ENGINEERING

Updated 08/12/2022

Foundations of Engineering Electromagnetics
ECE 555 – 001 and – 002
Fall 2022
Course Outline and Syllabus

Preamble: Please see the important information beginning 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 **Media Gallery** at the side of the http://canvas.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 (preferred method of communication)

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://canvas.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 Canvas's assignment tool] (30%), midterm exam (30%), and a final project (40%). Final grades will be assigned as follows:

| 100 A+ | 90-99 A | 80-89 B | 70-79 C | <70 F |

(Note: These are not raw scores, they are based on the curved scores for Exams)

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Lecture Schedule*

Week#	*Day*	*Date*	*Topic*	*Text Chapter/Ref.*
1	Tu	23 Aug	Preamble – Applied EM@UNM	
	Th	25 Aug	Intro to Linear Analysis	Chapter 1
2	Tu	30 Aug	Inner Product Space	Chapter 1
	Th	01 Sep	Hilbert Space/Operators	Chapter 1
3	Tu	06 Sep	CSB Inequality	Chapter 1
	Th	08 Sep	Method of Moments	Chapter 1
4	Tu	13 Sep	Review of Linear Space	Lecture Notes
	Th	15 Sep	*Connections to Quantum Mechanics*	Lecture Notes
5	Tu	20 Sep	Complex Analysis I	Lecture Notes
	Th	22 Sep	Complex Analysis II	Lecture Notes
6	Tu	27 Sep	Random Coupling Model	Lecture Notes
	Th	29 Sep	More EM and QM	Lecture Notes
7	Tu	04 Oct	Complex Analysis III	Lecture Notes
	Th	06 Oct	Complex Analysis IV	Lecture Notes
8	Tu	11 Oct	Method of Steepest Descent	Lecture Notes
	Th	*13 Oct*	***Fall Break***	
9	Tu	18 Oct	Sturm-Liouville – First kind	Chapter 2
	Th	20 Oct	Sturm-Liouville – Second kind	Chapter 2
10	Tu	25 Oct	Sturm-Liouville – Third kind	Chapter 2
	Th	27 Oct	Sturm-Liouville – Wrap-up	Chapter 2
11	Tu	01 Nov	***Midterm Exam***	
	Th	03 Nov	Go over Midterm Exam Solutions – Discuss Final Project	
12	Tu	08 Nov	Spectral Rep. Meth. SLP1/SLP2	Chapter 3
	Th	10 Nov	Spectral Rep. Meth. SLP1/SLP2	Chapter 3
13	Tu	15 Nov	Spectral Rep. Meth. SLP3	Chapter 3
	Th	17 Nov	Spectral Rep. Meth. SLP3	Chapter 3
14	Tu	22 Nov	Spectral Rep. Meth. and GF's	Chapter 3
	Th	24 Nov	***Thanksgiving Holiday – No Class***	
15	Tu	29 Nov	EM Sources – Sheet Source	Chapter 4
	Th	01 Dec	EM Sources – Line Source	Chapter 4
16	Tu	06 Dec	No Class – work on Final Project	
	Th	08 Dec	No Class – work on Final Project**	

**** I will miss several lectures due to travel. I will post my lecture slides and provide instructions for guided study for these missed classes. The final project will be due at noon on Friday, December 16, 2022.**

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FALL 2022 ADDITIONAL SYLLABUS INFORMATION

Dear Students:

Below each of these statements, you will find a description of related resources (in light blue). *Please note that these are resources on the Albuquerque campus only.*

Faculty Resource: Over one hundred instructors across all UNM campuses have appreciated the information on designing a welcoming and equitable syllabus offered by the Student Experience Project (see: https://studentexperienceproject.org/firstdaytoolkit/) and have boosted academic outcomes and positive engagement by using all of the UNM-tested research-based approaches on the SEP Resource Hub.

