

Faculty of Engineering & Technology

Radio Frequency Microelectronics

Information :

Course Code : ELE 511

Level : Undergraduate

Course Hours : 3.00- Hours

Department : Specialization of Electronics & Communication

Instructor Information :

Title	Name	Office hours
Associate Professor	Hesham Nabil Mohamed Ahmed	
Assistant Lecturer	Amiraa Sayed Ahmed Abdallah Elhamshary	

Area Of Study :

- Prepare students to model the passive components in the RF frequency range.
- Develop students skills to analyze and design RF power amplifiers .
- Train students to analyze Low Noise amplifiers .
- Train students to determine the Model parameters of radio frequency transistors.

Description :

The theory and practice of Radio Frequency (RF) engineering, Transmission lines, and scattering parameters, Design of RF components (low noise amplifiers, power amplifiers, oscillators, RF power detectors, active/passive mixers, power amplifiers), Properties and representation of noise, Passive device design (micro strip lines, diodes, IC resistors, IC capacitors, and IC inductors), Active device design (bipolar and FET's).

Course outcomes :

a. Knowledge and Understanding: :

1 -	Describe the operation of common transceiver architectures for RF transmission and reception.
2 -	Explain the concept of noise figure, non-linearity, blockers, and sensitivity in RF transceivers
3 -	Estimate the performance requirements of different building blocks of RF transceivers such as noise figure, gain and non-linearity
4 -	Describe the concept of impedance matching and impedance transformation in RF circuits
5 -	Identify the operation of low noise amplifiers, mixers, voltage-controlled oscillators, power amplifiers, and phase locked loops.

b. Intellectual Skills: :

1 -	Analyze RF transceivers and its building blocks.
2 -	Analyze system requirements of RF transceivers.

c. Professional and Practical Skills: :

1 -	Perform analysis of RF transceivers and its building blocks.
2 -	Evaluate the different RF building blocks.
3 -	Prepare technical report.

d.General and Transferable Skills: :

1 -	Work in teams.
2 -	Search for information and formulate new ideas.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Basic Concepts in RF Design.	10	6	4
RF Passive Components.	5	3	2
Transmission lines and scattering parameters.	12	6	6
Active RF Components.	10	6	4
RF Power amplifiers.	18	12	6
LNA amplifiers and Mixers.	8	6	2
Oscillators.	12	6	6

Teaching And Learning Methodologies :

Interactive Lecturing
Discussion
Problem Solving
Experiential Learning
Project

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignments/Lab	10.00		
Final Exam	40.00		
Final Exam Marks on ILOs			
First Mid-Term Exam	15.00	7	
Project	10.00	15	
Quizzes	10.00		
Second Mid-Term Exam	15.00	11	

Recommended books :

- B. Razavi, RF Microelectronics, Prentice Hall, 2nd Ed., 2011, USA.
- R. Ludwig, RF Circuit Design Theory and Applications, Prentice Hall, 2nd Ed., 2008, USA.