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## **Course Information**

• Information in this block comes from "Student Information System". If you need update for this block you can contact with your faculty administrative staff.

Term

202101

Code

**ME 308** 

Title

**Industrial Control** 

Faculty

Faculty of Eng. & Natural Sci.

Subject

Mechatronics(ME)

SU Credit **3** 

3.0

ECTS Credit **3** 

6.0

Level Of Course

UG

Prerequisites

Content

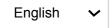
This is an course that covers industrial control systems. The specific topics include: control systems architectures; transducers and actuators; communications in industrial control systems - industrial LANs; sequential control - programmable logic controllers; direct digital control and supervisory control; structures of SCADA systems; case studies.

Distribution of Lectures

1+2

## Syllabus Information

Language of Instruction (ECTS)



Recommended or required reading (ECTS) **3** 

Course Web			
Readings			
Pdf documents relat	ted to Siemens S7 30	0 PLC's	
Optional Readi	inas		
Optional Readi			
	nufacturing Systems		
Author: S. Brian Mon	rriss		
Year: 1994 Publisher: Mc Graw	ыш		
Publisher. Mc Graw	ПШ		
Title: Automation Sv	stems for Control and	d Data Acquisition	
Author: Lawrence T.			
Year: 1992	·		
Publisher: ISA (Instr	rument Society of Ame	erica)	
Series: Resources for	or Measurement and	Control Series	
T''	0 1 1		
Title: Practical Proce	ess Control		
Author: A. M. Seal			
Vaar: 1008			
Year: 1998 Publisher: Arnold			
Year: 1998 Publisher: Arnold			
Publisher: Arnold	h, Automating with SI	IMATIC, Publicis MCD Verlag, Munich	
Publisher: Arnold Hans Berger, Munic		IMATIC, Publicis MCD Verlag, Munich or Control and Data Acquisition, ISA	
Publisher: Arnold Hans Berger, Munic			
Publisher: Arnold Hans Berger, Munic Lawrence T. Amy, A	utomation Systems fo		
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Publisher: Arnold  Hans Berger, Munic Lawrence T. Amy, A  ssessment methods an	utomation Systems fo		
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Publisher: Arnold  Hans Berger, Munic Lawrence T. Amy, A  sesessment methods and Final Midterm Quiz Assignment Case Study	utomation Systems fo		
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Publisher: Arnold  Hans Berger, Munic Lawrence T. Amy, A  sessment methods and Final Midterm Quiz Assignment Case Study Term-Paper Participation	utomation Systems fo		
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Publisher: Arnold  Hans Berger, Munic Lawrence T. Amy, A  sessment methods and Final  Midterm  Quiz  Assignment  Case Study  Term-Paper  Participation  Individual Project  Group Project  Written report	utomation Systems fo		
Publisher: Arnold  Hans Berger, Munic Lawrence T. Amy, A  sessment methods and Final  Midterm  Quiz  Assignment  Case Study  Term-Paper  Participation  Individual Project  Group Project  Written report  Presentation	utomation Systems for and criteria (ECTS)		
Publisher: Arnold  Hans Berger, Munic Lawrence T. Amy, A  sessment methods and Final  Midterm  Quiz  Assignment  Case Study  Term-Paper  Participation  Individual Project  Group Project  Written report  Presentation  Team member eva	utomation Systems for and criteria (ECTS)		
Publisher: Arnold  Hans Berger, Munic Lawrence T. Amy, A  sessment methods and Final  Midterm  Quiz  Assignment  Case Study  Term-Paper  Participation  Individual Project  Group Project  Written report  Presentation	utomation Systems for and criteria (ECTS)		

