

ECE 561: Engineering Electromagnetics (Secs. 001 and 002)
Spring 2026
MW 9:30-10:45 DSH 318
(Updated 01/05/2026)

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Office Hours: TuTh 9:30-10:30

Catalog Description: “Maxwell’s equations, electromagnetic interaction with materials, the wave equation, plane wave propagation, wave reflection and transmission, vector potentials and radiation equations, electromagnetic field theorems, wave propagation in anisotropic media and metamaterials, periodic structures, dielectric slab waveguides.”

Canvas Course Supplement: <http://canvas.unm.edu> (you need to be registered for the course; use your UNM NetID and password to access).

NOTE: Advanced topics in Electromagnetics will be taught every two years as ECE 661.

Prerequisites: ECE 360 and ECE 555. Note: ECE 555 is *Foundations of Engineering Electromagnetics* and is taught each Fall Semester. If you have not taken ECE 555 please take it Fall 2026.

Text: C.A. Balanis, *Balanis’s Advanced Engineering Electromagnetics*, 3rd Ed. (John Wiley & Sons, New York, NY, 2024).

There will be a problem set each week (on average). There will be three exams and a final (exams will be closed book, except for the final, which will be open book). You will be allowed to bring a sheet of paper with notes to each in-class exam. Your final grade will be based on:

Exam 1 (Chaps. 1-3) 20%
Exam 2 (Chaps. 4/5) 20%
Exam 3 (Chap. 6/periodic structures) 20%
Final (Cumulative, emphasize Chap. 8.7) 30%
Problem Sets 10%
Grade 100%

Roughly, we will cover Chapters 1-7, 8.7, in Balanis’s book. References will be provided for topics not covered in Balanis. Emphasized topics are:

- Review of Maxwell’s equations and EM fundamentals
- Electrical properties of materials, now including metamaterials
- The wave equation and its solutions
- Wave propagation in isotropic media
- Polarization
- Reflection and transmission, including metamaterials
- Electromagnetic vector potentials and radiation integrals



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- Periodic structures
- Dielectric slab waveguides

Syllabus - Lecture No. and Topics[†]

1. 1/19 Dr. Martin Luther King Jr. Day – No Classes [**Week 1**]
2. 1/21 **Introduction to the course**
3. 1/26 **Time-varying/time-harmonic electromagnetic fields - Intro (Chap. 1) [Week 2]**
4. 1/28 Chap. 1 (cont'd)
5. 2/02 **Electrical properties of matter (Chap. 2) [Week 3]**
6. 2/04 Chap. 2 (cont'd)
7. 2/09 Chap. 2 (cont'd) [**Week 4**]
8. 2/11 Chap. 2 (cont'd)
9. 2/16 **Wave equation (Chap. 3) [Week 5]**
10. 2/18 Chap. 3 (cont'd)/what to expect on Exam 1
11. 2/23 **Exam 1 [Chaps. 1-3] [Week 6]**
12. 2/25 **Wave propagation and polarization (Chap. 4)**
13. 3/02 Chap. 4 (cont'd) [**Week 7**]
14. 3/04 Chap. 4 (cont'd)
15. 3/09 **Introduction to Metamaterials [Week 8]**
16. 3/11 **Reflection and transmission (Chap. 5)**

Spring Break Week 3/15-22

17. 3/23 Chap. 5 (cont'd) [**Week 9**]
18. 3/25 Chap. 5 (cont'd) – What to expect on Exam 2
19. 3/30 **Exam 2 [Chaps. 4/5] [Week 10]**
20. 4/01 **Auxiliary vector potentials and scattering equations (Chap. 6)**
21. 4/06 Chap. 6 (cont'd) [**Week 11**]
22. 4/08 Chap. 6 (cont'd)
23. 4/13 Chap. 6 (cont'd) [**Week 12**]
24. 4/15 **Periodic structures**
25. 4/20 Periodic structures (cont'd) – What to expect on Exam 3 [**Week 13**]
26. 4/22 **No Class – Study Period for Exam 3**
27. 4/27 **Exam 3 [Chap. 6/periodic structures] [Week 14]**
28. 4/29 **Dielectric slab waveguides (Chap. 8.7)**
29. 5/04 Chap. 8.7 (cont'd) [**Week 15**]
30. 5/06 Final Prep - Recap

Final Exam: TBD

[†] subject to minor changes. Additional topics will probably be included. Use this syllabus as a guide to read the textbook in advance of the lectures.



