

RF AND MICROWAVE CIRCUITS FOR WIRELESS COMMUNICATIONS

Overview

This course reviews some fundamental principles of high frequency RF and microwave networks. Discussion of system parameters for various components that form building blocks for a wireless receiver system. They include amplifiers, oscillators, mixers, filter and antennas. Design approaches of all the blocks will be discussed in detail. A module on modulation methods allows the participants to understand and characterize the wireless system from an input data stream through the transmitter, antennas and propagation channel, and the receiver. After completing the course, the participants should be able to design a receiver for a wireless application system and evaluate the system performance.

Knowledge & Understanding (Theory Component) - Explain the fundamental requirements behind any wireless system design and how to evaluate the system performance for a particular application. List the principle of operation of the different building blocks of the system.

Key Skills (Practical Component) - Many design problems will be carried out for understanding of noise figure, signal to noise ratio and assess the wireless link for the suitable application.

Professional Development Skills (Industry Component) - Describe and apply theoretical and design skills mastered in the course and carry out the real time problem in applications like satellite communication, cellular mobile communication, RADAR, RFID and other related wireless systems.

Objectives

The primary objectives of the course are as follows:

- i) Understand and Identify various high frequency components
- ii) Justify the limitation of low frequency approaches
- iii) Solve the design issues with desired performances of complete receiver system
- iv) Suggest the suitable filters for the specific wireless application
- v) Identify the matching issues between different RF blocks
- vi) Develop the suitable antenna for a particular wireless transmission and receiver system
- vii) Explain the characteristics of active devices such as mixer, amplifier and oscillator
- viii) Recommend the suitable modulation format for analog and digital wireless system
- ix) Analyze and estimate the performance of practical wireless receiver system

This course will be presented by formal lectures that will be supported by practical, hands-on implementation of designs in Electromagnetic Softwares such as HFSS. Participants will be given prepared lecture notes and hand-outs that will guide them through the learning process.

Modules	<ol style="list-style-type: none"> 1. Wireless System Description and Network Analysis including Noise Estimation 2. Microwave Network subsystems Part I: Antennas and Filters 3. Microwave Network subsystems Part II: Amplifiers and Oscillators 4. Microwave Receiver Designs
You should attend if...	<ol style="list-style-type: none"> 1. B.Tech, M.Tech, Honours, M.Sc, PhD, Post Doc research students with interests in RF and Microwave Engineering and Communications. 2. Faculty members involved in teaching Electromagnetics, RF and Microwave and Communications.
Fees	<p>Participants from Abroad: US \$600 Industry/ Research Organizations: Rs. 6000/- Faculty Members / Researchers: Rs. 3000/- Students (pursuing PhD/ Masters / Bachelors courses): Rs 2000/- NIT Mizoram: Free (Faculty / Student / Researcher)</p> <p>The above fee includes all instructional materials, computer use for tutorials, free internet facility. The participants will be provided with single bedded accommodation on payment basis.</p> <p>To register or for any questions please send an email to anumoy.science@gmail.com</p>



Prof. Arokiaswamy Alphones received his B.Tech. from Madras Institute of Technology in 1982, M.Tech. from Indian Institute of Technology Kharagpur in 1984 and Ph.D. degree in Optically Controlled Millimeter wave Circuits

from Kyoto Institute of Technology (Japan) in 1992. He was a JSPS visiting fellow from 1996-97 at Japan. During 1997-2001, he was with Centre for Wireless Communications, National University of Singapore involved in the research on optically controlled passive/active devices. Since 2001 he is with the School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore. He is also Program coordinator for research in the school of EEE. He has 30 years of research experience. He has published and presented over 250 technical papers in peer reviewed International Journals/ Conferences. His current interests are electro-magnetic analysis on planar RF circuits and integrated optics, microwave photonics, metamaterial based leaky wave antennas and wireless power transfer technologies. He was involved many IEEE flagship conferences held in Singapore and General Chair of APMC 2009, MWP 2011, TENCON 2016. He is currently the chairman of IEEE Singapore section and a senior member of IEEE. He is also Associate Editor of IEICE (Japan) and in the board of reviewers of IEEE Transactions on Microwave Theory of Techniques and Antennas and Propagation. He has been serving as international steering committee member of Asia Pacific Microwave Conferences.

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**National Institute of Technology
Mizoram**



Mr. Anumoy Ghosh is an Assistant Professor in the Department of Electronics and Communication Engineering, National Institute of Technology, Mizoram. His research areas of interest include Antennas and Microstrip Filters, Frequency Selective Structures, Computational Electromagnetics.

Course Coordinator

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