EE572- Electromagnetics 1: Microwave Engineering
Autumn 2016

Class Meetings:

Wednesdays in EEB 045, 6-8:50PM

Dr. Allan Ecker

Office Hours: Thursdays in EEB M358, 6-8:50PM
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Midterm: The midterm exam is scheduled for November 2.

Final: The final exam is scheduled for December 7.

Syllabus

Grading Breakdown:
Homework: 8 assignments, 40% credit
Midterm: 60 minutes, 20% credit
Final: 120 minutes, 40% credit

Lecture Schedule

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1	Class Intro Review of T-Lines S-Parameters And Microstrip	Matlab and Octave for simulated instrumentation	S-Parameters from circuit theory perspective (Gamma, S matrix, frequency dependence of t-line)	Computing reflections and transmissions (Matlab)	Reintroducing the Smith Chart and some Use Cases	HW1: S-Parameter Demonstrations
2	Electric Materials From Physics To Mathematics	Frequency Domain Models and the Phase Unwrapping Problem	Vector Electric Fields and Voltages in TEM	Electric Signal Motion In 2-Conductor Waveguides in TEM	Microstrip and Stripline	HW2: DeEmbedding and Model Making
3	Electric Materials From Mathematics To Modeling	Interpolating S-Parameters Mindfully	Mechanisms of Electric Signal Loss	Deduction of VNA Parameters	Dispersion	HW3: Building an NWA and Interpolation
4	Time Domain Models for Transmission Lines and Loads	Software TDR	Bounce Diagrams and the Telegrapher's Equations	Inverse transform of S-Parameters	Step functions from impulse responses	HW4: Software TDR of simple systems
5	Time Domain Models of Lossy and Dispersive Media	Modeling Lossy and Dispersive Transmission Lines in Numerical Tools With Convolution	Additional Reading on Time Domain Models	Pseudorandom Bit Sequences and Eye Diagram Construction	Midterm Review	Midterm Review
6	MIDTERM	MIDTERM	Coupled Lines	Interpolating, Patching and Otherwise Fixing S Parameter Datasets	Multiport S Parameters	HW5: Virtual Eye Diagrams
7	Modeling Discontinuity	Case Study: Complex Interconnect	PCB Design Considerations	Lumped Edge Models	Delay Matching	HW6: PCB Case Study In Routing
8	Modes of Propagation TEM, TE, TM	Modeling Multimode Scattering	Suppressing Higher-order modes	Case Study: Interconnect via Oversized Model	Signal Integrity Overview	HW7: Interconnect with Multimode Loss
9	Single-conductor Waveguides	Rectangular and Circular Waveguides	Wave guide use cases	Logic Without DC: Wireless Protocols	Case Study: DIY NWA	HW8: Bit Error Rate Analysis
10	Wireless: The Universe as a Waveguide	377 Ohms	Optics vs RF	Recommended Projects	Final Examination Prep	Final Examination Prep