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Required syllabus language

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 505-277-3506.

UAP 2720 and 2740. Our classroom and university should foster mutual respect, kindness, and support. If you have concerns about discrimination, harassment, or violence, please seek [support](#) and [report](#) incidents. Find confidential services at [LoboRESPECT Advocacy Center](#), the [Women's Resource Center](#), and the [LGBTQ Resource Center](#). UNM prohibits discrimination on the basis of sex (including gender, sex stereotyping, gender expression, and gender identity). All instructors are "responsible employees" who must [communicate reports](#) of sexual harassment, sexual misconduct and sexual violence to [Compliance, Ethics and Equal Opportunity](#). For more information, please see [UAP 2720](#) and [UAP 2740](#).

Credit-hour statement: This is a three-credit-hour course. Class meets for two 75-minute sessions of direct instruction for 15 weeks during the spring 2026 semester. Please plan for a minimum of six hours of out-of-class work (or homework, study, assignment completion, and class preparation) each week. For those taking the online section, this is a three-credit-hour course delivered in an entirely asynchronous online modality over 16 weeks during the spring 2026 semester. Please plan for a minimum of 18 hours per week to learn course materials and complete assignments.

Optional syllabus language

Respectful Conduct Expectations: I am committed to building with you a positive classroom environment in which everyone can learn. I reserve the right to intervene and enforce standards of respectful behavior when classroom conduct is inconsistent with University expectations [and/or classroom community agreements]. Interventions and enforcement may include but are not limited to required meetings to discuss classroom expectations, written notification of expectations, and/or removal from a class meeting. Removal from a class meeting will result in an unexcused absence. [Insert number] or more unexcused absences may result in permanent removal and a drop from the course (see attendance policy). The University of New Mexico ensures freedom of academic inquiry, free expression and open debate, and a respectful campus through adherence to the following policies: [D75: Classroom Conduct](#), [Student Code of Conduct](#), [University Policy 2240 – Respectful Campus](#), [University Policy 2210 – Campus Violence](#).

Academic honesty and AI use

Responsible Learning and Academic Honesty: Cheating and plagiarism (academic dishonesty) are often driven by lack of time, desperation, or lack of knowledge about how to identify a source. Communicate with me and ask for help, even at the last minute, rather than risking your academic career by committing academic dishonesty. Academic dishonesty involves claiming that work created by another source is your own original work. It is a [Student Code of Conduct](#) violation that can lead to a disciplinary procedure. When you use a resource in work submitted for this class, document how you used it and distinguish clearly between your original work and the material taken from the resource. (Add specifics about acceptable AI usage.)

Encouraging use of supports and resources

Thriving and Finding Support: Students are especially successful at UNM when they take advantage of support and get involved in campus and academic life.

Your MyUNM login page provides direct links to [wellbeing resources](#), including financial capability, mental health, food, jobs, and resource centers. MyUNM will help you identify [academic resources](#) like peer tutoring and opportunities like study abroad. You can contact academic advisors and resource advisors for information and guidance via Student Hub on MyUNM. I look forward to providing you with information about academic opportunities related to our class and to helping you find support resources.



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Welcoming, honoring and acknowledging students: The [Division for Change and Empowerment](#) offers statements to include on syllabi, in Canvas shells, or on in-class Powerpoint slides in class to communicate welcome and respect.