



Foundations of Engineering Electromagnetics

ECE 555 – 001 and – 002

Fall 2020 – Updated 08/15/2020

Course Outline and Syllabus

Preamble:

Due to the COVID-19 pandemic, UNM and the School of Engineering will require students, staff, and faculty to follow all health guidelines of the New Mexico Department of Health. Specifically, students, faculty and staff will adhere to social distancing guidelines, will wear masks in all buildings on campus (students are expected to provide their own masks), will maintain a distance of at least six feet from others, and will wash their hands frequently when on campus. To ensure social distancing, classes and laboratories that have enrollments larger than a third of the capacity of the scheduled classroom will be offered in a Face-to-Face + Remote Scheduled format. This will require that students attend class on campus only on certain days, watching the class live via the internet on other days. Your instructor will assign you to specific days to attend on campus – if you have a special need regarding timing, contact your instructor for an accommodation. If you have an underlying health condition that will preclude you from coming to campus, take care of a family member with an underlying condition, or simply do not feel comfortable coming to campus, you can attend remotely; please contact your instructor to make arrangements for this. It is possible that sometime during this semester the pandemic may worsen; if this happens it may be necessary to close campus and transition all classes to a remote delivery.

Lectures:

I will lecture Tu Th 9:30-10:45 AM Room Woodward 149 and an operator will be available to record my lectures. Students are welcome to come to class as there are fewer than 10 students in Sec. 001 and the classroom holds 150 students. The recordings will be posted under **ZOOM Recordings** at the side 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
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



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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%).

Revised Fall Schedule:

Aug 17, 2020	First Day of Classes
Sept 7, 2020	Labor Day - no classes
Oct 7, 2020	Wednesday break day - no classes
Nov 3, 2020	Tuesday break day / Election day - no classes
Nov 25, 2020	Last day of in-person classes
Nov 26/27	Thanksgiving break - no classes
Nov 30 - Dec 4	Remote instruction week
Dec 7 - Dec 12	Remote exam week
Dec 12, 2020	End of Term

This schedule eliminates Fall break (previously Oct. 8-9) as the start of a 4-day weekend in favor of two separated days - a Wednesday and a Tuesday - and greatly reduces the numbers of students returning to campus after Thanksgiving break. This eliminates two possible travel-return periods and reduces the number of students on campus if we experience a late November or December seasonal wave of respiratory virus infections. It requires the last two weeks of the semester (including exam week) to be provided remotely.

**Lecture Schedule***

<u>Week#</u>	<u>Day</u>	<u>Date</u>	<u>Topic</u>	<u>Text Chapter/Ref.</u>
1	Tu	18 Aug	Preamble – Applied EM@UNM	
	Th	20 Aug	Intro to Linear Analysis	Chapter 1
2	Tu	25 Aug	Inner Product Space	Chapter 1
	Th	27 Aug	Hilbert Space/Operators	Chapter 1
3	Tu	01 Sep	Method of Moments	Chapter 1
	Th	03 Sep	Review of Linear Space	Chapter 1
4	Tu	08 Sep	Complex Analysis I	Lecture Notes
	Th	19 Sep	Complex Analysis II	Lecture Notes
5	Tu	15 Sep	<i>Connections to Quantum Mechanics</i>	Lecture Notes
	Th	17 Sep	Complex Analysis III	Lecture Notes
6	Tu	22 Sep	Complex Analysis IV	Lecture Notes
	Th	24 Sep	Method of Steepest Descent I	Lecture Notes
7	Tu	29 Sep	Method of Steepest Descent II	Lecture Notes
	Th	01 Oct	Method of Steepest Descent III	Lecture Notes
8	Tu	06 Oct	Introduction to Green's Functions and Sturm-Liouville Theory	Chapter 2
	Th	08 Oct	Introduction to Green's Functions and Sturm-Liouville Theory	Chapter 2
9	Tu	13 Oct	Sturm-Liouville – First kind	Chapter 2
	Th	15 Oct	Sturm-Liouville – Second kind	Chapter 2
10	Tu	20 Oct	Sturm-Liouville – Third kind	Chapter 2
	Th	22 Oct	Sturm-Liouville – Wrap-up	Chapter 2
11	Tu	27 Oct	Midterm Exam	
	Th	29 Oct	Go over Midterm Exam Solutions – Discuss Final Project	
12	Tu	03 Nov	<i>Election Day – No Class</i>	
	Th	05 Nov	Spectral Rep. Meth. SLP1/SLP2	Chapter 3
13	Tu	10 Nov	Spectral Rep. Meth. SLP3	Chapter 3
	Th	12 Nov	Spectral Rep. Meth. SLP3	Chapter 3
14	Tu	17 Nov	Spectral Rep. Meth. and GF's	Chapter 3
	Th	19 Nov	EM Sources – Sheet Current	Chapter 4
15	Tu	24 Nov	EM Sources – Line Source	Chapter 4
	Th	26 Nov	<i>Thanksgiving Holiday – No Class</i>	
16	Tu	01 Dec	No Class – work on Final Project	
	Th	03 Dec	No Class – work on Final Project**	

