TED UNIVERSITY

Syllabus for
EE 351 Analog Electronics

Fall 2016-2017

Instructor:	**Asst. Prof. Dr. Mirbek Turduev**
Office:	**431**
Phone:	**(0312) 585-01-85**
E-mail:	**mirbek.turduev@tedu.edu.tr**

Time Schedule:	**Tuesday (09.00 – 10.50), Section 1** **Wednesday(10.00 – 11.50), Section 2** **Friday (12:00-12:50 and 15:00-15:50), Sections 1 and 2**
Office Hours:	**Monday (17.00 –18.30)** **Friday (17.00 –18.30)** **(or by appointment)**

Course Code & Number	EE351	**Course Title**	Analog Electronics
Type of Course	☑ Compulsory ☐ Elective	**Semester**	☑ Fall ☐ Spring ☐ Summer
Level of Course	BSc	**Year of Study**	Junior
Course Credit Hours / ECTS	(3+0+0) 3 / 6 ECTS	**Pre-requisite / Co-requisite**	Pre-requisite: EE252 Co-requisite: EE353
Mode of Delivery	☑ Face-to-face ☐ Distance learning	**Language of Instruction**	☑ English ☐ Turkish
Course Coordinator	Asst. Prof. Dr. Mirbek Turduev Phone: 0312-5850185 E-mail: mirbek.turduev@tedu.edu.tr		
Computer Usage	MATLAB		
Textbook	S. Sedra & K. C. Smith, "Microelectronic Circuits", 6th ed, Oxford University Press, 2011		
Supplementary Reading	1) Jaeger, Richard C., Blalock, Travis N., "Microelectronic Circuit Design", McGraw Hill, 2008. 2) Robert L. Boylestad & Louis Nashelsky, "Electronic Devices and Circuit Theory", 11th ed., Pearson Educ. , 2013		
Module and Instructor Evaluation Date	Evaluation will be held on the last day of the class		

Course Catalog Description	Basic single-stage transistor amplifiers. Low and high frequency response of amplifiers. Multi-stage amplifiers. Differential amplifiers. Current mirrors. Feedback amplifiers and stability. Power amplifiers and regulators.
Course Objectives	The goal of this course is to establish a background on analog circuits, specifically on BJT- and MOSFET-based amplifiers used in discrete circuits and integrated circuits, namely the microelectronic circuits. The frequency response of discrete circuit amplifiers will also be covered in this course. Furthermore, some useful integrated circuit elements based on these two transistors will be introduced and analyzed as well; and these elements include constant-current sources, current mirrors and current steering circuits. The course also aims to cover the differential amplifiers, and output stages, as well as the feedback and stability concept in the amplifiers.
Course Learning Outcomes (LO)	Having successfully completed this course, students will be able to: LO-1: Interpret the single stage discrete-circuit amplifier based on BJT LO-2: Interpret the single stage discrete-circuit amplifier based on MOSFET LO-3: Analyze the frequency response of discrete-circuit amplifiers LO-4: Learn about the differences between the discrete- and integrated-circuits LO-5: Analyze different kinds of useful integrated circuit elements such as current mirrors, constant current sources and current steering circuits LO-6: Analyze the multistage amplifiers, such as differential amplifier LO-7: Interpret the feedback and stability concept in the amplifiers LO-8: Interpret and analyze the different kinds of output stages

TENTATIVE COURSE OUTLINE						
	Week	**Month / Day**	**Topics**	**Learning Outcome (LO)**	**Textbook Reading**	**Assignments / Exams**
	1	09/27 09/28 09/30	Introduction to Analog Electronics	1, 2	Ch. 1	
	2	10/04 10/05 10/07	Bipolar Junction Transistor	1	Ch. 4	
	3	10/11 10/12 10/14	BJT Discrete-Circuit amplifiers:	1, 2	Ch.4, 5	Quiz #1
	4	10/18 10/19 10/21	BJT Discrete-Circuit amplifiers,	1, 2	Ch.4, 5	
	5	10/25 10/26 10/28	BJT Discrete-Circuit amplifiers,	2	Ch. 5	
	6	11/01 11/02 11/04	MOSFET Discrete-Circuit amplifiers	3	Ch. 8	Quiz #2 Assignment #1
	7	11/08 11/09 11/11	MOSFET Discrete-Circuit amplifiers	3	Ch. 8	**Midterm # 1**
	8	11/15 11/16 11/18	Frequency-Response of BJT Discrete-Circuit amplifiers ,	3, 4	Ch. 8, 6	Quiz #3
	9	11/22 11/23 11/25	Frequency-Response of MOSFET Discrete-Circuit amplifiers	5	Ch. 6	
	10	11/29 11/30 12/02	Introduction to Integrated-Circuit amplifiers Cascode amplifiers, Current mirrors	5	Ch. 6	Quiz #4
	11	12/06 12/07 12/09	Constant-current sources, Current steering circuits	6	Ch. 7	Assignment #2
	12	12/13 12/14 12/16	Differential Amplifiers	6	Ch. 7	**Midterm # 2**
	13	12/20 12/21 12/23	Feedback and stability in amplifiers	7	Ch. 9	Quiz #5
	14	12/27 12/28 12/30	Output stages	7, 8	Ch. 9, 14	Group presentations
	FINAL EXAMS WEEK (date and time to be announced later).					

