

Fall 2024

## PHYS 621 - 101: Classical Electrodynamics

Satoshi Inoue

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**Class Schedule:**

Class: Classical Electrodynamics

Day and Time: Thursday and 6:00-8:50 pm

Room: Faculty Memorial Hall 319

Delivery Mode: Face-to-Face (Delivery of instruction is structured around in-person classroom meeting times. Instruction is delivered in person and students are expected to attend class).

**General Information**

This course is the graduate-level classical electrodynamics. The goal of this class is to acquire enough knowledge and ability in classical electrodynamics (starting from Coulomb's law to Maxwell equations) to be able to apply them to research. Since this is a graduate-level EM class, understanding the physical significance of the formulas is required, rather than memorizing them. Basic Math knowledge (Vector calculus, differential equation, Fourier analysis, linear algebra, etc.) is required.

**Instructor Information**

Instructor: Satoshi Inoue

Center for Solar-Terrestrial Research (CSTR), New Jersey Institute of Technology (NJIT)

Office: 423C (Tiernan Hall)

Office Hour: Tuesday (1:30-3:30 pm) in person or virtual, but you can come my office whenever my office door is open.

Phone: 973-642-4059

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URL: <http://inosato78.wixsite.com/inosatopage>

1) **Textbook** Jackson, J. D., "Classical Electrodynamics", 3<sup>rd</sup> edition, J. Wiley is primarily used. David J. (Griffiths, "Introduction to Electrodynamics" 4<sup>th</sup> Edition will be also used in conjunction with Jackson book.) I strongly recommend the students to have Griffiths book.

2) **Lecture Quiz;** The Quiz is given at the beginning of the class.

3) **Homework;** Homework will be assigned weekly.

4) **Attendance;** I will not be taking an attendance.

5) **Midterm and Final Exam;** The Midterm exam will be asked from Chapters 1-3, and the Final exam will be asked from Chapters 4– 6 (Depending on the situation, the Final exam will be asked from the whole area, Chapters 1-6). **Review the slides, separately distributed problems, and quiz.**

**Final Letter Grades:** Here are the approximate weights to be used for calculating the composite score:

- **80%** for the midterm and final exams  
(Only final or midterm + final, a better grade will be considered.)
- **10%** for homework work
- **5%** for the quizzes
- **5%** for the final report

The cutoff percentages for various letter grades will be:

Percentage	Letter Grade
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> 80%	A
75 - 80	B+
70 - 75	B
65 - 70	C+
55 - 65	C
< 55	F

Final grades are not negotiable: A score of 79.99% is a B+, not an A.

TOPIC	TEXT STUDIES	NOTES
Week 1 (9/5/24) Introduction to electrostatics	Chapter 1	1.1-1.5
Week 2 (9/12/24) Introduction to electrostatics	Chapter 1	1.6-1.11
Week 3 (9/19/24) Boundary-value problems, I	Chapter 2	2.1-2.7
Week 4 (9/26/24) Boundary-value Problems, I	Chapter 2	2.8-2.10
Week 5 (10/3/24) Boundary-value problems, II	Chapter 3	3.1-3.3, 3.5-3.6
Week 6 (10/10/24) Boundary-value problems, II	Chapter 3	3.7-3.9
Week 7 (10/17/24) Multipoles, Electrostatics of Macroscopic Media, Dielectrics	Chapter 4	4.1-4.4
Week 8 (10/24/24) <b>Midterm Exam (Chapters 1-3)</b>		
Week 9 (10/31/24) Multipoles, Electrostatics of Macroscopic Media, Dielectrics	Chapter 4	4.4, 4.7
Week 10 (11/7/24) Magnetostatics	Chapter 5	5.1-5.3
Week 11 (11/14/24) Magnetostatics	Chapter 5	5.4-5.10
Week 12 (11/21/24) Magnetostatics	Chapter 5	5.15-5.18
Week 13 (11/26/24) Maxwell Equations	Chapter 6	6.1-6.3
Week 14 (12/5/24) Maxwell Equations	Chapter 6	6.7-6.10