THE UNIVERSITY of NEW MEXICO

Foundations of Engineering Electromagnetics
ECE 555 – 002 (on-line 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. 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.

Course Objectives: This course is a prerequisite to 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. If you have already taken ECE 561 you must take this the following semester.

Grading: 7 problem sets (30%), two exams (30%) and a comprehensive final exam (30%). Participation in the on-line discussions will account for 10% of the final grade (see the next paragraph for additional information). All exams in Sec 002 will be take-home and open book and arranged the week before the exam date. The posted exam days reflect the week that the Exam must be completed.

Course Conduct: The on-line section of the course is organized as follows. The semester is divided into 8 modules. Each module covers a two-week period. The modules are synchronized with the lectures in class.

Each module will be released Sunday evening before the beginning of the module. The students should review the .pdf lecture files, and they should read the textbook in parallel. There will a problem set and/or exam for each module. In addition to reviewing the content in each module, I will post a question each week using the Discussion Tool. I expect each student to contribute to the dialogue with thoughtful remarks.

Lecture Schedule*

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

*subject to change

** 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.