review of digital systems and data representation					
3	<b>Microcontroller Instruction Set:</b> Addressing modes; Data transfer, arithmetic, logical, branch, stack and machine control groups of instruction set; Unspecified flags and instructions					
4	<b>Microcontroller Instruction Set:</b> Addressing modes; Data transfer, arithmetic, logical, branch, stack and machine control groups of instruction set; Unspecified flags and instructions					

5	<b>Assembly Language Programming:</b> Assembler directives, simple examples; Subroutines, parameter passing to subroutines.
6	<b>Assembly Language Programming:</b> Assembler directives, simple examples; Subroutines, parameter passing to subroutines.
7	<b>Interfacing:</b> microcontroller bus timing analysis, multiplexed bus expansion, general-purpose I/O and printer interface, buffered I/O handling, interrupt handling, applications
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9	<b>Mid-term Exam</b>
10	<b>Interfacing:</b> microcontroller bus timing analysis, multiplexed bus expansion, general-purpose I/O and printer interface, buffered I/O handling, interrupt handling, applications
11	<b>Interfacing:</b> microcontroller bus timing analysis, multiplexed bus expansion, general-purpose I/O and printer interface, buffered I/O handling, interrupt handling, applications
12	<b>Interrupts:</b> Interrupt structure of Cortex-M0 microprocessor, processing of vectored and nonvectored interrupts, latency time and response time; Handling multiple interrupts
13	<b>Interrupts:</b> Interrupt structure of Cortex-M0 microprocessor, processing of vectored and nonvectored interrupts, latency time and response time; Handling multiple interrupts
14	<b>Interrupts:</b> Interrupt structure of Cortex-M0 microprocessor, processing of vectored and nonvectored interrupts, latency time and response time; Handling multiple interrupts
15	<b>Interrupts:</b> Interrupt structure of Cortex-M0 microprocessor, processing of vectored and nonvectored interrupts, latency time and response time; Handling multiple interrupts