# ECE 5180 / 6180 – Microwave Engineering

Students should also sign up for the Laboratory: ECE 5190 / 6190
Course Taught: MWF 8:30-9:30 EC 302
Lab Taught: As scheduled by sign-up sheet

**Professor:** Cynthia Furse, 797-2870, furse@alpha.ece.usu.edu
Office Hours: MWF 9:30-11:30 EL152
Open Door Policy: When my door is open, you are welcome to come in.

### ECE 6130 Website:

http://www.engineering.usu.edu/classes/ece/6130/ (will be changing to 6180)

Lecture notes, announcements, schedule, etc.

### Objectives:

After this course, the student should:

- Understand the fundamentals of microwave devices and microwave measurement methods.
- Be able to design basic passive microwave components including matching networks, couplers/power dividers, and filters. Be able to implement designs in Agilent/EESOF Libra software.
- Be able to develop prototypes of passive microstrip devices, measure their characteristics, and understand the measurements.
- Be able to combine passive elements with commercial active elements (amplifiers, mixers, VCOs, etc.) to create a microwave circuit. The project for this class will be an FSK WLAN.

### Software:

Course includes use of computational methods for analyzing microwave elements. Students will need a SUN account to run Agilent ADS software. You will also need access to Matlab or Mathcad software.

### Porfolios:

You will need a 3-ring binder to maintain your portfolio. Portfolio questions will be assigned with each day ‘s lecture, such as “How do you design a Widget?” You should write a set of notes with the steps needed to answer the portfolio question ( a cookbook), and illustrate this with examples. Copies of the solution manual are in the IEEE room. It is critical to keep up with lectures, in order to understand the material. Portfolio sections should be turned in each Monday. They will be verified for completeness. EXAMS WILL BE OPEN PORTFOLIO and LAB BOOK, CLOSED TEXT, so copy all tables, figures, etc. from the text that you will need, and keep them in your portfolio.

### Portfolio Grades:

A Index, 100% complete, 2+ examples for each topic

B Index, 95% complete, 1.5+ examples for each topic

C Index, 90% complete, 1+ example for each topic

D Index, 80% complete, 1+ example for each topic

### Laboratory:

Laboratory and design projects will be scheduled throughout the quarter. Measurement labs will be approximately bi-weekly. Sign-up sheets will be used to schedule lab times. Design projects (often

associated with the measurement lab) will be assigned at the completion of each “unit”. Realistic specifications will be given and you will be asked to design a product through simulation. Later in the quarter you will also prototype and measure your designs. IN addition, each student will design and build an FSK WLAN. Students will need a bound laboratory notebook. Notebooks are due one week after your lab time. See Lab book policies for details of how to maintain your lab book.

**Laboratory Notebook:**

Fill this notebook with sufficient instructions so that another student of your level could QUICKLY, EASILY, ACCURATELY repeat your results. Do this NEATLY enough that you can proudly show it to an interviewer.

Leave one page in the front of your lab book for a table of contents and grade summary.

Each lab must include

1. A copy of the lab handouts (copy and paste)
2. All preliminary calculations (if done on computer, paste a hard copy of your calculations, programs, etc. in the book, and keep a disk in the back).
3. Sketch of equipment setup, including model #s of equipment.
4. WELL-LABELED data taken during the lab. Make tables, graphs, specific notes, etc. Include UNITS in all results.
5. Conclusions (approximately 1 page long) and SUPPORTING FIGURES/TABLES/GRAPHS for all conclusions. For instance, if you say, “The measured data agreed well with predicted data,” you need either a table or a graph where the results are tabulated/plotted together. It would be even better to say, “The measured data agrees with the predicted data with less than 5% error.”
6. Also include: name, date, signature at bottom of each page.
7. For your final project, you should include all of your preliminary work and design work in your lab book, and a final written report using this data. I will grade both the lab book and written report.

**Exams:**

Two midterm exams will be given during the quarter. Dates are given on the schedule. If you have conflicts with these dates, such as travel or an overburden of exams that day, please let me know as soon as possible.

**Grading:**

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| Portfolio | 20% | OR | 20% |
| Laboratory | 20% | | 20% |
| Midterm | 20% | | |
| Midterm II | 20% | | |
| Comprehensive Final | 20% | | 60% |

**Text:** Microwave Engineering, 2nd edition, David M. Pozar, John Wiley & Sons

Your comments and feedback are appreciated !