GAU, Faculty of Engineering

Course Unit Title	Electronic Circuits I
Course Unit Code	EEN301
Type of Course Unit	Compulsory, Electrical and Electronics Engineering students
Level of Course Unit	3rd Year BSc
National Credits	4
Number of ECTS Credits Allocated	7 ECTS
Theoretical (hour/week)	3
Practice (hour/week)	-
Laboratory (hour/week)	2
Year of Study	3
Semester when the course unit is delivered	5
Mode of Delivery	Face to Face, Laboratory Experiments, E-learning activities
Language of Instruction	English
Prerequisities and co-requisities	ENG202 Physical Electronics
Recommended Optional Programme Components	Basic background of Fundamentals of Electrical Engineering

Objectives of the Course:

- Teaching DC biasing and DC analysis of transistor amplifiers
- Teaching AC (small signal) analysis of basic transistor amplifier stages
- Teaching the operational amplifier its applications

Learning Outcomes

When this course has been completed the student should be able to		Assessment
1	conduct DC analysis of basic transistor amplifiers	1,2
2	bias transistors in proper operating region	1,2
3	conduct AC analysis of basic transistor amplifier stages	1,2
4	design single- and multi-stage amplifiers for low frequencies	1,2
5	analyze and design operational-amplifier-based circuits	1,2
6	test basic transistor amplifiers and operational amplifier circuits via measurements	3,5

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5 Lab. Work

Course's Contribution to Program

		CL
1	Ability to understand and apply knowledge of mathematics, science, and engineering	5
2	Ability to design and conduct experiments as well as to analyze and interpret data	5
3	Ability to work in multidisciplinary teams while exhibiting professional responsibility and ethical conduct	2
4	Ability to apply systems thinking in problem solving and system design	4
5	Knowledge of contemporary issues while continuing to engage in lifelong learning	2
6	Ability to use the techniques, skills and modern engineering tools necessary for engineering practice	5
7	Ability to express their ideas and findings, in written and oral form	4
8	Ability to design and integrate systems, components or processes to meet desired needs within realistic constraints	5
9	Ability to approach engineering problems and effects of their possible solutions within a well structured, ethically responsible and professional manner	3
10	Strong foundation on the fundamentals of Electrical and Electronics Engineering such as Circuit Theory, Signals, Systems, Control and Communications, which are necessary for successful practice in the field	5
11	Awareness on the contemporary requirements, methods and applications of the Electrical and Electronics Engineering	3

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5:Very High)

Course Contents

Week		Exams
1	Overview on physical structure, behavior, electrical model and operation regions of bipolar-junction transistor (BJT)	
2	Characteristics of BJT. Conceptual usage of transistors in analog and digital applications.	
3	Biasing and DC analysis of BJT	
4	Amplification and the gain concept. Amplifier models.	
5	Small signal equivalent and terminal resistances of BJT. AC analysis of BJT.	Quiz #1
6	Gain and input/output resistances of basic BJT amplifier stages.	
7	Analysis of cascade (direct/capacitively-coupled) amplifiers.	
8	Midterm Exam	Midterm
9	Differential amplifier, common mode rejection ratio.	
10	Physical structure, behavior, electrical model, operation regions and characteristics of metal-oxide-semiconductor field-effect transistor (MOSFET).	
11	Biasing and DC analysis of MOSFET circuits. Small signal equivalent and terminal resistances of MOSFET.	
12	AC analysis, gain and input/output resistances of basic MOSFET amplifier stages.	Quiz #2
13	Operational amplifier (OpAmp); ideal and practical behavior.	
14	Linear and non-linear applications of OpAmp.	
15		Final

Recommended Sources

Textbook: R. Boylestad & L. Nashelsky, "Electronic Devices and Circuit Theory", 10th edition, Prentice Hall, 2008.
Supplementary Material(s): A. Sedra & K.C. Smith, "Microelectronic Circuits", 6th edition, Oxford University Press, 2010.

Assessment

Attendance	5%	
Assignments	10%	
Laboratory	10%	
Midterm Exam	20%	Written
Quizzes	20%	
Final Exam	35%	Written
Total	100%	

ECTS Allocated Based on the Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Hours per week (Theoretical)	15	3	45
Hours per week (Laboratory)	14	2	28
Pre-Lab work preparation before experiments	5	3	15
Presenting of observations and laboratory practices as report	5	6	30
Preparation of the homeworks	5	5	25
Quizzes	2	11	22
Supervision	1	17	17
Final Exam	1	22	22
Total Workload			204
Total Workload/30 (h)			6.7
ECTS Credit of the Course			7