

PHYSICS 650
ELECTRODYNAMICS I

FALL 2023

Watanabe Hall 417A, MWF 9:30am-10:20pm
Monday, August 21 – Friday, December 15
Last Day of Instruction: Thursday, December 7

Instructor

Dr. Chester Vause
Professor, Department of Physics & Astronomy
Watanabe Hall 434, 808-956-2989, cvause@hawaii.edu
Office Hours: After class or by appointment.

Prerequisites (UHM Catalog)

Physics 450, and Physics 600 (or concurrent), or Math 402

Textbooks (Physics 650-651)

“The Classical Theory of Fields” (4th revised English ed.), Course of Theoretical Physics, Volume 2, L. D. Landau and E. M. Lifshitz (Pergamon Press, Oxford, 1975)

“Electrodynamics of Continuous Media,” Course of Theoretical Physics, Volume 8, L. D. Landau and E. M. Lifshitz (Pergamon Press, Oxford, 1984, 2nd ed. revised and enlarged English ed. by E. M. Lifshitz and L. P. Pitaevskii)
[recommended]

Student Learning Outcomes (Physics 650-651)

Among the student learning outcomes of this course are the abilities to:

- (a) Understand the Principle of Relativity, and the use of tensor analysis methods to formulate geometric concepts in Einstein’s formulation of Special Relativity
- (b) Present the formalism of classical electrodynamics of charged point particles as a classical relativistic field theory.
- (c) Formulate the fundamental principles of electrodynamics as a branch of classical mechanics in terms of the Principle of Least-Action, the Lagrangian, Hamiltonian, and covariant formulations.
- (d) Study of static and time-dependent applications of electrodynamics of point particles, electromagnetic waves, radiation of charged particles.
- (e) Provide the formulation of macroscopic electrodynamics using the principles of thermodynamics. Statics, dynamics, and phenomenological constitutive relations of macroscopic bodies (metals, insulators, superconductors).

Exams

Exams are take-home (details decided upon assignment). Allowed materials for exam use are: assigned textbooks (see above) only (no other books), mathematical integrals/formulas reference, in-class and personal notes, scientific/graphing calculator. No internet searches.

Each Exam is weighted equally towards the TOTAL SCORE(%):

$$\text{TOTAL SCORE(\%)} = \text{AVERAGE OF (EX1(\%)+EX2(\%)+EX3(\%))}$$

Grade Scale

The Letter Grade for the course is determined from the TOTAL SCORE(%) according to the following scale:

A- (86%-90%)	A (91%-95%)	A+ (96%-100%)
B- (61%-70%)	B (71%-80%)	B+ (81%-85%)
C- (31%-40%)	C (41%-50%)	C+ (51%-60%)
	F (0%-20%)	D (21%-30%)

NO INCOMPLETE GRADE GIVEN

NOTICE

The written lecture narratives are the intellectual property of the instructor, and are for your personal use only. It is not to be shared or distributed to any person, any entity, in any form, in any media.