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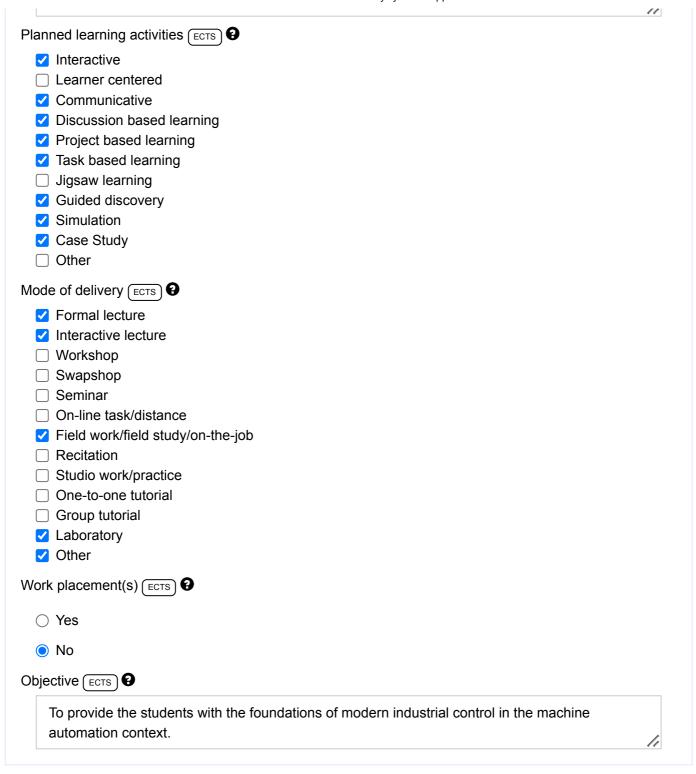
	Percentage (%)	Number of assessment methods	
Final	30		
Midterm	25	1 🗸	
Assignment	6	4 🗸	
ndividual Project	28	4 🗸	
Vritten report	6	1 🗸	
lomework	5	3 🗸	
earning Outcomes (ECTS	10		
(LO-1)	, -		
List main types of inc	lustrial automation sys	stems and industrial actuation and sensor system	s
LO-2	design stops in an in	dustrial automation project.	
identity the marvidua	design steps in an in	uustiiai automation project.	
LO-3			
Design automation s	ystems with industrial	control components.	
LO-4			
Compare different in	dustrial control strateg	ies.	
(LO-5)  Draw wiring diagram	IS		
Draw wiinig diagram			
(LO-6)			
Program Programma	ble Logic Controllers	(PLC) and Industrial Robots	
(LO-7)			
Develop Graphical U	ser Interfaces		
(LO-8)			
vvork with industrial (	communication netwo	KS	

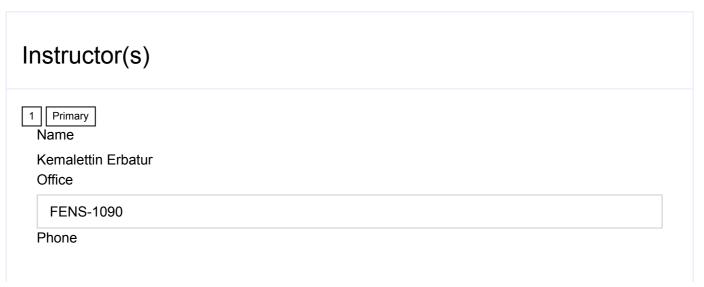
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LO-9 Wire and instrument basic industrial sensors and actuators. (LO-10 Develop skills to adapt industrial control components to their automation design. LO-11 Develop problem solving and planning skills and work effectively as part of a team Course Policies (ECTS) Term project is demanding and students are required to work in teams. Students are monitored by teaching assistants in laboratory hours and during the term project works. Students who do not contribute to the term project efforts properly are warned and may finally receive a lower Course Outline (ECTS)

Week 1:

Introduction
PLC (Programmable Logic Controller)
Resources
Hard wired logic
Week 2:
PLC
Ladder Logic Program (LAD)
Week 3:
PLC
Statement List Program (STL)
Linear Programming
Partitioned Programming
Week 4:
PLC - Structured Programming
Week 5:
Wiring Diagrams
Week 6:
Wiring diagrams
willing diagrams
Week 7:
Industrial PCs
Industrial Networks
Structural text programming
Week 8:
Structural text programming
Midterm
Week 9:
Graphical User Interfaces
Week 10:
Robotics
Mook 44
Week 11:
Robotics
Week 12:
Sensors
Week 13:
Actuators





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9585						
Email						
erbatur@sabanciuniv.edu						
Web						
http://people.sabanciuniv.edu/~erbatur/						
Office Hours						
Program Outcomes						
The program outcomes related to this course listed below. Please select appropri	iate sc	ale	value	that	shov	WS
trength of the relation between the course and the program outcome.						
( 1:Not at all 5:A lot )						
Ommon Outcomes For All Programs  1 Understand the world, their country, their society, as well as themselve ethical problems, social rights, values and responsibility to the self and to toplumu ve kendilerini anlamak; etik sorunlara, toplumsal haklara ve gerel başkalarına karşı sorumluluklara dair bilinçlenmek.	others	s. / [	Düny	ayı,		
		1	2	3	4	5
2 Understand different disciplines from natural and social sciences to n	_ nathen	nati	cs ai	L nd ar	t ar	nd
develop interdisciplinary approaches in thinking and practice. / Doğa ve to matematiğe ve sanata kadar farklı disiplinleri anlayarak düşünce ve uygul yaklaşımlar geliştirmek.	plum	bilin	nlerii	nden		
7		1	2	3	4	5
				l .		
Think critically, follow innovations and developments in science and t	_ echno	log	, de	mon	strat	e
personal and organizational entrepreneurship and engage in life-long lear have the ability to continue to educate him/herself. / Eleştirel düşünmek, by ve gelişmeleri takip etmek, kişisel ve kurumsal girişimcilik sergilemek ve ç	ning ir oilim ve eşitli k	n va e tel	rious knol	s sub ojidel	ject: ki ye	s; :nilik
personal and organizational entrepreneurship and engage in life-long lear have the ability to continue to educate him/herself. / Eleştirel düşünmek, b	ning ir oilim ve eşitli k	n va e tel	rious knol	s sub ojidel	ject: ki ye	s; :nilik
personal and organizational entrepreneurship and engage in life-long lear have the ability to continue to educate him/herself. / Eleştirel düşünmek, be ve gelişmeleri takip etmek, kişisel ve kurumsal girişimcilik sergilemek ve çöğrenim çabasında olmak; kendini sürekli yenileme becerisine sahip olma	ning ir pilim ve eşitli k ık.	n va e tel konu	rious knok ulard 2	s sub ojide a ha	oject ki ye yat b	s; enilik boyu 5
personal and organizational entrepreneurship and engage in life-long lear have the ability to continue to educate him/herself. / Eleştirel düşünmek, k ve gelişmeleri takip etmek, kişisel ve kurumsal girişimcilik sergilemek ve ç öğrenim çabasında olmak; kendini sürekli yenileme becerisine sahip olma	ning ir bilim ve eşitli k ık.	n va e tel konu 1	rious knok ulard 2 tech	s sub ojide a ha 3 nolog	ojects ki ye yat b 4 gical	s; enilik boyu 5
personal and organizational entrepreneurship and engage in life-long lear have the ability to continue to educate him/herself. / Eleştirel düşünmek, by ve gelişmeleri takip etmek, kişisel ve kurumsal girişimcilik sergilemek ve çüğrenim çabasında olmak; kendini sürekli yenileme becerisine sahip olmak.  4 Communicate effectively in Turkish and English by oral, written, grap	ning ir bilim ve eşitli k ık.	n va e tel konu 1	rious knok ulard 2 tech	s sub ojide a ha 3 nolog	ojects ki ye yat b 4 gical	s; enilik boyu 5

Take individual and team responsibility, function effectively and respectively as an individual and a member or a leader of a team; and have the skills to work effectively in multi-disciplinary teams. / Bireysel sorumluluk ve takım sorumluluğu almak; birey olarak ya da takımın üyesi veya lideri olarak

verimli ve saygılı bir şekilde çalışmak; çok disiplinli takımlarda etkin biçimde çalışabilme becerisine sahip olmak.

