

## DEPARTMENT OF MECHATRONICS

Course Details									
Code					Academic Year			Semester	
ETE104					1			Spring	
Title					Α	L	ECTS		
Microprocessors						1	6		
Language	German								
Level	Undergraduate		F	Postgra	aduate				
Department / Program	Electrics-Electronics Engineering								
Forms of Teaching and Learning	Formal								
Course Type	Compulsory		Ele	Elective			$\checkmark$		
Objectives	The aim of the module is to teach the students the basics of microprocessors, while also learning how to program a microcontroller. The graduates have mastered the structure and functionality of a microprocessor, programming a microcontroller with all hardware modules.								
Content	Basics of microprocessors; Computer architectures; Representation of information in microprocessors; Internal structure: instruction set, register set, hardware modules of a microcontroller, input and output, clock signals, timer, interruption (interrupt), ADC, USCI, flash memory, USB; Energy efficiency								
Prerequisites	INF101								
Coordinator	Asst. Prof. Murat Tümer								
Lecturer(s)	Asst. Prof. Murat Tümer								
Assistant(s)	R. A. Oğuzhan Memişoğlu								
Work Placement	-								
Recommended or Required Reading									
Books / Lecture Notes	<ul> <li>Mikrocontrollertechnik; Matthias Sturm; Hanser; 2014</li> <li>Mikroprozessortechnik; Klaus Wüst; Springer; 2011</li> <li>Mikrocontroller und Mikroprozessoren; Uwe Brinkschulte, Theo Ungerer; Springer; 2010</li> <li>Anwendungsorientierte Mikroprozessoren; Helmut Bähring; Springer; 2010</li> </ul>								
Other Sources									
Additional Course Material									
Documents									
Assignments	8 Assignments								
Exams	1 Midterm, 1 Final								
Course Composition									
Mathematics und Basic Sciences	20 %								



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## **DEPARTMENT OF MECHATRONICS**