COURSE ASSIGNMENTS
A. Midterm Exams [40%]
There will be 2 closed-book midterm exams, 20% for each exam. Exam 1 and Exam 2 will be on the 8th and 13th week, respectively. Date and time of the exams will be announced later.

B. Final [30%]
There will be a cumulative closed-book final exam covering all topics. Date and time of the final will be announced at the end of the semester.
C. Quizzes [15 %]
There will be 5 quizzes, 3% for each quiz.
D. Written homeworks / assignments [15%]
There will be 2 assignments and 1 Group presentation

COURSE ASSESSMENTS & LEARNING OUTCOMES MATRIX

Assessment Methods	Course Learning Outcomes
Written homeworks/assignments	LO # 1…8
Quizzes	LO # 1…8
1st Midterm Exam	LO # 1…3
2nd Midterm Exam	LO # 4…6
Final Exam	LO # 1…8

Teaching Methods & Learning Activities	☑ Telling/Explaining ☑ Questioning ☑ Reading ☑ Problem Solving	☑ Collaborating ☑ Web Searching ☑ Hands-on Activities ☑ Other(s): Homework and MATLAB/Spice assignments
Assessment Methods (Formal & Informal)	☑ Test/Exam ☑ Quiz	☑ Other(s): Homework and MATLAB assignments
Student Workload (Total 165 Hrs)	☑ Lectures ..... **41** hrs ☑ Course Readings ..... **50** hrs ☑ Exams/Quizzes ..... **50** hrs	☑ Other: Homework and assignments ..... **24** hrs

COURSE POLICIES

I. Attendance

- Regular class attendance is expected for all students at the University. You are not required but advised to attend all classes.
- Please send your professor a brief e-mail to explain your absence in advance.
- Your absence will not reduce your attendance rate *if and only if* you have a legitimate reason for missing a class (such as illness, death in family, a traffic accident, etc.). In case of an illness or emergency, you must supply a formal documentation that supports your claim.
- Classes start on the hour. Please be respectful of your classmates by being on time.
- All electronic equipment should be turned off and kept out of sight before lecture starts.

II. Make-up Exams

Make-ups for Midterm Exams 1 and 2 will be available *if and only if* you have a legitimate reason for missing the exam (such as illness, death in family, a traffic accident, etc.). In case of an illness or emergency, you must supply a formal documentation that supports your claim.

III. Late Submission Policy

Late submissions will not be graded. There will be *no* make-up for quizzes and homework/ assignments. Missed assignments and quizzes will result in a grade of zero (0).

IV. Participation

In their book, The Adult Student's Guide to Survival & Success, Al Siebert and Mary Karr suggest that the most effective learning technique of all is to study by *asking and answering questions*. Develop the habit of reading textbooks, taking lecture notes, and studying by asking and answering questions. When you do this, you save many hours of studying and have time to spend with your family or friends.

There are several ways to go about asking and answering questions.

- When studying on your own, write questions that occur to you while you're reading and then go back and find the answers.
- If you're part of a study group, make a list of questions to ask the group.
- In the classroom, participate fully by asking questions and answering the ones posed by your instructor.

Curiosity is one of the cornerstones of learning. Be curious. Ask questions. Learn faster.

V. Cheating & Plagiarism

Collaboration is strongly encouraged; however, the work you hand in must be solely your own. Cheating and plagiarism are very serious offenses and will be penalized accordingly by the university disciplinary committee.

Cheating has a very broad description which can be summarized as "acting dishonestly". Some of the things that can be considered as cheating are the following:
- Copying answers on exams, homeworks and lab works,
- Using prohibited material on exams,
- Lying to gain any type of advantage in class,
- Providing false, modified or forged data in a report,
- Plagiarising (see below),
- Modifying graded material to be re-graded,
- Causing harm to colleagues by distributing false information about an exam, homework or lab.

All of the following are considered plagiarism:
- Turning in someone else's work as your own,
- Copying words or ideas from someone else without giving credit,
- Failing to put a quotation in quotation marks,
- Giving incorrect information about the source of a quotation,
- Changing words but copying the sentence structure of a source without giving credit,
- Copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not.
(www.plagiarism.org)

VI. Disability Support

If you have a disabling condition which may interfere with your ability to successfully complete this course, please contact Dr. Aslı Bugay (email: asli.bugay@tedu.edu.tr) or Dr. Tolga İnan (email: tolga.inan@tedu.edu.tr). For more information please see Handbook for Registered Students.

*** GOOD LUCK ***