Required Content Areas

Course number and name – ECE469

Credits — 2

Contact hours — 3

Name(s) of instructor(s) or course coordinator(s) — H. Grebel

Instructional Materials — Lab Setting

Specific course information (Brief description of the content of the course (catalog description))

Prerequisites or co-requisites — ECE362, ECE461, ECE462

Educational objectives for the course (e.g. The student will be able to explain the significance of current research about a particular topic.) — The purpose of the lab is to familiarize the student with basic concepts of experimental and simulation techniques used in the RF/Microwave field. This include familiarity with vector network analyzer, calibration, transmission lines, filters, spectrum analyzers, shielding and automations.

Brief list of topics to be covered—

Experiments:

1. Vector Network Analyzer (VNA) - Introduction
   Please refer to: https://coppermountaintech.com/university-kit/, Operating Manual is in the S2VNA\Doc directory or may be downloaded from the CMT website

2. VNA Calibration and Loss Measurements. Simulations: using MultiSim analyze the transmission of a three-segment coaxial cable

3. Filters in the frequency and time domains. Simulations: analyze Low-pass, Band-pass and High-pass filters

4. Antennas; dealing with low signal-to-noise ratio and the concept of Standing Wave Ratio (SWR). Simulations: Simulate a Wi-Fi antenna link

5. Cables; verify and troubleshoot the electrical performance of RF and microwave transmission systems. Understanding loss, frequency response of various types of cables.

6. Transmission Lines (may require fabrication in the Maker-Space at NJIT): loss and frequency aspects, resonance, phase aspects. Simulations: design and analyze the line

7. Automation; learn the basics of VNA Test Automation.

8. Co-planar waveguides; assess the coupling between two adjacent CPW waveguides, one on top of each other

9. Introduction to Spectrum Analyzers and Shielding; become familiar with spectrum analyzers and shielding properties of various materials