


ECE 5322
21st Century Electromagnetics

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Lecture #0

Course Overview, Policies, and Procedures

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Lecture Outline



- Course Overview
 - Mission
 - Course Objectives
 - Course Outline
- Policies and Procedures
 - Grading
 - Homework
 - Final Project
 - MATLAB Codes

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Course Overview

Mission



To teach students the theory, and equip them with the skills, to design electromagnetic devices in the 21st century where digital manufacturing becomes dominant.

Course Objectives



- Present the most advanced topics in electromagnetics.
- Predict and describe 21st century electromagnetic device concepts.
- Train students to independently analyze and design 21st century electromagnetic devices.
- Present a potpourri of electromagnetic concepts that the student can draw upon in their career.
- Strong emphasis on metamaterials and 3D printed electromagnetics.

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Course Outline



Lecture 1 -- Preliminary topics in EM
 Lecture 2 -- Lorentz and Drude models
 Lecture 3 -- Nonlinear and anisotropic materials
 Lecture 4 -- Transmission lines in anisotropic media
 Lecture 5 -- Coupled-mode theory
 Lecture 6 -- Coupled-mode devices
 Lecture 7 -- Theory of periodic structures
 Lecture 8 -- Calculation examples of periodic structures
 Lecture 9 -- Diffraction gratings
 Lecture 10 -- Subwavelength gratings
 Lecture 11 -- Guided mode resonance
 Lecture 12 -- Introduction to engineered materials
 Lecture 13 -- Metamaterials
 Lecture 14 -- Photonic crystals
 Lecture 15 -- Homogenization and parameter retrieval
 Lecture 16 -- Transformation Electromagnetics
 Lecture 17 -- Holographic lithography
 Lecture 18 -- Spatially variant lattices
 Lecture 19 -- Interfacing MATLAB with CAD
 Lecture 20 -- Frequency selective surfaces
 Lecture 21 -- Surface waves
 Lecture 22 -- Slow waves

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Policies and Procedures

Homework	40%	90% – 100% → A
Exams	30%	80% – 89% → B
Final Project	20%	70% – 79% → C
Participation	10%	60% – 69% → D

**HOMEWORK IS 40%
OF YOUR FINAL GRADE!!!!!!!**

Homework Rules



- Assigned on a weekly basis.
- Late Homework
 - -10% every day late.
 - Grade of zero after three days.
 - I need to distribute solutions as soon as possible.
- Homework is 40% of your final grade. The homework IS this class.
- **Do your own work. Do not copy from other students.**

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Homework Format



- Must have a cover page.
 - Name, course information, assignment #, date, etc.
- Put problems in the proper order.
- Be neat and well organized.
- ***ALL COMPUTER CODES MUST GO INTO AN APPENDIX!***
- Construct homework as if you will need to relearn and implement the material 10 years from now, and have only your notes and homework to relearn the material.
- **PAPERLESS!!! Submit homework as a single PDF file.**

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Exams



- All exams are take-home.
- Exams follow the exact same format and rules as the homework.
- Cannot provide help on an exam.

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Rules For Your MATLAB Codes

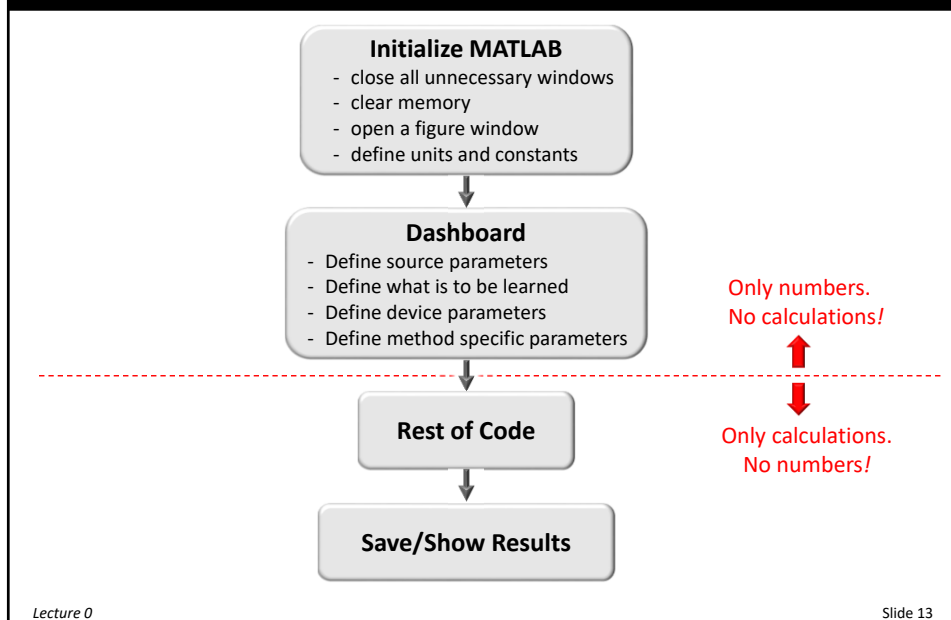


- You must use MATLAB for all homework and exams.
- Programs must follow the block diagrams in the class exactly.
- Codes must be neat, well organized, and well commented.
- Unless otherwise instructed, code must be a single program and NOT broken into separate functions.
- Try to use the same variable names as the notes and the instructor.
- Need help? If you are stuck and your codes follow ALL of the above rules, e-mail me your MATLAB code.
 - `rcrumpf@utep.edu`
 - Cannot provide help on exams.

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Structure of the Ideal Code



The Final Project



- Purpose – to learn, practice, and share something outside of what was taught in class.
- Project should be summarized in Power Point.
 - Must be complete enough that instructor can reproduce your work if needed.
- Final Project = Final Exam
- Projects presented during the final exam period.
- May work alone or in teams, but teams must do proportionally more work.
- No late project will be accepted and will be given a grade of zero.
- *Get started on this early!!*

Project Ideas



- ???

- ???