1 2 3 4 5

## Common Outcomes For Faculty of Eng. & Natural Sci. Programs

Possess sufficient knowledge of mathematics, science and program-specific engineering topics; use theoretical and applied knowledge of these areas in complex engineering problems. / Matematik, fen bilimleri ve ilgili mühendislik disiplinine özgü konularda yeterli bilgi birikimine; bu alanlardaki kuramsal ve uygulamalı bilgileri, karmaşık mühendislik problemlerinde kullanabilme becerisine sahip olmak.

1 2 3 4 5

2 Identify, define, formulate and solve complex engineering problems; choose and apply suitable analysis and modeling methods for this purpose. / Karmaşık mühendislik problemlerini saptama, tanımlama, formüle etme ve çözme becerisine; ve bu amaçla uygun analiz ve modelleme yöntemlerini seçme ve uygulama becerisine sahip olmak.

1 2 3 4 5

3 Develop, choose and use modern techniques and tools that are needed for analysis and solution of complex problems faced in engineering applications; possess knowledge of standards used in engineering applications; use information technologies effectively. / Mühendislik uygulamalarında karşılaşılan karmaşık problemlerin analizi ve çözümü için gerekli olan modern teknik ve araçları geliştirme, seçme ve kullanma becerisine; mühendislik uygulamalarında kullanılan standartlar hakkında bilgiye; bilişim teknolojilerini etkin bir şekilde kullanma becerisine sahip olmak.

1 2 3 4 5

Have the ability to design a complex system, process, instrument or a product under realistic constraints and conditions, with the goal of fulfilling specified needs; apply modern design techniques for this purpose. / Karmaşık bir sistemi, süreci, cihazı veya ürünü gerçekçi kısıtlar ve koşullar altında, belirli gereksinimleri karşılayacak şekilde tasarlama becerisine; bu amaçla modern tasarım yöntemlerini uygulama becerisine sahip olmak.

1 2 3 4 5

Design and conduct experiments, collect data, analyze and interpret the results to investigate complex engineering problems or program-specific research areas. / Karmaşık mühendislik problemlerinin veya disipline özgü araştırma konularının incelenmesi için deney tasarlama, deney yapma, veri toplama, sonuçları analiz etme ve yorumlama becerisine sahip olmak.

1 2 3 4 5

Possess knowledge of business practices such as project management, risk management and change management; awareness on innovation; knowledge of sustainable development. / Proje yönetimi, risk yönetimi ve değişiklik yönetimi gibi, iş hayatındaki uygulamalar hakkında bilgi; girişimcilik, yenilikçilik hakkında farkındalık sahibi olmak; sürdürülebilir kalkınma hakkında bilgi sahibi olmak.

1 2 3 4 5

Possess knowledge of impact of engineering solutions in a global, economic, environmental, health and societal context; knowledge of contemporary issues; awareness on legal outcomes of engineering solutions; knowledge of behavior according to ethical principles, understanding of professional and ethical responsibility. / Mühendislik uygulamalarının evrensel ve toplumsal boyutlarda sağlık, çevre ve güvenlik üzerindeki etkileri ve çağın mühendislik alanına yansıyan sorunları hakkında bilgi sahibi olmak; mühendislik çözümlerinin hukuksal sonuçları konusunda

