

**PHYSICS 650**  
**ELECTRODYNAMICS I**

FALL 2025

Watanabe Hall 417A, MWF 9:30am-10:20am  
Monday, August 25 – Friday, December 19  
Last Day of Instruction: Thursday, December 11

**Instructor**

Dr. Chester Vause  
Professor, Department of Physics & Astronomy  
Watanabe Hall 434, (808) 956-2989, [cvause@hawaii.edu](mailto:cvause@hawaii.edu)  
Office Hours: MWF 12:30pm-1:30pm, or by appointment

**Prerequisites (UHM Catalog)**

For Physics 650: Physics 450, and Physics 600 (or concurrent), or Math 402  
For Physics 651: Physics 650

**Primary Textbooks (Physics 650-651)**

“The Classical Theory of Fields” (4<sup>th</sup> 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, 2<sup>nd</sup> ed. revised and enlarged English ed. by E. M. Lifshitz and L. P. Pitaevskii)

**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**

Exam instructions will be given on the exam cover page, Exams are closed-book, two student-generated notes, paper pages only (not electronic), per new exam material (2 pages for Exam 1, 4 pages for Exam 2, 6 pages for Exam 3, 8 pages for Final Exam), and scientific calculator, only. No internet devices (smartphones, pads, etc.) or electronic storage media. No other sources of material are allowed. By taking the exams, you consent to the conditions set forth.

The Exam dates are:

Exam 1	Friday	September 26
Exam 2	Friday	October 24
Exam 3	Friday	November 21
Final Exam	Friday	December 19 (9:45am- 11:45am).

Each Exam is based on material covered since the previous Exam (including the Final Exam). Each Exam is worth 1/4 of the final grade total score:

$$\text{Total Score}(\%) = (1/4)*[\text{Exam1}(\%)+\text{Exam2}(\%)+\text{Exam3}(\%)+\text{FinalExam}(\%)]$$

### **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 Instructor's course lectures and any of the Instructor's written materials (handouts, solutions, etc.) are the intellectual property of the Instructor, and are for your personal use only. It is not to be shared or distributed to anyone, in any form, in any media. No photography, no video, no audio, no electronic recordings of any kind.

Be prepared to take the exams on the assigned dates.\*. This is not negotiable. If you have time conflicts, decide if this course is your first priority. I do not "work around" student's personal plans and schedules (work, travel and otherwise).

\*(The Final Exam date is set by the University.)