

COURSE SYLLABUS
Advanced Electromagnetic Theory
PHYS 6306-001 (3:3:0)

Faculty Information

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Course Information

Course: PHYS 6306-001
Place and Time: Science Building 112, TR 12:30-1:50 pm
Pre-requisites: PHYS 5303 Electromagnetic Theory
Textbook: "Classical Electrodynamics" 3rd Edition, by J.D. Jackson (Wiley)
Reference: "Mathematical Methods of Physics" 2nd Edition, by Mathews and Walker (Benjamin); "Electrodynamics of Continuous Media" by Landau and Lifshitz (Pergamon); Feynman Lectures of Physics (Vol 2), by Feynman (Addison Wesley)

Course Description

This course focuses on the advanced theory of electromagnetic fields, radiation, scattering and diffraction, special theory of relativity and electrodynamics and special topics. Prior knowledge of vector calculus, differential equation involving Green function and elementary electromagnetic theory (PHYS 5303) are required. It is important to spend at least 8 hours or more outside of class each week on lectures, your notes and homework.

Course Purpose (Goals)

This is a Ph.D. core course. The goals of this course are to introduce the concepts and mathematics of classical electromagnetic theory in continuous media, to understand the relativistic description of electromagnetic fields and their interactions particles, and to present the radiation and scattering phenomena associated with the electromagnetic waves.

Course Outline

This course is divided into seven segments. Each segment will be covered in 1-2 weeks.

1. Review of vector calculus, electrostatics and magnetostatics
2. Maxwell Equations and Laws of Conservation
3. Plane Waves and Wave Packet in dispersive media
4. Radiation theory
5. Relativistic electrodynamics
6. Radiation of moving charge
7. Special topics to be presented by the students

Expected Learning Outcomes

Upon completion of this course, students will be able to:

- (1) Know the principles of the techniques in Advanced Electromagnetic Theory.
- (2) Apply the physics principles learnt in this class in their research and future career.
- (3) Apply the knowledge of electricity and magnetism in public affairs and help improve higher education in the U.S.

Methods for assessing the expected learning outcomes

Examinations and grades; In-class responses by students; Evaluation of term-project via the written term-paper and 30-min oral presentation; Class discussions for assessing the assimilation of knowledge; Feedback from students after graduation about the usefulness of this course.

Criteria for Grading

Homework assignments (25 points): Six to seven homework assignments from the materials in the textbook and lectures will be given. The assignment will be due in two weeks.

Mid-term Exam (25 points): A mid-term exam will be given after the due date of the third homework assignment. The format will involve both short-answer and analytical (calculation) formats.

Term-Project on a special topic (25 points): A term-project is required in this course. It involves a written term paper of at least 10 pages (including graphs and illustrations) and a 30-min oral presentation of the term-project. The special topic of the project has to be closely related with the materials covered by this course and pre-approved by the instructor during the first month of the course.

Final Exam (25 points): A final exam will be given at the end of the course. It covers all the materials from the lecture and term-projects presented by the students.

Grade Scale: 100-A-86-B-72-C-58-D-44-F-0

Extra Credit policy: No extra credit is offered in this course.

Late Assignment policy: All assignments are considered late if the students fail to submit them at the beginning of class the day they are due. For each day (not including weekends) that assignment is late, a 6% deduction in the overall grade of that assignment will be enforced.

Attendance policy: Each unexcused absence or tardiness will lower the total grade in the class by 0.5 points. No make up exams will be granted. Please consult The Texas Tech University Catalog for the policy of excused absences due to religious observance, officially approved trips, or illness and death notification.

Academic Integrity

Academic Misconduct (OP 34.12): “It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and a high standard of integrity. The attempt of students to present as their own any work that they have not honestly performed is regarded by the faculty and administration as a serious offense and renders the offenders liable to serious consequences, possibly suspension.”

Civility in the classroom: The students are expected to be respectful and attentive in class. More information about this topic is available on-line at www.studentaffairs.ttu.edu/vpsa/publications/civility.htm

Students with Disabilities

Any student who because of a disability may require special arrangements in order to meet course requirements should contact the instructor as soon as possible to make any necessary accommodations. Student should present appropriate verification from AccessTECH. No requirement exists that accommodations be made prior to completion of this approved university procedure.