Syllabus

Electrodynamics A (PHY 5346 – Fall 2016)

Prof. Bernd A. Berg

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Office: 615 Keen.

Class: TR 9:30–10:45 am at HCB 0314.

Office hours: T 1:30–2:30 pm, W 2:00–4:00 pm at 615 Keen and by appointment.

Midterm tentative Date: Tuesday, October 11.

Test on Homework tentative Date: Thursday, December 1.

Final Date: Wednesday December 14, 7:30–9:30 am, HCB 0314

Goal

This course and its continuation, Electrodynamics B (PHY 5347), intend to give a thorough understanding of classical electrodynamics based on the relativistic space-time (Minkowski space). For an overview see the schedule below as well as the preface, the overview and the table of contents of the text for this course.

Required Text: My lecture notes *Essential Graduate Electrodynamics* will be available at Target Copy. In Electrodynamics A we intend to cover chapters 1, 2, part of chapter to 3 and most of the appendixes. Chapters 4 to 7, appendix D and some parts of appendix B contain material for Electrodynamics B (PHY 5347).

As reference text, but not required, I recommend Jackson, *Classical Electrodynamics*, **Second** Edition. Other useful texts are the two volumes of the *Course of Theoretical Physics* by Landau and Lifshitz: Vol. 2, *The Classical Theory of Fields* and Vol. 8, Landau, Lifshitz and Pitaevskiĭ, *Electrodynamics of Continuous Media*.

Homework and Classwork: Weekly homework assignments will be posted on the web. They have to be turned in **before** the beginning of the class indicated (usually on Thursdays). Each problem counts ten points unless stated otherwise. Some problems will be solved in class. These (unannounced) Classwork Assignments count the same as homework. They are turned in at the end of the class and students missing such a class unexcused will get no credit. For full credit on home- and classwork you need only 90% of the maximally possible score (10% will initially be added).

A standing assignment is to read the chapters of the script as listed in the (tentative) schedule.

Prerequisites: Undergraduate Electrodynamics, Analysis (including several variables), Vector Analysis, and a basic understanding of function theory of one complex variable.

Grades will be based on 40% for homework and classwork, 15% for the midterm, 15% for a test on homework and 30% for the final. Anticipated dividing lines are: $A \geq 90\% > A^- \geq 85\% > B^+ \geq 80\% > B \geq 70\% > B^- \geq 65\% > C^+ \geq 60\% > C \geq 55\% > C^- \geq 50\% > D \geq 40\% > F$.

ADA: Students with disabilities should register with the Student Disability Resource Center and bring a letter to the instructor indicating their needs. Please do so during the first week of class.

Honor Code: Students are expected to uphold the Academic Honor Code published in the FSU Bulletin and the Student Handbook.

For important informations see the **"Required Syllabus Statements" linked on the course website.**

Schedule (Tentative)		
Date	Topic	Book
Aug. 30	Maxwell Eqns, Special Relativity, Space and Time	Chapt. 1
Sep. 1	Lorentz Invariance, Minkowski Space, 2D Lorentz Transformations	Chapt. 1
Sep. 6	Vector and Tensor Notation, 4D Lorentz transformations	Chapt. 1
Sep. 8	4D Lorentz transformations, Vector Analysis	Appendix A.4
Sep. 13	Relativistic Kinematics	Chapt. 1
Sep. 15	Relativistic Kinematics	Chapt. 1
Sep. 20	Relativistic Dynamics	Chapt. 1
Sep. 22	Relativistic Dynamics	Chapt. 1
Sep. 27	Special Relativity, Maxwell Equations	Chapt. 1
Sep. 29	Special Relativity, Maxwell Equations	Chapt. 1
Oct. 4	Lorentz Force, Review for Midterm	Chapt. 1
Oct. 6	Midterm	

Schedule (Tentative)		
Date	Topic	Book
Oct. 11	Elementary Electrostatics and Units	Chapt. 2, Appendix B
Oct. 13	Boundary Conditions in Electrostatics	Chapt. 2
Oct. 18	Coordinate Systems	Appendix A.1 - A.3
Oct. 20	Poisson's Equation and Green Functions	Chapt. 2
Oct. 25	Green Functions and the Method of Images	Chapt. 2
Oct. 27	Expansion in Orthonormal Functions	Chapt. 2
Nov. 1	Separation of Variables for the Laplace Operator	Chapt. 2
Oct. 3	Expansion in Orthonormal Functions (Cartesian)	Chapt. 2
Nov. 8	Expansion in Orthonormal Functions (Cylindrical)	Chapt. 2
Nov. 10	Angular Momentum and Spherical Harmonics	Appendix C
Nov. 15	Eigenfunction Method for Green Functions	Chapt. 2
Nov. 17	Multipole Expansion	Chapt. 3
Nov. 22	Dielectrics in the Electric Dipole Approximation	Chapt. 3
Nov. 23	No Office Hours, Thanksgiving	
Nov. 24	No Classes, Thanksgiving	
Nov. 29	Elementary Magnetostatics	Chapt. 3
Dec. 1	Test on Homework	
Dec. 6	Elementary Magnetostatics, Review for Final	Chapt. 3
Dec. 8	SPCI Forms, Review for Final	
Dec. 14	Final	