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Syllabus

Electrodynamics B (PHY 5347 – Winter/Spring 2017)

Prof. Bernd A. Berg

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- Class: TR 9:30–10:45 am at UPL 0110.

- Office hours: T 1:30–2:30 pm and W 2:00–4:00 pm at 615 Keen. Or by appointment (send e-mail).

- Midterm: Thursday, February 23.

- Test on Homework: Thursday, April 20.

- **Final:** Tuesday, May 2, 10:00 am – 12:00 pm at UPL 0110.

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Goal

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This course is the continuation of Electrodynamics A (PHY 5346). Both courses together intend to give a thorough understanding of classical electrodynamics based on the relativistic fundamentals of space-time. 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 as well as of the previous PHY 5346 course.

Texts: My lectures notes *Essential Graduate Electrodynamics* which are available at Target Copy and were already distributed for the PHY 5346 course in fall 2015. Recommended reference texts, but not required, are Jackson, *Classical Electrodynamics*, Second Edition and two volumes of the *Course of Theoretical Physics*, 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, which have to be turned in **before** the beginning of the class indicated. 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%, up to a maximum of 100%, will be added at the end of the semester).

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

Prerequisites: Graduate Electrodynamics A (PHY 5346) at FSU or an equivalent course from another university. 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 homeworks 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 more informations see the "Required Syllabus Statements" linked on the course website.

Schedule (continued on next page)

Schedule (Tentative)		
Date	Topic	Text A
Jan. 10	Magnetostatics	Chapt. 3
Jan. 12	Magnetostatics	Chapt. 3
Jan. 17	General Electromagnetic Fields, Faraday's Law	Chapt. 4
Jan. 19	General Electromagnetic Fields, LCR Circuit	Chapt. 4
Jan. 24	Wave Equation and its Green Function	Chapt. 4
Jan. 26	Wave Equation and its Green Function	Chapt. 4
Jan. 31	Cauchy Problem and Retarded Solutions	Chapt. 4
Feb. 2	Wave Equation – Liénard-Wiechert Potential	Chapt. 4
Feb. 7	Lagrangian Formulation and Noether's Theorem	Chapt. 4
Feb. 9	Translations and Energy-Momentum Tensor	Chapt. 4
Feb 14	Poynting's Theorem	Chapt. 4
Feb 16	Electrodynamics of Continuous Media	Chapt. 4
Feb. 21	Review for Midterm	
Feb. 23	Midterm	

Schedule (Tentative)		
	Topic	Text B
Feb. 28	Electromagnetic Waves and Polarization	Chapt. 5
Mar. 2	Reflection and Refraction	Chapt. 5
Mar. 7	Dispersion	Chapt. 5
Mar. 9	Wave Packets and Group Velocity	Chapt. 5
Mar. 13 to 17	Spring Break – No Classes or Office Hours.	
Mar. 21	Kramers-Kronig Relations	Chapt. 5
Mar. 23	Kramers-Kronig Relations and Causality	Chapt. 5
Mar. 28	Boundary Conditions with a Conductor	Chapt. 6
Mar. 30	Wave Guides	Chapt. 6
Apr. 4	Wave Guides and Fiber Optics	Chapt. 6
Apr. 6	Fiber Optics and Resonant Cavities	Chapt. 6
Apr. 11	Radiating Systems and Spherical Waves	Chapt. 7
Apr. 13	Radiating Systems and Spherical Waves	Chapt. 7
Apr. 18	Scattering of Light	Chapt. 7
Apr. 20	Test on Homeworks	
Apr. 25	SPCI, Review for the Final	
Apr. 27	Review for the Final	
May 2	Final 10:00 – 12:00 am	