



Indian Institute of Information Technology, Design and Manufacturing Kancheepuram

Introduction of New Course

Course Title	RF Microelectronics	Course Code	EC51XX			
Department/ Specialization	Electronics & Communications	Credits	L	T	P	C
			3	1	0	4
Faculty proposing the course	Dr. K P Pradhan	Status	Core <input type="checkbox"/>		Elective <input checked="" type="checkbox"/>	
Offered for	UG/PG	Type	New <input checked="" type="checkbox"/>		Revision <input type="checkbox"/>	
Recommendation from the DAC		Date of DAC				
External Expert(s)						
Pre-requisites	Knowledge of analog electronics, communication and semiconductor devices	Submitted for Approval	49 th Senate			
Learning Objectives	The key objective of this course is to provide a good understanding on the design and implementation of RF Integrated Circuits					
Learning Outcomes	<p>The course would equip students for</p> <ul style="list-style-type: none"> • Understanding of RF Circuits Design • Design of RF Integrated Circuits and Design Considerations • Develop RF Circuits for Practical Problems 					
Course Contents (with approximate breakup of hours for lecture/ tutorial/practice)	<ul style="list-style-type: none"> • Introduction to RF: RF Range, Skin Effect, Behavior & equivalent circuits of passive components like R, L, C, at high RF. Transmission Line Theory, Reflection Coefficient, Smith Chart Calculation, Impedance Matching, S-Parameter. (L-7 & T-2) • Basic Concepts in RF Design: RF DC Design. Hexagon Wireless Communication Standards, Nonlinearity, Harmonics, Gain Compression, Desensitization, Cross Modulation, Inter Modulation Distortion (IMD), Input Intercept Point (IIP3 & IIP2), Inter Symbol Interference. Noise, Noise analysis of active devices. (L-8 & T-2) • Basic Blocks in RF Systems and their VLSI Implementation: MOSFET behavior at RF, Modeling of the transistors and SPICE Models, high-speed devices such as HEMT and MESFET, BiCMOS technology, Integrated Parasitic Elements at High Frequencies and their Monolithic Implementation, Low Noise Amplifiers Design and Considerations. (L-10 & T-4) • Oscillators: Basic VCO Topologies, Phase Noise, Noise-Power Trade-Off. Resonator Less VCO Design, GHz Frequency Mixers Design and Issues, Radio Frequency Synthesizers: PLLS, Various RF Synthesizer Architectures and Frequency Dividers. (L-9 & T-3) • Trans-receiver Architecture: TRF Receivers, Heterodyne Receivers, Homodyne Receivers, Different receiver topologies, RF Receiver Architecture and its Design, Design issues in integrated RF filters, IC application and case studies for DECT, GSM and Bluetooth. (L-8 & T-3) 					
Essential Reading	<ul style="list-style-type: none"> • B.Razavi, RF Microelectronics, Prentice-Hall PTR, 2011. • T. H. Lee, The Design of CMOS Radio-Frequency Integrated Circuits", Press, 2003. • R. Jacob Baker, H. W. Li, and D.E. Boyce, CMOS Circuit Design, Layout and Simulation, Prentice-Hall, 1998. • Y.P. Tsividis Mixed Analog and Digital VLSI Devices and Technology, McGraw Hill, 1996. 					
Supplementary Reading	<ol style="list-style-type: none"> 1. RF and Microwave circuit design for wireless communication. L.E Larson (Artech House Publication 1997) 					