COVID-19 Health and Awareness. UNM is a mask friendly, but not a mask required, community. To be registered or employed at UNM, Students, faculty, and staff must all meet UNM's Administrative Mandate on Required COVID-19 vaccination. If you are experiencing COVID-19 symptoms, please do not come to class. If you have a positive COVID-19 test, please stay home for five days and isolate yourself from others, per the Centers for Disease Control (CDC) guidelines. If you do need to stay home, please communicate with me at edls@unm.edu; I can work with you to provide alternatives for course participation and completion. UNM faculty and staff know that these are challenging times. Please let us know that you need support so that we can connect you to the right resources and please be aware that UNM will publish information on websites and email about any changes to our public health status and community response.

Support:

Student Health and Counseling (SHAC) at (505) 277-3136. If you are having active respiratory symptoms (e.g., fever, cough, sore throat, etc.) AND need testing for COVID-19; OR If you recently tested positive and may need oral treatment, call SHAC.

LoboRESPECT Advocacy Center (505) 277-2911 can offer help with contacting faculty and managing challenges that impact your UNM experience.

UNM SYLLABUS ADDITIONAL INFORMATION (not COVID-19 related)
Accommodations: UNM is committed to providing equitable access to learning opportunities for students with documented disabilities. As your instructor, it is my objective to facilitate an inclusive classroom setting, in which students have full access and opportunity to participate. To engage in a confidential conversation about the process for requesting reasonable accommodations for this class and/or program, please contact Accessibility Resource Center at arcsrvs@unm.edu or by phone at 505-277-3506.

Support: Contact me at edls@unm.edu and contact Accessibility Resource Center (https://arc.unm.edu/) at arcsrvs@unm.edu (505) 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 2022 semester. Please plan for a *minimum* of six hours of out-of-class work (or homework, study, assignment completion, and class preparation) each week.

OR

This is a three credit-hour course. Class meets for two 75-minute sessions of direct instruction for fifteen weeks during the Fall 2022 semester. Please plan for a *minimum* of six hours of out-of-class work (or homework, study, assignment completion, and class preparation) each week.

OR

This is a three credit-hour course delivered in an entirely online modality over 8 weeks during the Fall 2022 semester. Please plan for a *minimum* of 18 hours per week to learn course materials and complete assignments.

Support: Center for Academic Program Support (CAPS). Many students have found that time management workshops can help them meet their goals (consult (CAPS) website under "services").

Title IX:

In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered "responsible employees." This designation requires that any report of gender discrimination which 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 (oeo.unm.edu). For more information on the campus policy regarding sexual misconduct, see: https://policy.unm.edu/university-policies/2000/2740.html

OR

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. 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. For more information on the campus policy regarding sexual misconduct, please see: https://policy.unm.edu/university-policies/2000/2740.html.

Support: LoboRESPECT Advocacy Center and the support services listed on its website, the Women's Resource Center and the LGBTQ Resource Center all offer confidential services and reporting.

ADDITIONAL SYLLABUS INFORMATION

Land Acknowledgement: Founded in 1889, the University of New Mexico sits on the traditional homelands of the Pueblo of Sandia. The original peoples of New Mexico Pueblo, Navajo, and Apache since time immemorial, have deep connections to the land and have made significant contributions to the broader community statewide. We honor the land itself and those who remain stewards of this land throughout the generations and also acknowledge our committed relationship to Indigenous peoples. We gratefully recognize our history.

Resource: Division for Equity and Inclusion.

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/.

Respectful and Responsible Learning: We all have shared responsibility for ensuring that learning occurs safely and equitably. 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 consequences.

Support: Center for Academic Program Support (CAPS). Many students have found that time management workshops can help them meet their goals (consult (CAPS) website under "services").

Connecting to Campus and Finding Support: UNM has many resources and centers to help you thrive, including opportunities to get involved, mental health resources, academic support including tutoring, resource centers for people like you, free food at Lobo Food Pantry, and jobs on campus. Your advisor, staff at the resource centers and Dean of Students, and I can help you find the right opportunities for you.