Physics 913: Electromagnetic Theory I (Fall 2023)
Mondays, Wednesdays, and Fridays, 11:30-12:20
Jorgensen Hall 247

Instructor: Evgeny Tsymbal
Office: JH 310B
E-mail: tsymbal@unl.edu
Office Hours: by agreement. Appointments to be made by e-mail or in class after the lecture

Fall Semester begins 21 August (Mon)
Labor Day (Student Holiday) 4 September (Mon)
Fall Semester Break 16 - 17 October (Mon-Tue)
Student Holiday 22 November (Wed)
Thanksgiving Vacation 23 - 26 November (Wed-Sun)
Last day of classes 8 December (Fri)

Course outline

1. Electrostatics
Coulomb’s law, Gauss’s law, Scalar potential; Poisson and Laplace equations; Green’s theorem; Green’s function; Electrostatic energy, Capacitance; Method of images; Boundary value problems; Multipole expansion, Electrostatics of dielectrics; Electric polarization

2. Magnetostatics
Biot and Savart’s law; Ampere’s law; Vector potential; Fields from localized current distributions; Magnetic moment; Magnetic fields in matter; Magnetization; Boundary-value problems in magnetostatics; Scalar magnetic potential

3. Electrodynamics
Ohm’s law, Electromotive force; Faraday’s law, Energy in magnetic field, Inductance; Displacement current, Maxwell’s equations

Texts: D. J. Griffiths, Introduction to Electrodynamics; J. D. Jackson, Classical Electrodynamics
Reference: A. Zangwill, Modern Electrodynamics

Lecture Notes: Lecture Notes will be provided and will cover all the material needed for the course. The Lecture Notes will be posted on Canvas in due course.

Lectures: Most lectures will be given in-person. In some cases, lectures may be delivered via zoom with the zoom link placed on Canvas (TBA). Attendance of the lectures is important for successful performance in the course.

Practice Classes: Three practice classes will be given before the midterm exams. The goal of these classes is to provide training in solving exam problems.

Assignments: Homework assignments will be posted on Canvas and will be normally due in a week from the day of assignment. There will be 9 assignments during the semester. All homework problems will have an equal weight of 10 points unless indicated otherwise. Students are encouraged to discuss ideas and approaches to solve the assignment problems with other students. However, all students are required to complete all derivations themselves. It is
Homework is an important part of learning and essential for successful performance at exams. Students should bring homework solutions in written form to the class on the due date and put them on the instructor’s desk in JH 247 before the class starts. Alternatively, students can place homework solutions in the instructor’s mailbox before the due time shown on the assignment. Delays beyond the due time are not allowed.

Exams: All exams will be open book in class. Students are allowed to use homework solutions, lecture notes, and textbooks. However, using internet is not allowed. While having cell phones, laptop computers or other gadgets is not forbidden (e.g., to display lecture notes), they must be switched to the airplane mode. Also, students are not allowed making electronic copies (photographs) of the exam problems. Problem sheets need to be returned with the exam solutions.

Midterm Exams: Fri, Sept. 22, 11:30-12:20 (JH247)
Mon, Oct. 23, 11:30-12:20 (JH247)
Mon, Nov. 27, 11:30-12:20 (JH247)

Final Exam: Mon, Dec 11, 10:00-12:00 (JH247)

Performance in class reflects a student’s contribution to the everyday work in the classroom. All students are expected to participate in discussions, answer and ask questions, i.e., be active during class time.

Grading
Homework 30%
Midterm Exams 12%
Final Exam 30%
Performance in Class 4%

Final grade:

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Ownership rights protection: Any work and/or communication that you are privy to as a member of this course should be treated as the Intellectual Property of the instructor and is not to be shared outside the context of this course. Students may not make or distribute screen captures, audio/video recordings of, or livestream, any class-related activity, including lectures and presentations, without express prior written consent from the instructor.

Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the UNL’s policy to provide flexible and individualized accommodation to students with disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with Services for Students with Disabilities.

UNL Course Policies and Resources: Students are responsible for knowing the university policies and resources found at https://go.unl.edu/coursepolicies.