SONOMA STATE UNIVERSITY | Department of Engineering Science Electrical Engineering

EE 444L

1. **Course Number & Name:** EE 444L, RF Circuit Design Laboratory
2. **Course Credit and Contact Hours:** 1 Units, 3 hours Lab
3. **Course Coordinator:** Dr. Farid Farahmand
4. **Textbook:** Reading materials will be provided.
5. **Supplemental Materials:**
    a. USB SDR receiver, available from many sources, e.g. Amazon - These typically cost about $25.
    b. NanoVNA vector network analyzer, also available from many sources, e.g. Amazon - typically cost about $70.
    c. A low cost test board containing many of these is available from Amazon - This typically costs about $20.
    d. Access to Matlab.
6. **Specific Course Information:**
    a. Description: This course is a hands-on experience to learn basics of RF circuit design, s parameters, insertion and return loss and filter characterization. Use of MATLAB libraries to control the SDR receiver.
    b. Prerequisites: Upper-division standing or consent of instructor.
    c. Co-Requisite: EE 444 (Introduction to RF Communications)
    d. Status: ☐ Required for EE program, ☑ Elective, ☐ Selected Elective
7. **Specific Goals for the Course:**
    a. Specific outcomes of instruction: Upon successful completion of this course the students will be able to:
        i. Know how to identify component of an RF communication system.
        ii. Know how to characterize RF communication system components.
        iii. Use MATLAB for extending the functionalities of SDR.
        iv. Know how to use basic RF test instruments.
    b. This course supports the following ABET Student Outcomes:
        SO-1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
8. **Brief List of Topics to be Covered:**
    a. Basic RF Concepts.
    b. Units of power, insertion and return loss.

c. Calibration to remove errors caused by cable loss.
d. Impedance visualization using Smith charts.
e. Understanding services using HF, VHF and Microwave radio by Frequency Domain analyses.
f. Extending SDR capabilities with MATLAB and Simulink libraries.