** Final project will be due at noon on Friday, December 11, 2020



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COVID-19 IMPACT

Respect the UNM Community by Preserving Health

You have the ability to prevent the spread of COVID-19 and to preserve the health of fellow students, your instructor, staff and the community by following UNM health protocols. The UNM Provost Administrative Directive on Mandatory Student Face Covering and Symptom Reporting of July 9, 2020 requires that all students on UNM-Main and UNM branch campuses wear face masks in the face-to-face classroom and on campus unless they have a specific mask accommodation (confidentially documented with the Accessibility Resource Center). UNM Provost Administrative Directive is consistent with Governor Lujan Grisham's [Public Health Emergency Order](#) as amended, and the [Public Health Order of the New Mexico Health Secretary](#). It also requires daily participation in symptom screening through covidscreen, which will be sent via UNM e-mail.

Acceptable masks and mask wearing in class: A two-layer mask that covers the nose and mouth and that is cleaned regularly is acceptable. A face shield is not sufficient protection. It is vital that you wear your mask correctly, covering your nose and mouth. Removing your mask for an extended period to eat or drink in class violates the Provost Administrative Directive and endangers others.

Mask Wearing Accommodation: Individuals with a documented disability or diagnosis may seek accommodation with the UNM Accessibility Resource Center (ARC) (<https://arc.unm.edu/>). Individuals do not need to reveal private information to an instructor. ARC will require documentation of health requirements, which will be kept confidential. The instructor will be informed only of any need for accommodation.

Consequences of not wearing a mask properly: Unless you have an ARC-approved accommodation, if you don't wear a mask, or if you do not wear a mask properly by covering your nose and mouth, you will be asked to leave class. If you fail to wear a mask properly on more than one occasion, you can expect to be dropped from the class. If you insist on remaining in the classroom while not wearing a mask (without an ARC-determined accommodation), class will be dismissed for the day to protect others and you will be dropped from the class immediately.

This class may move to remote delivery at any time to preserve the health and safety of the students, instructor and community. Please check [fill in your communication system] regularly for updates about our class and please check <https://bringbackthepack.unm.edu> regularly for general UNM updates.

NON-COVID-19 UNM INFORMATION

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 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.

[Sample 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 2019 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:

Note: UNM encourages all faculty and TAs to include a Title IX statement on the syllabus and reminds all faculty, TAs, and GAs that per university policy APPM 2740 they are mandatory reporters to the Title IX Coordinator at the Office of Equal Opportunity of reports of gender discrimination, including sexual harassment, sexual misconduct and sexual violence per APPM 2740 http://policy.unm.edu/university-policies/2000/2740.html#reporting_misconduct.

The Office of the Provost and EVP for Academic Affairs recognizes that instructors may seek choice in the syllabus language used to address Title IX. Below is a standard statement as well as alternative statements proposed by UNM Faculty for a Sexual Assault Free Environment (SAFE).

Standard Title IX statement: In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered "responsible employees" by the Department of Education (see



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<https://www.ed.gov/news/press-releases/us-department-education-launches-new-title-ix-resources-students-institutions-historic-new-rule-takes-effect>) requires that any report of gender discrimination that includes sexual harassment, sexual misconduct and sexual violence made to a faculty member, TA, or GA must be reported to the Title IX Coordinator at the Office of Equal Opportunity (<https://oeo.unm.edu>). For more information on the campus policy regarding sexual misconduct, see: <https://policy.unm.edu/university-policies/2000/2740.html>

Alternative Valid Title IX statements suggested by UNM Faculty for a Sexual Assault Free Environment are available here: <https://facultysafeunm.wordpress.com/title-ix-syllabus-statements/>. Please note that these alternative statements may be used on the syllabus. However, faculty, TAs and GAs are mandatory reporters of reports of Title IX violations, regardless of the syllabus language used.

Citizenship and/or Immigration Status: All students are welcome in this class regardless of citizenship, residency, or immigration status. Your professor will respect your privacy if you choose to disclose your status. As for all students in the class, family emergency-related absences are normally excused with reasonable notice to the professor, as noted in the attendance guidelines above. UNM as an institution has made a core commitment to the success of all our students, including members of our undocumented community. The Administration's welcome is found on our website: <http://undocumented.unm.edu/>.

Support in Receiving Help and in Doing What is Right: I encourage students to be familiar with services and policies that can help them navigate UNM successfully. Many services exist to help you succeed academically and to find your place at UNM, see students.unm.edu or ask me for information about the right resource center or person to contact. UNM has important policies to preserve and protect the academic community, especially policies on student grievances (Faculty Handbook D175 and D176), academic dishonesty (FH D100), and respectful campus (FH CO9). These are in the *Student Pathfinder* (<https://pathfinder.unm.edu>) and the *Faculty Handbook* (<https://handbook.unm.edu>) Please ask for help in understanding and avoiding plagiarism or academic dishonesty, which can both have very serious disciplinary consequences.