1. **Course number and name**
   EE 431: RF and Microwave Circuits and Systems

2. **Credits and contact hours**
   4 credits, 3 lecture hours and 3 lab hours

3. **Instructor's or course coordinator's name**
   Deuk Heo

4. **Textbook, title, author, and year**
   Reinhold Ludwig. 2000. *RF Circuit Design Theory and Applications* (2nd ed.). Prentice Hall. ISBN -10:0-13-147137-6.

5. **Specific course information**
   a. Catalog description: In this class, we study the operation and design of wireless communication circuit components from the perspective of the radio frequency. These include high speed circuits for telecommunications including filters, mixers, amplifiers, oscillators and transceivers. We will study characteristics of these subsystems which set the ultimate limits on the performance of wireless communication systems.
   b. Prerequisites or co-requisites: Certified major in EE, CE, CS or SE.

6. **Specific goals for the course**
   At the end of the course, students will be able to
   - Analyze circuit in frequency-domains (1).
   - Compute the input and output impedance matching (1).
     Obtaining high frequency behavior of active and passive components using custom CAD tools (1).
   - Design RFICs with lumped component impedance matching networks (1,2,6).
     Design RFICs with transmission line impedance matching networks (1,2,6).

7. **Brief list of topics to be covered**
   Lectures:
   - Transmission Line Analysis
   - Smith Chart
   - Single and Multi-port Network
   - Matching and Bias Network
   - Filter Design
   - RF Transistor Amplifier Design
   - Oscillator
   - Mixer
   - RF Transceiver Architecture

   Laboratory:
   - Software Lab: ADS Tutorial Lab, EME 205
   - Software Lab: ADS DC and AC simulation Lab, EME 205
   - Software Lab: ADS inductor design and MOMENTUM simulation, EME 205

- ADS lumped element LC impedance matching, EME 205
- ADS lumped element TL impedance matching, EME 205
- ADS Filter Low and Band Pass filter Design, EME 205
- ADS Amplifier Design, EME 205
- ADS Oscillator design, EME 205
- ADS Mixer design, EME 205
- RF Receiver link budget simulation EME 205