GAU, Faculty of Engineering

Course Unit Title	Electronic Circuits II
Course Unit Code	EEN302
Type of Course Unit	Compulsory, Electrical and Electronics Engineering
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	6
Mode of Delivery	Face to Face, Experiments, E-learning activities
Language of Instruction	English
Prerequisities and co-requisities	EEN301 Electronic Circuits I
Recommended Optional Programme Components	Basic background of Circuit Theory

Objectives of the Course:

- Teaching frequency and pulse responses of amplifiers
- Teaching basic feedback theory and stability issues of feedback amplifiers
- Teaching oscillator circuits

Learning Outcomes

When this course has been completed the student should be able to		Assessment
1	draw Bode plots of a given s-domain transfer function	1,2,3
2	determine pole and zero frequencies (low frequency response) of an amplifier due to coupling and bypass capacitances	1,2
3	determine pole and zero frequencies (high frequency response) of an amplifier due to parasitic capacitances	1,2
4	determine type of feedback and conduct relevant analyses	1,2
5	reveal the stability properties of a feedback via proper techniques	1,2
6	design sine-wave and square-wave oscillators	1,2
7	test low- and high-frequency responses of amplifiers and operation of oscillators 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	Causes and effects of frequency-dependent behavior.	
2	Bode diagrams of s-domain transfer functions.	
3	Low frequency response of capacitively-coupled amplifiers: Effect of coupling and bypass capacitors.	
4	High frequency behavior: Parasitic capacitances of BJT and MOSFET, definition of the transition frequency f_t, small-signal high-frequency equivalent circuits of BJT and MOSFET.	
5	Miller's theorem. High frequency behavior of basic gain stages.	Quiz #1
6	Broadband amplifiers: Definition of gain-bandwidth product. Cascode amplifier, differential amplifier.	
7	Basic definitions, negative and positive feedback;	
8		Midterm
9	The effect of negative feedback on circuit performance parameters.	
10	Types of negative feedback.	
11	Stability of negative feedback amplifiers:	
12	Stability criteria: Bode and Nyquist diagrams.	Quiz #2
13	Pulse response: Tilt, rise time, ringing.	
14	Barkhausen criterion, sinusoidal oscillators. Relaxation oscillators.	
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)	14	3	42
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
Midterm Examination	1	17	17
Final Exam	1	22	22
Total Workload			201
Total Workload/30 (h)			6.7
ECTS Credit of the Course			7