

**Faculty of Engineering & Technology**

**Analog Signal Processing**

**Information :**

**Course Code :** ELE 415

**Level :** Undergraduate

**Course Hours :** 3.00- Hours

**Department :** Specialization of Electronics & Communication

**Instructor Information :**

Title	Name	Office hours
Lecturer	AHMED SAEED ABDELSAMEA SAYED	2
Assistant Lecturer	Mostafa Mohamed Salaheldin Abdelkhalek	2

**Area Of Study :**

- Develop the students' knowledge about analog Multipliers.
- Prepare students to analyze, design and implement analog filters.
- Develop students' knowledge about Phase Locked Loop (PLL).
- Develop students' knowledge about Phase Locked Loop.
- Train students to perform experiments on electronic communication systems.

**Description :**

Op-Amp analog signal processing: Active Filters, voltage multiplier/divider, logarithmic and exponential amplifiers, inductance simulation, comparators & window comparators, switched capacitor filters, voltage multiplier (Gilbert Cell), voltage regulators, phase detectors, VCO, F/V & V/F converters, PLL and synthesizers. FM & PM detection using PLL.

**Course outcomes :**

**a. Knowledge and Understanding: :**

1 -	Define different techniques of the data conversion systems.
2 -	Explain the theories and techniques of the voltage controlled oscillator & PLL design and implementation and its applications in communication systems.
3 -	Explain the theories and techniques of the analog multiplier design and implementation.
4 -	Explain the signal processing theories and techniques of the analog filter design.

**b. Intellectual Skills: :**

1 -	Solve problems related to the voltage-controlled oscillator & Phase Locked Loop.
2 -	Evaluate the performance of analog multipliers with their applications in communication systems.
3 -	Use software tools to design analog filters.
4 -	Apply mathematical background for analyzing and designing the analog filters.

**c. Professional and Practical Skills: :**

1 -	Write a technical report of an assignment and project.
-----	--

2 -	Formulate the knowledge of communication systems and electronics to design and implement analog multipliers.
3 -	Develop the analog filter design using software tools.
4 -	Build the appropriate analog filters based on techniques of analog filter design.

**d.General and Transferable Skills :**

1 -	Search for information and engage in life-long self-learning discipline.
2 -	Effectively manage tasks, time, and resources.
3 -	Communicate effectively.

**Course Topic And Contents :**

Topic	No. of hours	Lecture	Tutorial / Practical
Analog filters	10	6	4
Active Filters 1	10	6	4
Review on electronic circuits	5	3	2
Active Filters 2	10	6	4
Analog Multipliers 1 (voltage & Frequency)	10	6	4
Analog Multipliers 2 (voltage & Frequency)	10	6	4
Voltage Oscillators	10	6	4
Phase Locked Loop	5	3	2
Data conversion	5	3	2

**Teaching And Learning Methodologies :**

Interactive Lecture
Discussion
Problem Solving
Experimental Learning
Project

**Course Assessment :**

Methods of assessment	Relative weight %	Week No	Assess What
Assignments	5.00		
Final Exam	40.00		
Lab and Project	15.00		
Mid Term I	15.00		
Mid Term II	15.00		
Quizzes	10.00		

**Recommended books :**

---

Adel S. Sedra, and Kenneth C. Smith, "Microelectronic Circuits", Oxford University Press, 7th edition, 2014.  
B. P. Lathi, "Modern analog and digital communication systems", Oxford University Press, 3rd Ed., 2012.