OPERATIONAL AMPLIFIERS AND THEIR APPLICATIONS

1	Course Title:	OPERATIONAL AMPLIFIERS AND THEIR APPLICATIONS	
2	Course Code:	EEM4305	
3	Type of Course:	Optional	
4	Level of Course:	First Cycle	
5	Year of Study:	4	
6	Semester:	7	
7	ECTS Credits Allocated:	4.00	
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. ABDURRAHMAN GÜNDAY	
15	Course Lecturers:	-	
16	Contact information of the Course Coordinator:	E-posta:agunday@uludag.edu.tr Tel: (224) 29 42791 Adres: Elektrik - Elektronik Mühendisliği Bölümü 3. Kat, No: 304	
17	Website:		
18	Objective of the Course:	Ensuring the students to learn the circiuts structures of OpAmp sucah as summing and difference amplifiers, differentiator-integral amplifiers, logaritmic, anti-logaritmic amplifierr and filter-oscillator amplifiers circuits. In addition to this, teaching to the students how to be calculated and analyzed the slew rate (SR), diffecrential and Common Mode output voltages, input bias curent and offset voltages.	
19	Contribution of the Course to Professional Development:	Comprehend the Operational Amplifier circuits structures and use all them in the practical studies.	
20	Learning Outcomes:		
		1	Ability to apply theoretical and practical knowledge for modeling and solving engineering problems in the field of operational amplifiers and applications
		2	Ability to solve, formulate and identify complex engineering problems encountered in the field of operational amplifiers by selecting the appropriate analysis and modeling methods
		3	Ability to design complex system in operational amplifiers under realistic constraints and conditions by applying modern design methods
		4	Ability to develope, select and use modern techniques and tools for operational amplifiers
		5	Ability to interpret the results and collect data for analysing engineering problems in the field of operational amplifiers.
		6	
		7	
		8	
		9	
		10	
21	Course Content:		

	Course Content:	
Week	Theoretical	Practice
1	Operational amplifiers and their characteristic properties	
2	Open and close loop operation, voltage gain, offset voltage, negative and positive feedback concepts	
3	Inverting and non-inverting amplifiers (OpAmps)	
4	Summing and difference amplifiers (OpAmps)	
5	Summing and difference amplifiers (OpAmps)	
6	OpAmp curent-voltage converter circuits	
7	Voltage follower and comparator amplifiers (OpAmps)	
8	Midterm Exam + Review of Past Lectures	
9	Differentiator and integral amplifiers (OpAmps)	
10	Logarithmic and anti-logarithmic amplifiers (OpAmps)	
11	OpAmp filter circuits	
12	OpAmp filter circuits	
13	OpAmp oscillator circuits	
14	OpAmp oscillator circuits	

22	Textbooks, References and/or Other Materials:	1. Eldar Musayev, Elektronik Devreler I, Ders Notları 2. Elektronik, M. Sait Türköz, Birsen Yayınevi, İstanbul, 2004. 3. Elektronik Devreler, Halit Pastacı, Yıldız Teknik Üniversitesi, İstanbul, 1998. 4. Jacob Millman: Microelectronics, McGraw Hill, 1979. 5. R. Boylestad and L. Nashelsky: Electronic Devices and Circuit Theory, Prentice Hall, 1992.
23	Assesment	

TERM LEARNING ACTIVITIES	**NUMBER**	**WEIGHT**
Midterm Exam	1	40.00
Quiz	0	0.00
Home work-project	0	0.00
Final Exam	1	60.00
Total	2	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		Measurement and evaluation are performed according to the Rules & Regulations of Bursa Uludağ University on undergraduate and graduate educations.

24	**ECTS / WORK LOAD TABLE**

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	14	2.00	28.00
Homeworks	0	0.00	0.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	25.00	25.00
Others	0	0.00	0.00
Final Exams	1	25.00	25.00
Total Work Load			120.00
Total work load/ 30 hr			4.00
ECTS Credit of the Course			4.00

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	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK2	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK3	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK4	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
ÖK5	0	0	0	0	5	0	0	0	0	0	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**