

1. Course number and name

EE 351: Distributed Parameter Systems

2. Credits and contact hours

3.0 (three lecture hours per week)

3. Instructor's or course coordinator's name

Patrick Pedrow

4. Text book, title, author, and year

Matthew N. O. Sadiku. 2018. *Elements of Electromagnetics* (7th ed.). Oxford University Press.

5. Specific course information

- a. *Catalog description:* Maxwell's equations, plane waves, waveguides, resonators, antennas, numerical methods.
- b. *Prerequisites or co-requisites:* EE 331 with a C or better; certified major in Electrical Engineering, Computer Science, or Computer Engineering.

6. Specific goals for the course

At the end of this course, students must be able to:

- Use phasors and vectors to analyze electromagnetic plane waves normally incident upon an interface. (1)
- Use the Smith chart to analyze electromagnetic plane waves normally incident upon an interface. Design a radome. (1, 2)
- Use phasors and vectors to analyze electromagnetic plane waves obliquely incident upon an interface. Design a laser window. (1, 2)
- Design a rectangular waveguide for a designated dominant mode frequency range. (1, 2)
- Design a filamentary antenna. (1, 2)
- Complete a project in which the student uses a modern numerical commercial software platform to design antennas and analyze their far zone antenna patterns for antennas such as filamentary, patch, array, etc. (1, 2, 3, 6,7)

7. Brief list of topics to be covered

- Plane waves associated with normal incidence, oblique incidence, and use of the Smith chart for analysis of normal incidence.
- Plane waves associated with lossy media, lossless media, and total internal reflection
- Rectangular waveguides associated with boundary conditions at a perfect electric conductor, dispersion curves, and dominant mode propagation.
- Rectangular waveguides associated with TM versus TE modes, cutoff frequencies, and cavity resonators.

- Antennas associated with retarded magnetic potential, Hertzian dipoles, and associated zones (near, intermediate, and far).
- Antennas associated with directive gain, half wave dipole, and the Friis transmission formula.
- Workshop on commercial software for antenna analysis and design.
- Exams and reviews.