VEHICLE DISCRETE-TIME CONTROL SYSTEMS

1	Course Title:	VEHICLE DISCRETE-TIME CONTROL SYSTEMS
2	Course Code:	OTO5164
3	Type of Course:	Optional
4	Level of Course:	Second Cycle
5	Year of Study:	1
6	Semester:	2
7	ECTS Credits Allocated:	6.00
8	Theoretical (hour/week):	3.00
9	Practice (hour/week):	0.00
10	Laboratory (hour/week):	0
11	Prerequisites:	
12	Language:	Turkish
13	Mode of Delivery:	Face to face
14	Course Coordinator:	Doç. Dr. ZELİHA KAMIŞ KOCABIÇAK
15	Course Lecturers:	
16	Contact information of the Course Coordinator:	Uludağ Üniversitesi, Mühendislik Fakültesi, Otomotiv Mühendisliği Bölümü 16059 Görükle/BURSA zkamis@uludag.edu.tr; Tel: 0224 2941992
17	Website:	
18	Objective of the Course:	Explanation of the basic concepts of computerized control systems such as discrete-time, z transform, signal transformation (ADC, DAC), sampling time and designing a computerized control system. Explanation of basic features of data collection cards, real-time system design and adaptation of the measuring element to the system. Applying different control algorithms to practical systems using MATLAB software.
19	Contribution of the Course to Professional Development:	Understands the basic concepts of computerized control systems and system design.
20	Learning Outcomes:	
	1	To explain the discrete-time systems
	2	To be able to theoretically set up a computer controlled control system
	3	Selecting the sampling time and interpreting its effect on the system
	4	Preparing programs in MATLAB environment and building models in Simulink environment
	5	Selecting and installing the necessary infrastructure such as computer, interface, control card and software for real-time system
	6	Ability to design and install a real-time computerized control system of a theoretically modeled system
	7	Vehicle applications
	8	
	9	
	10	
21	Course Content:	

Course Content:

Week	Theoretical	Practice

1	Introduction, Basic components and sample applications of discrete time and digital control systems.	
2	Signal transformations and sampling time selection. Nyquist and Shannon sampling frequency theorems and properties.	
3	Computer-oriented mathematical models and z-transformations in discrete time systems.	
4	Transfer functions, block diagrams and signal flow graph methods in discrete time systems.	
5	Determining state variables and deriving state equations.	
6	Discrete time, z and frequency domain analysis.	
7	Data acquisition and/or control card basic features and integration with peripherals (interface, sensor, actuator).	
8	Introduction to MATLAB and Simulink software, real time programming.	
9	Repeating courses and Midterm Exam	
10	Solution of system equations: Z-transform and programming in MATLAB/Simulink environment.	
11	Design of discrete time systems	
12	Advanced control systems and algorithms	
	Microprocessor features and microprocessor XPC Target applications.	

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	3.00	42.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	0	0.00	0.00
Homeworks	1	56.00	56.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	28.00	28.00
Others	0	0.00	0.00
Final Exams	1	56.00	56.00
Total Work Load			210.00
Total work load/ 30 hr	0	0.00	6.07
ECTS Credit of the Course			6.00

Materials:	
	Oxford University Press, 1992. 2. Computer-Controlled Systems: Theory and Design, K. J. Aström, B. Wittenmark, Engineering: Analysis and Design, M. S. Fadali, A. Visioli, Elsevier, 2009 4. Digital Control, K. Moudgalya, Wiley-Basım, 2006

TERM LEARNING ACTIVITIES	NUMBER	WEIGHT
Quiz	0	0.00
Final Exam	1	60.00
Total	3	100.00
Contribution of Term (Year) Learning Activities to Success Grade		40.00
Contribution of Final Exam to Success Grade		60.00
Total		100.00
Measurement and Evaluation Techniques Used in the Course		Relative evaluation system

24	**ECTS / WORK LOAD TABLE**

25	CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS															
	PQ1	**PQ2**	**PQ3**	**PQ4**	**PQ5**	**PQ6**	**PQ7**	**PQ8**	**PQ9**	**PQ10**	**PQ11**	**PQ12**	**PQ13**	**PQ14**	**PQ15**	**PQ16**
ÖK1	3	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
ÖK2	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
ÖK3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
ÖK4	0	0	5	0	4	0	0	0	0	0	0	0	0	0	0	0
ÖK5	0	4	0	4	4	0	0	0	0	0	0	0	0	0	0	0
ÖK6	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
ÖK7	5	2	3	4	3	2	3	2	2	2	0	0	0	0	0	0
LO: Learning Objectives PQ: Program Qualifications																
Contribution Level:	**1 very low**			**2 low**			**3 Medium**			**4 High**			**5 Very High**			