Course number: 04024250
Course name: Analog Communications Lab
Prerequisites by course: Analog Communications
Prerequisites by topic: Students are assumed to have had sufficient background of the following topics: AM and FM modulation techniques, PWM, PCM.
Credit hours: 1 hour
Contact hours: 3 hours
Textbook: Lab manual
References:

1. Haykin, Communication Systems, Wiley, latest edition

Course website: ---
Schedule and duration: 16 weeks, 16 Labs, 170 minutes each (including exams).
Minimum student material: class handouts, some instructor keynotes, calculator and access to a personal computer and internet.
Minimum college facilities: digital electronics lab., library, and computational facilities.
Course objectives: The objectives of this course are:

1.	To understand analog filter types and characteristics and become capable to design tuned amplifiers practically
2.	Become capable to modulate and demodulate analog base band signals practically using different amplitude modulation and demodulation techniques
3.	To distinguish between different types of AM, FM modulation and demodulation techniques and sort the benefits and disadvantages for each one
4.	To analyze the Bandwidth of each modulation type and to understand Single side band modulation as a Bandwidth efficient modulation technique

Course outcomes and relation to ABET student outcomes: (matrix)
Upon successful completion of the course, a student should be able to:

Course Outcomes	Student Outcomes						
	SO1	SO2	SO3	SO4	SO5	SO6	SO7
To understand the concept of signal source as carrier generator and FM modulator and to be able to adjust and connect the signal source in a way that serves the experiment (i.e. signal source with tuned circuit)		*			*	*	
To be able to plot the response of any tuned circuit filter experimentally and evaluate the bandwidth and quality factor, and to become able to design a limited band amplifiers and express the gain practically		*			*	*	

To be able to modulate baseband signals using single side band (SSB), double side band suppressed carrier(DSB-SC) and double side band transmitted carrier (DSB-TC) using AM balanced and ring bridge modulators		*			*	*	
To be able to select and practice a proper demodulation type among demodulation methods (coherent detection, square law detection and diode detector) to demodulate DSB-SC, DSB-SC, and SSB		*			*	*	
To be able to operate transistor as a modulator , and implement automatic gain control and vestigial side band modulators		*			*	*	
To get a good understanding of Intermediate frequency stage (IF) in communication systems and to be able to detect an AM radio channel practically using Super-heterodyne radio receiver		*			*	*	
To be able to modulate and demodulate baseband signals using frequency modulation (FM), and analyze the bandwidth in FM modulation, and to distinguish between benefits and drawbacks of each FM demodulation techniques		*			*	*	

Course topics:

Signal Source and Electrometrical Filters
Tuned Circuit and Tuned Amplifier
Amplitude Modulation (Balanced and Ring Bridge Modulators)
Transistor as a Modulator, Trapezium Display & Vestigial Side Band Modulation
Coherent AM Detection and Square Law Detection
Diode Detector and Automatic Gain Control
Single Side Band Modulation and Detection
Superhetrodyne Radio
Frequency Modulation
FM Detection
Signal Source and Electrometrical Filters

Computer usage: Matlab Software
Attendance: Class attendance will be taken every class and the university's policies will be enforced in this regard.
Assessments: Exams, lab reports
Grading policy:

Reports and student work	20%
Midterm Exam	30%
Final Exam	50%

Instructors:
Student Outcomes (SOs)

1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3	An ability to communicate effectively with a range of audiences
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies