

Faculty of Engineering & Technology

Integrated Circuits

Information :

Course Code : ELE 561

Level : Undergraduate

Course Hours : 3.00- Hours

Department : Specialization of Electronics & Communication

Area Of Study :

Understand the basic principles of families of digital integrated circuits;
Enhance the student skills in the basic principles of low-voltage low-power design issues.
Understand the basic principles and theory of analog and Mixed-signal integrated circuits;
Enhance the student skills in the design of communication subsystems.
Design, and simulate electronic circuits using the Electronic Design Automation (EDA)

Description :

Switching characteristics of transistors, Digital integrated circuits including ECL, T2 L, CMOS, BiCMOS, Low voltage-low power and high performance design issues, Lab project, Design of analog circuits such as: current sources and mirrors, differential, low-noise and feedback amplifiers, mixers and oscillators, Applications of these circuits in areas such as A/D and D/A conversion and receiver front-end.

Course outcomes :

a. Knowledge and Understanding: :

1 -	a1- Explain the basic principles of digital integrated circuits including ECL, T2 L, CMOS, BiCMOS.
2 -	a2- Describe the basic principles and theory of low-voltage low-power design issues.
3 -	a3- Explain the basic principles and theory of low-noise and feedback amplifiers in analog integrated circuits.
4 -	a4- Illustrate the basic principles and theory of the A/D and D/A conversion in Mixed-signal integrated circuits.
5 -	a5- Explain the basic principles mixers and oscillators in the receiver front-end.
6 -	a6- Select the appropriate application of communication subsystems in the integrated circuit design.

b. Intellectual Skills: :

1 -	b1- Compare between different digital logic families in the digital integrated styles in terms of the functionality and performance.
2 -	b2- Analyze low-noise and feedback amplifiers and the A/D and D/A conversion.
3 -	b3- Analyze and design building units in the receiver front-end.

c. Professional and Practical Skills: :

1 -	c1. Build the basic components and requirements to design a communication subsystem.
2 -	c2. Develop the design and implementation of electronic circuits using software tools.

3 - c3. Develop technical report writing skills.

d.General and Transferable Skills: :

1 - d1. Collaborate effectively within multidisciplinary team

2 - d2. Communicate effectively.

3 - d3. Effectively manage tasks, time, and resources

4 - d4. Search for information and engage in life-long self-learning discipline.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Families of digital integrated circuits.	10	6	4
Designing for high-speed digital circuits	5	3	2
Designing for low-power digital circuits	5	3	2
Low-noise and feedback amplifiers in analog integrated circuits	15	9	6
The A/D and D/A converters	15	9	6
Basic issues of mixers in the receiver front-end.	10	6	4
Basic issues of oscillators in the receiver front-end.	10	6	4
Applications of the communication subsystems in the integrated circuit design	5	3	2

Teaching And Learning Methodologies :

Interactive Lecture

Discussion

Problem Solving

Experimental Learning

Cooperative Learning

Research

Site Visit (Field Trip)

Project / Assignment

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Final exam	40.00		
Lab Experiment	5.00		
o In Class Quizzes	10.00		
o Mid-Term Exams	30.00		
o Project / Assignment	10.00		
Oral Exam	5.00		

Course Notes :

Instructor notes.

Recommended books :

Recommended book (text books): B. Razavi, RF Microelectronics, Prentice-Hall, 2012.

Recommended book (text books): Behzad Razavi, "Design of Analog CMOS Integrated Circuits," McGraw-Hill, 2001.

Essential book: Neil H.E. Weste and David Harris; "CMOS VLSI Design, A Circuits and Systems Perspective", 4rd Edition; Pearson Addison-Wesley; 2011.