

Foundations of Engineering Electromagnetics

ECE 555 – 001 and – 002

Fall 2021

Course Outline and Syllabus

- Preamble:** Please see the important information on page 3 of this Syllabus.
- Lectures:** I will lecture Tu Th 9:30-10:45 AM Dane Smith Hall 132 and the lectures will be recorded. The recordings will be posted under **ZOOM Recordings** at the side of the <http://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
e-mail: edls@unm.edu
- Office Hours:** By appointment via telephone/Zoom
- Prerequisites:** ECE 360 or equivalent (undergraduate electromagnetics)
- Textbook:** **Required:** 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.

Recommended: L. Sevgi, *Electromagnetic Modeling and Simulation (IEEE Press Series on Electromagnetic Wave Theory)* (IEEE Press/John Wiley and Sons, New York, NY, 2014 (ISBN-13: 978-1118716182). This reference will be useful for the final project.
- 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's assignment tool] (30%), midterm exam (30%), and a final project (40%).

Lecture Schedule*

<u>Week#</u>	<u>Day</u>	<u>Date</u>	<u>Topic</u>	<u>Text Chapter/Ref.</u>
1	Tu	24 Aug	Preamble – Applied EM@UNM	
	Th	26 Aug	Intro to Linear Analysis	Chapter 1
2	Tu	31 Aug	Inner Product Space	Chapter 1
	Th	02 Sep	Hilbert Space/Operators	Chapter 1
3	Tu	07 Sep	CSB Inequality	Chapter 1
	Th	09 Sep	Method of Moments	Chapter 1
4	Tu	14 Sep	Review of Linear Space	Lecture Notes
	Th	16 Sep	<i>Connections to Quantum Mechanics</i>	Lecture Notes
5	Tu	21 Sep	Complex Analysis I	Lecture Notes
	Th	23 Sep	Complex Analysis II	Lecture Notes
6	Tu	28 Sep	Random Coupling Model	Lecture Notes
	Th	30 Sep	More EM and QM	Lecture Notes
7	Tu	05 Oct	Complex Analysis III	Lecture Notes
	Th	07 Oct	Complex Analysis IV	Lecture Notes
8	Tu	12 Oct	Method of Steepest Descent	Lecture Notes
	Th	14 Oct	Fall Break	
9	Tu	19 Oct	Sturm-Liouville – First kind	Chapter 2
	Th	21 Oct	Sturm-Liouville – Second kind	Chapter 2
10	Tu	26 Oct	Sturm-Liouville – Third kind	Chapter 2
	Th	28 Oct	Sturm-Liouville – Wrap-up	Chapter 2
11	Tu	02 Nov	Midterm Exam	
	Th	04 Nov	Go over Midterm Exam Solutions – Discuss Final Project	
12	Tu	09 Nov	Spectral Rep. Meth. SLP1/SLP2	Chapter 3
	Th	11 Nov	Spectral Rep. Meth. SLP1/SLP2	Chapter 3
13	Tu	16 Nov	Spectral Rep. Meth. SLP3	Chapter 3
	Th	18 Nov	Spectral Rep. Meth. SLP3	Chapter 3
14	Tu	23 Nov	Spectral Rep. Meth. and GF's	Chapter 3
	Th	25 Nov	Thanksgiving Holiday – No Class	
15	Tu	30 Nov	EM Sources – Sheet Source	Chapter 4
	Th	02 Dec	EM Sources – Line Source	Chapter 4
16	Tu	07 Dec	No Class – work on Final Project	
	Th	09 Dec	No Class – work on Final Project**	

** Final project will be due at noon on Friday, December 17, 2021

UNM Administrative Mandate on Required Vaccinations

All students, staff, and instructors are required by UNM Administrative Mandate on Required Vaccinations to be fully vaccinated for COVID-19 as soon as possible, but no later than September 30, 2021, and must provide proof of vaccination or of a UNM validated limited exemption or exemption no later than September 30, 2021 to the UNM vaccination verification site. Students seeking medical exemption from the vaccination policy must submit a request to the UNM verification site for review by the UNM Accessibility Resource Center. Students seeking religious exemption from the vaccination policy must submit a request for reasonable accommodation to the UNM verification site for review by the Compliance, Ethics, and Equal Opportunity Office. For further information on the requirement and on limited exemptions and exemptions, see the UNM Administrative Mandate on Required Vaccinations.

UNM Requirement on Masking in Indoor Spaces

All students, staff, and instructors are required to wear face masks in indoor classes, labs, studios and meetings on UNM campuses, see masking requirement. Qualified music students must follow appropriate specific mask policies issued by the Chair of the Department of Music and the Dean of the College of Fine Arts. Vaccinated and unvaccinated instructors teaching in classrooms must wear a mask when entering and leaving the classroom and when moving around the room. When vaccinated instructors are able to maintain at least six feet of distance, they may choose to remove their mask for the purpose of increased communication during instruction. Instructors who are not vaccinated (because of an approved medical or religious exemption), or who are not vaccinated yet, must wear their masks at all times. Students who do not wear a mask indoors on UNM campuses can expect to be asked to leave the classroom and to be dropped from a class if failure to wear a mask occurs more than once in that class. With the exception of the limited cases described above, students and employees who do not wear a mask in classrooms and other indoor public spaces on UNM campuses are subject to disciplinary actions.

Communication on Change in Modality

The President and Provost of UNM may direct that classes move to remote delivery at any time to preserve the health and safety of the students, instructor and community. Please check <http://learn.unm.edu> regularly for updates about our class and please check <https://bringbackthepack.unm.edu> regularly for general UNM updates about COVID-19 and the health of our community.

Accommodations

In accordance with University Policy 2310 and the Americans with Disabilities Act (ADA), academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. It is imperative that you take the initiative to bring such needs to the instructor's attention, as I am not legally permitted to inquire. Students who may require assistance in emergency evacuations should contact the instructor as to the most appropriate procedures to follow. Contact Accessibility Resource Center at 277-3506 or arcsrvs@unm.edu for additional information.

UNM is committed to providing courses that are inclusive and accessible for all participants. As your instructor, it is my objective to facilitate an accessible classroom setting, in which students have full access and opportunity. If you are experiencing physical or academic barriers, or concerns related to mental health, physical health and/or COVID-19, please consult with me after class, via email/phone or during office hours. You are also encouraged to contact Accessibility Resource Center at arcsrvs@unm.edu or by phone 277-3506.

Credit-hour Statement

This is a three credit-hour course. Class meets for three 50-minute sessions of direct instruction for fifteen weeks during the Fall 2021 semester. Students are expected to complete a minimum of six hours of out-of-class work (or homework, study, assignment completion, and class preparation) each week.

Title IX

Our classroom and our university should always be spaces of mutual respect, kindness, and support, without fear of discrimination, harassment, or violence. Should you ever need assistance or have concerns about incidents that violate this principle, please access the resources available to you on campus, especially the LoboRESPECT Advocacy Center and the support services listed on its website (<http://loborespect.unm.edu/>). Please note that, because UNM faculty, TAs, and GAs are considered "responsible employees" by the Department of Education, any disclosure of gender discrimination (including sexual harassment, sexual misconduct, and sexual violence) made to a faculty member, TA, or GA must be reported by that faculty member, TA, or GA to the university's Title IX coordinator at the Office of Compliance, Ethics, and Equal Opportunity. For more information on the campus policy regarding sexual misconduct, please see: <https://policy.unm.edu/university-policies/2000/2740.html>.