Physics 520A – Electromagnetic Theory

Fall 2015 TR at 11:00am – 12:15pm in Neckers 410

Lecturer: Professor Leo Silbert
Office: Neckers 489
Tel.: 453 1062
e-mail: lsilbert_at_siu_dot_edu
Office Hours: T&R: 8:30am-9:30am, W: 8:30am-12:30pm
Grader: N/A

Course Textbook:

Other
Introduction to Electrodynamics, D. J. Griffiths, 3rd Ed. (Prentice Hall).

Grading
Homework (to be assigned approximately biweekly during semester) 20%
Paper Presentation (topics and times to be announced) 20%
Midterm Exam (scheduled: week of October 6, 2015) 20%
Final Exam (compulsory: 10:15am-12:15pm, Thursday, December 17, 2015) 40%

FINAL GRADE
A: >90%; B: 75% - 90%; C: 60% - 74.9%; D: 50% - 59.9%; F: <50%
HOMEWORK & STUDYING

It is your responsibility to write your question answers with the following in mind:

• Homework is for your benefit. It helps you learn the material, develop technical skills, and practice applying the theory.

• Read the textbook(s), discuss problems with your class colleagues, grader, and instructor.

• Approach homeworks with technical rigor where required. Use this opportunity to develop mathematical skills.

• Every homework should include detailed explanations constructed using standard English language sentences at a level so that anyone can follow your answers.

• If you use a textbook or other material for reference then fully cite the this reference, and explain how this is necessary.

• For Phys 520A (and Phys 520B) Jackson problems are notoriously difficult and long. Jackson is widely regarded as the hardest graduate class at beginning level graduate physics.

  • Dedicate time during the week to look over your notes and textbooks.
  
  • You will not be able to complete homework assignments the night before.
  
  • The better you learn your subject the better your final grade.
Course Outline

We will cover in part, Chapters 1-5 (inclusive) of Jackson's textbook. A tentative detailed outline of the chapters and sections scheduled to be covered are listed here. Sections below marked by * may or may not be covered.

Chapter 1 Introduction (5 lectures)
   i. Mathematical Preliminaries
   ii. Coulomb's Law
   iii. Gauss' Law
   iv. Poisson and Laplace Equation
   v. Green Function of Electrostatics
   vi. Variational Technique*

Chapter 2 Boundary Value Problems I (4 lectures)
   i. Method of Images
   ii. Point Charge Problem
   iii. Green Function
   iv. Separation of Variables

Chapter 3 Boundary Value Problems II (6 lectures)
   i. Laplace Equation in Spherical Coordinates
   ii. Legendre Polynomials
   iii. Azimuthal Symmetry
   iv. Spherical Harmonics
   v. Poisson Equation and Green Function Technique*

Chapter 4 Multipoles & Dielectrics (6 lectures)
   i. Multipole Expansion
   ii. Ponderable Media
   iii. Polarizability

Chapter 5 Magnetostatics & Faraday's Law (5 lectures)
   i. Biot-Savart Law
   ii. Ampere Law
   iii. Vector Potential
   iv. Forces & Torques*
   v. Magnetized Sphere*
<table>
<thead>
<tr>
<th>Week of</th>
<th>Homework/Exam</th>
<th>Section (Jackson) / Comments</th>
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<tbody>
<tr>
<td>Aug 25</td>
<td>H/W 1</td>
<td>Chapter 1</td>
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<td>Sep 1</td>
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<tr>
<td>Sep 8</td>
<td>H/W 2</td>
<td>Monday, 1st September, Labor Day</td>
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<td>Chapter 2</td>
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<td>Sep 22</td>
<td>(H/W 2 due)</td>
<td>Chapter 3</td>
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<td>Oct 6</td>
<td>Midterm</td>
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<td>Oct 13</td>
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<td>Fall Break, Oct 12-13</td>
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<td>Oct 20</td>
<td>H/W 3</td>
<td>Chapter 4</td>
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<td>Oct 27</td>
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<td>Nov 3</td>
<td>H/W 4</td>
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<td>Nov 10</td>
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<td>Chapter 5</td>
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<td>Nov 17</td>
<td>H/W 5</td>
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<td>Nov 24</td>
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<td>Thanksgiving Break, Nov 26-27</td>
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<td>Dec 1</td>
<td>(H/W 5 due)</td>
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<td>Dec 8</td>
<td>Paper</td>
<td>Last week of classes</td>
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<td>On Dec 17</td>
<td>FINAL EXAM</td>
<td>10:15am – 12:15pm, Thursday, 17th December, Neckers 410</td>
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Please be aware of the SIUC Student Conduct Code available at the SIUC website:
http://srr.siu.edu/student_conduct_code

Please also not the following emergency procedures policy. Make sure you review the www.bert.siu.edu emergency response information available at the websites listed below or dotted around campus buildings.

Emergency Procedures. Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. Because some health and safety circumstances are beyond our control, we ask that you become familiar with the SIUC Emergency Response Plan and Building Emergency Response Team (BERT) program. Emergency response information is available on posters in buildings on campus, available on BERT's website at , Department of Safety's website www.dps.siu.edu and in Emergency Response Guideline pamphlet. Know how to respond to each type of emergency.

Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency. The Building Emergency Response Team will provide assistance to your instructor in evacuating the building or sheltering within the facility.
IMPORTANT DATES *

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<th>Event</th>
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<tr>
<td>Semester Class Begins</td>
<td>08/24/2015</td>
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<td>Last day to drop a course using SalukiNet</td>
<td>11/01/2015</td>
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<td>Last day to add a class (without instructor permission)</td>
<td>08/30/2015</td>
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<td>Last day to withdraw completely and receive a 100% refund</td>
<td>09/06/2015</td>
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<td>Final examinations; (for name to appear in Commencement program)</td>
<td>09/18/2015</td>
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<td>Labor Day Holiday</td>
<td>09/07/2015</td>
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<td>Fall Break</td>
<td>10/10—10/13/2015</td>
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<td>Veterans Day Holiday</td>
<td>11/11/2015</td>
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<td>Thanksgiving</td>
<td>11/26-11/29/2015</td>
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<td>Final Examinations</td>
<td>12/14—12/18/2015</td>
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Note: For outreach, internet, and short course drop/add dates, visit Registrar’s Academic webpage http://registrar.siu.edu/

FALL SEMESTER HOLIDAYS

Labor Day Holiday 09/07/2015
Fall Break 10/10—10/13/2015
Veterans Day Holiday 11/11/2015

WITHDRAWAL POLICY ~ Undergraduate only

Students who officially register for a session may not withdraw merely by the stopping of attendance. An official withdrawal form needs to be initiated by the student and processed by the University. For the proper procedures to follow when dropping courses and when withdrawing from the University, please visit http://registrar.siu.edu/pdf/ugrdcatalog1314.pdf

INCOMPLETE POLICY ~ Undergraduate only

An INC is assigned when, for reasons beyond their control, students engaged in passing work are unable to complete all class assignments. An INC must be changed to a completed grade within one semester following the term in which the course was taken, or graduation, whichever occurs first. Should the student fail to complete the course within the time period designated, that is, by no later than the end of the semester following the term in which the course was taken, or graduation, whichever occurs first, the incomplete will be converted to a grade of F and the grade will be computed in the student’s grade point average. For more information please visit: http://registrar.siu.edu/grades/incomplete.html

REPEAT POLICY

An undergraduate student may, for the purpose of raising a grade, enroll in a course for credit no more than two times (two total enrollments) unless otherwise noted in the course description. For students receiving a letter grade of A, B, C, D, or F, the course repetition must occur at Southern Illinois University Carbondale. Only the most recent (last) grade will be calculated in the overall GPA and count toward hours earned. See full policy at http://registrar.siu.edu/pdf/ugradcatalog1314.pdf

GRADUATE POLICIES

Graduate policies often vary from Undergraduate policies. To view the applicable policies for graduate students, please visit http://gradschool.siu.edu/about-us/grad-catalog/index.html

DISABILITY POLICY

Disability Support Services provides the required academic and programmatic support services to students with permanent and temporary disabilities. DSS provides centralized coordination and referral services. To utilize DSS services, students must come to the DSS to open cases. The process involves interviews, reviews of student-supplied documentation, and completion of Disability Accommodation Agreements. http://disabilityservices.siu.edu/

PLAGIARISM CODE


MORRIS LIBRARY HOURS

http://www.lib.siu.edu/about

SAFETY AWARENESS FACTS AND EDUCATION

Title IX makes it clear that violence and harassment based on sex and gender is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. If you or someone you know has been harassed or assaulted, you can find the appropriate resources here: http://safe.siu.edu

SALUKI CARES

The purpose of Saluki Cares is to develop, facilitate and coordinate a university-wide program of care and support for students in any type of distress—physical, emotional, financial, or personal. By working closely with faculty, staff, students and their families, SIU will continue to display a culture of care and demonstrate to our students and their families that they are an important part of the community. For Information on Saluki Cares: (618) 453-5714, or siucares@siu.edu, http://salukicares.siu.edu/index.html

EMERGENCY PROCEDURES

Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. We ask that you become familiar with the SIU Emergency Response Plan and Building Emergency Response Team (BERT) programs. Please reference the Building Emergency Response Protocols for Syllabus attachments on the following pages. It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency.

INCLUSIVE EXCELLENCE

SIU contains people from all walks of life, from many different cultures and sub-cultures, and representing all strata of society, nationalities, ethnicities, lifestyles, and affiliations. Learning from and working with people who differ is an important part of education as well an essential preparation for any career. For more information please visit: http://www.inclusiveness.excellence.siu.edu/

LEARNING AND SUPPORT SERVICES

Help is within reach. Learning support services offers free tutoring on campus and math labs. To find more information please visit the Center for Learning and Support Services website:

Tutoring : http://tutoring.siu.edu/
Math Labs http://tutoring.siu.edu/math_tutoring/index.html

WRITING CENTER

The Writing Center offers free tutoring services to all SIU students and faculty. To find a Center or Schedule an appointment please visit http://write.siu.edu/

AFFIRMATIVE ACTION & EQUAL OPPORTUNITY

Our office's main focus is to ensure that the university complies with federal and state equity policies and handles reporting and investigating of discrimination cases. For more information visit: http://diversity.siu.edu/

Additional Resources Available:

SALUKINET: https://salukinet.siu.edu/cp/home/displaylogin
ADVICEMENT: http://advisement.siu.edu/
SIU ONLINE: http://online.siu.edu/