ENGINEERING

Foundations of Engineering Electromagnetics
ECE 555 – in-class section
Fall 2019 – Updated 08/12/19
Course Outline and Syllabus

Lectures: Tu Th 9:30-10:45 AM
Room DSH-132 – Sec 002 students are welcome to attend the lectures if they wish; otherwise, the recordings will be posted under **Mediasite Recordings** at the bottom of the Learn.unm.edu website for this course and available to all students.

Instructor: Professor Edl Schamiloglu
Office: Dean's Office, Centennial 3071; Phone: 505-277-6095
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Office Hours: By appointment, or swing by the Dean's office and I can assist you if I am not pressed for time.

Prerequisites: ECE 360 or equivalent (undergraduate electromagnetics)

Textbook: D.G. Dudley, *Mathematical Foundations for Electromagnetic Theory* (IEEE Press, New York, NY, 1994) (ISBN-13: 978-0780310223). We will cover Chapters 1-4. Supplemental material will also be provided.

Course Website: http://learn.unm.edu. You will need your UNM NET ID to access this page if you are registered for the course.

Catalog Description: Mathematical foundations for engineering electromagnetics: linear analysis and method of moments, complex analysis and Kramers-Kronig relations, method of steepest descent, Green's functions, spectral representation method and electromagnetic sources.

Course Objectives: This course is a prerequisite to ECE 561, although students admitted in the Spring semester can take this after completing ECE 561. Topics covered: Mathematical foundations for engineering electromagnetics: linear analysis and method of moments, complex analysis (including the method of steepest descent), Kramers-Kronig relations, Green's functions, spectral representation method, and electromagnetic sources.

Grading: 7 problem sets [every two weeks, to be scanned and uploaded to learn.unm.edu 's assignment tool] (30%), two exams (30%) and a final project (40%).

ENGINEERING

Lecture Schedule*

Week#	*Day*	*Date*	*Topic*	*Text Chapter/Ref.*
1	Tu	20 Aug	Preamble – Applied EM@UNM	
	Th	22 Aug	Intro to Linear Analysis	Chapter 1
2	Tu	27 Aug	Inner Product Space	Chapter 1
	Th	29 Aug	Hilbert Space	Chapter 1
3	Tu	03 Sep	Operators in Hilbert Space	Chapter 1
	Th	05 Sep	Method of Moments	Chapter 1
4	Tu	10 Sep	Complex Analysis I	Lecture Notes
	Th	12 Sep	Complex Analysis II	Lecture Notes
5	Tu	17 Sep	*Connections to Quantum Mechanics*	Lecture Notes
	Th	19 Sep	Complex Analysis III	Lecture Notes
6	Tu	24 Sep	Complex Analysis IV	Lecture Notes
	Th	26 Sep	Method of Steepest Descent	Lecture Notes
7	Tu	01 Oct	Review for Exam #1	
	Th	03 Oct	**Exam #1**	In-Class Section
8	Tu	08 Oct	Introduction to Green's Functions and Sturm-Liouville Theory	Chapter 2
	Th	10 Oct	*Fall Break*	
9	Tu	15 Oct	Sturm-Liouville – First kind	Chapter 2
	Th	17 Oct	Sturm-Liouville – Second kind	Chapter 2
10	Tu	22 Oct	Sturm-Liouville – Third kind	Chapter 2
	Th	24 Oct	**Work on Exam #2 Take Home**	
11	Tu	29 Oct	**Work on Exam #2 Take Home**	
	Th	31 Oct	Go over Exam #2 Solutions – Discuss Final Project	
12	Tu	05 Nov	Spectral Representation Method	Chapter 3
	Th	07 Nov	Spectral Rep. Meth. SLP1/SLP2	Chapter 3
13	Tu	12 Nov	Spectral Rep. Meth. SLP3	Chapter 3
	Th	14 Nov	Spectral Rep. Meth. SLP3	Chapter 3
14	Tu	19 Nov	Spectral Rep. Meth. and GF's	Chapter 3
	Th	21 Nov	EM Sources – Sheet Current	Chapter 4
15	Tu	26 Nov	EM Sources – Line Source	Chapter 4
	Th	28 Nov	*Thanksgiving Break*	
16	Tu	03 Dec	EM Sources – Point Source	Chapter 4
	Th	05 Dec	*Review for Final Project***	

** Final project will be due at noon on Friday of Final Exam Week.

NOTE: I will miss a few lectures due to program reviews, travel, etc. I will provide an updated list of those dates as they become available. There will either be a guest lecturer or I will provide material for students to work on *in lieu* of class.

*subject to change