

ENG EC 455: Electromagnetics Systems I
Fall, 2022

Lecturer: Professor Min-Chang Lee
mclee@bu.edu
Office hours: TBA via zoom

Lectures: Tuesday/Thursday, 9:00 – 10:45 AM in EPC 208

Teaching Assistant: Purva Bhumkar (purvab@bu.edu)

Discussion Sessions: Tuesday, 6:30 – 7:20 PM, (B2 section in CAS B25A)
Wednesday, 6:30 – 7:20 PM, (B1 section in WED 208)
(B3 section in WED 208)

Textbooks: M.O. Sadiku, “Elements of Electromagnetics”, Oxford University Press, 2018, ISBN: 978-0-19-069801-4, and lecture notes.

Grading Policy: Homework: 20%
Mid-term exam 1: 25%
Mid-term exam 2: 25%
Final exam: 30%

Midterm Exam (1) on Friday Oct 7.
Midterm Exam (2) on Friday Nov 11.
Final Exam (TBA).

Homework will be collected in the class.
Late homework will not be accepted.

Course Schedule:

1. Sept. 6 Introduction, A preview of the course, units (Chapter 1)
2. Sept. 8 Scalar and Vector, Systems of Coordinates (lecture notes, Chap. 2).
3. Sept. 13 Vector Calculus, time averages (lecture notes, Chap. 3).
4. Sept. 15 Time-varying phenomena, and Maxwell equations, 9.1 – 9.4.

- 5. Sept. 20 Forms of Maxwell's equations and time-varying potential (9.5 – 9.6), boundary conditions (lecture notes).**
- 6. Sept. 22 Wave equations and solutions, time-harmonic fields (10.1 – 10.3; 9.7).**
- 7. Sept. 27 EM wave propagation in media, 10.4 – 10.6.**
- 8. Sept. 29 EM wave polarization, Poynting vector and power, 10.7 – 10.8).**
- 9. Oct. 4 Reflection and transmission of plane waves at normal incidence, 10.9, lecture notes.**
- 10. Oct. 6 Reflection and transmission of plane waves at oblique incidence, 10.10, lecture notes.**
- 11. Oct. 7 (Friday) 1st Midterm Exam**
- 12. Oct. 13 Transmission lines parameters, and TL equations, 11.1 – 11.2.**
- 13. Oct. 18 TL equations and analysis, 11.3 and lecture notes.**
- 14. Oct. 20 Input impedance, standing wave ratio and power, 11.4, lecture notes.**
- 15. Oct. 25 Smith charts, 11.5.**
- 16. Oct. 27 Smith charts and applications, lecture notes.**
- 17. Nov. 1 Impedance matching, 11.6 – 11.8.**
- 18. Nov. 3 Parallel-plate waveguides, lecture notes.**
- 19. Nov. 8 Rectangular waveguides, 12.1-12.2.**
- 20. Nov. 10 TM and TE modes, 12.3 – 12.4.**
- 21. Nov. 11 (Friday) 2nd Midterm Exam**
- 22. Nov. 15 Wave propagation in the guides, 12.5, lecture notes**

- 23. Nov. 17 Power transmission and attenuation, 12.6.**
- 24. Nov. 22 Waveguide current modes and mode excitation, waveguide resonators, 12.7 – 12.8.**
- 25. Nov. 29 Radiation fields of elemental dipoles, 13.1 – 13.5.**
- 26. Dec. 1 Antenna patterns and characteristics, 13.6.**
- 27. Dec. 6 Antenna arrays, 13.7.**
- 28. Dec. 8 Antenna arrays, lecture notes, and effective area and backscatter cross section, radars, 13.8.**
- 29. Final Exam (TBA).**

Academic Misconduct:

BU takes academic integrity very seriously. Academic misconduct is conduct by which a student misrepresents his or her academic accomplishments, or impedes other students' opportunities of being judged fairly for their academic work. Knowingly allowing others to represent your work as their own is as serious an offense as submitting another's work as your own. More information on BU's Academic Conduct Code, with examples, may be found at

<http://www.bu.edu/academics/policies/academic-conduct-code> .

Collaboration Policy:

In this class you may use any textbooks or web sources when completing your homework, and/or one human collaborator (from class) per homework, subject to the following strictly enforced conditions:

- You must clearly acknowledge all your sources (including your collaborators) on the top of your homework.**

- You must write all answers in your own words (although Java code may be shared with your collaborator)
- You must be able to fully explain your answers upon demand.
- You may not use any human resource outside of class (including web-based help services, outside tutors, etc.) in doing your homeworks or project. Obviously, you may not collaborate with anyone on exams.

Failure to meet any of the above conditions could constitute plagiarism and will be considered cheating in this class.