Engineering		%					
Engineering	Design		%				
Social Science	ces		%				
Educational	Sciences		%				
Natural Scie	nces		%				
Health Scien	ices		%				
Expert Know	vledge	%					
Assessmen	t						
A	Activity	Percentage (%)					
Midterm Exa	am	Im 1					
Quiz							
Assignments	s	40					
Attendance							
Recitations							
Projects							
Final Exam		1	40				
			100				
ECTS Points and Work Load							
L L	Activity	Count	Duration	Work Load (Hours)			
A Lectures	Activity	Count 14	Duration 3	Work Load (Hours) 42			
Lectures Self-Study	Activity	Count           14           14	Duration 3 3	Work Load (Hours) 42 42			
A Lectures Self-Study Assignments	Activity s	Count           14           14           8	Duration 3 3 5	Work Load (Hours) 42 42 40			
A Lectures Self-Study Assignments Presentation Preparation	Activity s n / Seminar	Count           14           14           8	Duration 3 3 5	Work Load (Hours) 42 42 40			
A Lectures Self-Study Assignments Presentation Preparation Midterm Exa	Activity s n / Seminar am	Count 14 14 14 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Duration 3 3 5 2	Work Load (Hours)           42           42           40           2			
Lectures Self-Study Assignments Presentation Preparation Midterm Exa Recitations	Activity s n / Seminar am	Count 14 14 14 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Duration           3           3           5           2           1	Work Load (Hours)           42           42           40           2           14			
Lectures Self-Study Assignments Presentation Preparation Midterm Exa Recitations Laboratory	Activity s n / Seminar am	Count 14 14 14 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Duration           3           3           5           2           1           1	Work Load (Hours) 42 42 40 2 14 14			
Lectures Self-Study Assignments Presentation Preparation Midterm Exa Recitations Laboratory Projects	Activity s n / Seminar am	Count 14 14 14 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Duration           3           3           5           2           1           1           12	Work Load (Hours) 42 42 40 2 2 14 14 14 12			
Lectures Self-Study Assignments Presentation Preparation Midterm Exa Recitations Laboratory Projects Final Exam	Activity s n / Seminar am	Count 14 14 14 14 14 14 1 1 1 1 1 1 1 1 1 1	Duration           3           3           5           2           1           12           2           2	Work Load (Hours) 42 42 40 2 2 14 14 12 2 2			
Lectures Self-Study Assignments Presentation Preparation Midterm Exa Recitations Laboratory Projects Final Exam	Activity s n / Seminar am	Count 14 14 14 14 14 14 1 1 1 1 1 1 1 1 1 1	Duration         3         3         5         2         1         12         2         12         2         12         2         3         3         5         3         1         12         2         12         2         15         16         17         18         19         10         10         11         12         2         10         11         12         2         10         11         12         2         10         10         10         11         12         13         14         15         16         17         18         19         100         100         100         100 <tr< th=""><th>Work Load (Hours) 42 42 40 2 2 14 14 12 2 2 168</th></tr<>	Work Load (Hours) 42 42 40 2 2 14 14 12 2 2 168			
Lectures Self-Study Assignments Presentation Preparation Midterm Exa Recitations Laboratory Projects Final Exam	Activity s n / Seminar am	Count 14 14 14 14 14 14 1 1 1 1 1 1 1 1 1 1	Duration         3         3         5         2         1         12         2         12         2         12         2         15         10         12         2         14         15         16         17         18         19         10         10         11         12         13         14         15         16         17         18         19         10         11         12         13         14         15         16         17         18         19         10         10         11         12         13         14         15         16         17         18         19         10	Work Load (Hours) 42 42 40 2 2 14 14 12 2 2 168 6			
Lectures Self-Study Assignments Presentation Preparation Midterm Exa Recitations Laboratory Projects Final Exam	Activity s n / Seminar am utcomes	Count 14 14 14 14 14 14 1 1 1 1 1 1 1 1 1 1	Duration         3         3         5         2         1         12         2         12         2         12         2         14         15         16         17         18         19         2         10         11         12         2         14         15         16         17         18         19         10         11         12         13         14         15         16         17         18         19         10         11         12         13         14         15         16         17         18         19         10         10         11         12         13         14	Work Load (Hours) 42 42 40 2 14 14 12 2 2 168 6			
Lectures Self-Study Assignments Presentation Preparation Midterm Exa Recitations Laboratory Projects Final Exam	Activity s n / Seminar am utcomes The students know	Count         14         14         8         1         1         14         14         14         14         14         14         14         14         15         16         17         18         19         10         10         11         12         13         14         14         15         16         17         18         19         10         10         11         12         13         14         15         16         17         18         19         10         10         10         10         10         10         10         10         10         10         10         10         10	Duration         3         3         5         2         1         12         2         Total Work Load         nts (Total Work Load / Hour)	Work Load (Hours) 42 42 40 2 14 14 12 2 2 168 6			
Lectures Self-Study Assignments Presentation Preparation Midterm Exa Recitations Laboratory Projects Final Exam Learning Ou 1 2	Activity s n / Seminar am utcomes The students know The students know	Count 14 14 14 14 14 14 1 1 1 1 1 1 1 1 1 1	Duration         3         3         5         2         1         12         2         Total Work Load         nts (Total Work Load / Hour)         functionality of microprocessor         ocomputer and microcontrolled	Work Load (Hours) 42 42 40 2 14 14 12 2 2 168 6 6			
Lectures Self-Study Assignments Presentation Preparation Midterm Exa Recitations Laboratory Projects Final Exam Learning Ou 1 2 3	Activity s n / Seminar am utcomes The students know They have acquired	Count 14 14 14 14 14 14 1 1 1 1 1 1 1 1 1 1	Duration         3         3         5         2         1         12         2         Total Work Load         hts (Total Work Load / Hour)         functionality of microprocessor         ocomputer and microcontroller         rocessor-specific programming	Work Load (Hours)         42         42         40         2         14         12         2         168         6         ors.         er.         g and can debug machine code.			



## **DEPARTMENT OF MECHATRONICS**

Weekly Content											
1	Basics, computer architectures, microcontrollers										
2	Informat	Information units and information presentation									
3	Internal	Internal structure of a microprocessor: instruction set, register set									
4	Internal	Internal structure of a microprocessor: system bus, address system, addressing types									
5	Memory	Memory, RAM, ROM									
6	Hardware modules: I/O, pull-up, pull-down resistors										
7	Hardware modules: System reset, clock module, clock signals, watchdog timer										
8	Hardware modules: Timer, clock source selection, capture / compare unit										
9	Midterm Exam										
10	Hardware modules: Interrupt										
11	Hardware modules: ADC										
12	Hardware modules: Serial communication unit, USCI, USART, SPI, I2C										
13	Hardware modules: Memory, RAM, flash memory										
14	Hardware modules: USB										
15	Energy efficiency, power modes, sleep										
Contribution of Learning Outcomes to Program Objectives (1-5)											
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
1	5	4	4	3	5	3	3	4	5	4	4
2	5	4	4	3	5	3	3	4	5	4	4
3	5	4	4	3	5	3	3	4	5	4	4
4	4	5	4	5	5	3	4	4	5	5	5
Contributio	tribution Level         1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High										
https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=en&curSunit=196											
Compiled by	əy: R. A. Oğuzhan Memişoğlu										
Date of Com	Compilation: 09.09.2022										