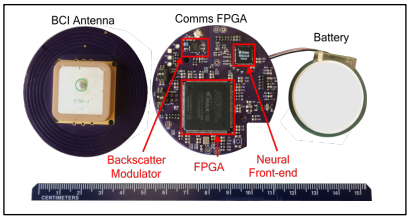
EE P 572 Fall 2023 Microwave Engineering

Instructor: Matt Reynolds
matt.reynolds@ece.uw.edu

Class Schedule: TBD



Objectives

This course will provide a hands-on introduction to RF and microwave circuit design, simulation, and measurement. We will cover commonly used circuit elements in waveguide and planar (microstrip) structures, including transmission lines, connector transitions, couplers, and filters. Semiconductor devices such as Schottky and PIN diodes and RF FETs and circuit blocks such as detectors, switches, amplifiers, oscillators, and mixers will also be covered.

Students will conduct a series of design exercises using both analytical and numerical modeling approaches. The final project will include the design, simulation, fabrication, and measurement of a microwave circuit.

Prerequisites

Basic knowledge of electromagnetics (EE 361) and electronic circuits (EE 233/331/332). For the homework, students should have a working knowledge of Python or MATLAB. Example code will be provided in Python but students are welcome to program in MATLAB if they prefer. Students will need to provide a Windows 10 laptop capable of running Python or MATLAB as well as the Cadence/AWR Microwave Office circuit design and simulation suite.

Course Materials

Class web site - lecture notes and journal papers
Text: David M. Pozar, Microwave Engineering, 4th Ed. ISBN: 978-0-470-63155-3

HW & Lab

There will be 5 graded design exercises using both analytical and numerical modeling approaches. The final project will include circuit design, fabrication, and testing. During the final 5 weeks of the course, lab time will be allocated during the class period for final project work.

Tentative Course Topics

1. Modeling microwave circuit elements
2. Waveguide and microstrip transmission lines
3. The Smith Chart and impedance matching strategies
4. Passive structures - connector transitions, couplers, filters
5. Semiconductor devices - diodes and FETs
6. Detector, switch, amplifier, oscillator, and mixer design
7. System design considerations - noise figure, phase noise, etc

Grading Policy

The final grade will be based on the final project report and the 5 design exercises. There will be no final exam.