farkındalık sahibi olmak; etik ilkelerine uygun davranma ve mesleki ve etik sorumluluk hakkında bilgi sahibi olmak; 2 3 8 Have the ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions. / Etkin rapor yazma ve yazılı raporları anlama, tasarım ve üretim raporları hazırlayabilme, etkin sunum yapabilme, açık ve anlaşılır talimat verme ve alma becerisine sahip olmak. 2 3 4 5 Mechatronics Engineering Program Outcomes (Core Electives) 1 Familiarity with concepts in statistics and optimization, knowledge in basic differential and integral calculus, linear algebra, differential equations, complex variables, multi-variable calculus, as well as physics and computer science, and ability to use this knowledge in modeling, design and analysis of complex dynamical systems containing hardware and software components. / İstatistik ve optimizasyon konularına aşina olmak, temel diferansiyel ve integral hesaplamalar, lineer cebir, türevsel denklemler, kompleks değişkenli ve çok değişkenli hesaplamalar içeren matematik, matematiğe dayalı fizik ve bilgisayar bilimleri alanlarında bilgi sahibi olmak ve bu bilgiyi kullanarak dinamik sistemlerle etkileşebilen, donanım ve yazılım bileşenleri içeren karmaşık sistemlerin modellemesini, analizini ve tasarımını yapabilmek. 5 2 Ability to work in design, implementation and integration of engineering applications, such as electronic, mechanical, electromechanical, control and computer systems that contain software and hardware components, including sensors, actuators and controllers. / Algilayici, eyleyici ve kontrol birimleri içeren, donanım ve yazılım öğelerine sahip elektronik, mekanik, elektromekanik, kontrol veya bilgisayar sistemleri gibi mühendislik uygulamalarının tasarımı, gerçeklenmesi ve entegrasyonu alanlarında çalışabilme becerisine sahip olmak. 5 Industrial Engineering Program Outcomes (Area Electives) 1 Formulate and analyze problems in complex manufacturing and service systems by comprehending and applying the basic tools of industrial engineering such as modeling and optimization, stochastics, statistics. / Karmaşık üretim ve servis sistemlerinde oluşacak problemleri endüstri mühendisliğinin modelleme ve eniyileme, rassal modeller ve istatistik gibi temel araçlarını kullanarak formüle ve analiz etmek. 3 5 2 Design and develop appropriate analytical solution strategies for problems in integrated production and service systems involving human capital, materials, information, equipment, and energy. / İçinde insan kaynağı, malzeme, bilgi, teçhizat ve enerji bileşenlerini içeren tümleşik üretim ve servis sistemlerinde karşılaşılan problemler için uygun analitik çözüm stratejileri tasarlamak ve geliştirmek. 2 5 3 Implement solution strategies on a computer platform for decision-support purposes by

employing effective computational and experimental tools. / Karar destek amacıyla oluşturulan

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çözüm stratejilerini etkin hesaplamalı ve deneysel araçlar kullanarak bilgisayar ortamında uygulamak.

1 2 3 4 5

## Materials Science and Nano Engineering Program Outcomes (Area Electives)

Applying fundamental and advanced knowledge of natural sciences as well as engineering principles to develop and design new materials and establish the relation between internal structure and physical properties using experimental, computational and theoretical tools. / Temel ve ileri bilim ve mühendislik prensiplerini yeni malzeme geliştirme ve tasarlamaya uygulama, ve malzemenin yapısı ve fiziksel özellikleri arasında deneysel, hesaba dayalı ve teorik metotlarla bağlantı kurabilme.

1 2 3 4 5

2 Merging the existing knowledge on physical properties, design limits and fabrication methods in materials selection for a particular application or to resolve material performance related problems. / Belirli uygulamalar veya malzeme performansıyla ilgili problemlerin çözümü için malzeme seçiminde fiziksel özellikler, tasarım limitleri ve üretim metotları üzerine varolan bilgi birikimini birleştirme.

1 2 3 4 5

3 Predicting and understanding the behavior of a material under use in a specific environment knowing the internal structure or vice versa. / Herhangi bir malzemenin iç yapısını bilerek, bu malzemenin farklı ortamlardaki davranışlarını tahmin etme ve anlama, ve bunun tam tersini de yapabilme.

1 2 3 4 5

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