

PHYS 520B: ELECTROMAGNETIC THEORY

SYLLABUS (2020 Spring)

Department of Physics, Southern Illinois University–Carbondale

Last updated: March 5, 2020

1 General information:

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Class meetings: TR 12:35-1:50 PM, in Neckers 410.

Office hours: MWF 10:00-12:00 PM.

2 Prerequisites:

This course continues on the concepts built in PHYS-520A. Thus, “PHYS 520A: Electromagnetic Theory” is, unofficially, a prerequisite for this course. In PHYS-520A, we covered Maxwell’s equations and the corresponding conservation laws, macroscopic electrodynamics, dielectric models, and Green’s function technique to solve problems in electrostatics. We will continue to assume an earlier exposure to Maxwell’s equations and special relativity at undergraduate level. Familiarity with the following topics will be assumed: vector calculus, complex variables, partial differential equations.

3 Course description

We shall then move on to magnetostatics. We shall cover radiation in detail. Special Relativity will be motivated and Lorentz transformation of electric and magnetic fields will be introduced. We shall build techniques to study propagation of electromagnetic waves in dielectric mediums. Scattering and diffraction will be covered, if time allows.

References

1. *Classical Electrodynamics*, by J. Schwinger, L. L. DeRaad, Jr., K. A. Milton, and Wu-yang Tsai. (Assigned textbook.)
2. *Electromagnetic Theory*, by J. A. Stratton.
3. *Classical Electrodynamics*, by J. D. Jackson.
4. *Introduction to Electrodynamics*, by D. J. Griffiths.
5. Lecture notes on Electromagnetic Theory (2013-2014), available at
<http://www.physics.siu.edu/~shajesh/tc/201308-SIU-P520A/>.
<http://www.physics.siu.edu/~shajesh/tc/201401-SIU-P520B/>.

Webpage

Lecture notes and homework will be posted at <http://www.physics.siu.edu/~shajesh>. It is advised to download relevant materials to your computer, because the website (or the internet) could be occasionally down.

4 Course work

Evaluation

Homework	40 %
Midterm Exams ($2 \times 20\%$)	40 %
Extra Credit Work	y in Eq. (1)
Final Exam	20 %

Homework

Homework will be assigned regularly. Students are encouraged to discuss homework problems with their peers, refer to additional books, and use resources on the Internet. But, each student should submit their own work describing detailed steps of their thought process.

Exams

Four examinations (including the final exam) will be administered.

Midterm Exam 1	February 13 (Thursday)
Midterm Exam 2	March 26 (Thursday)
Final Exam	May 6 (Wednesday, 10:15 AM-12:15 PM, in class)

The midterm exams will assess you on concepts covered in lectures and homework. Midterm exams will be an hour-long exam. All the midterm exams will be cumulative, but you are recommended to concentrate more on topics covered in the later part of the semester.

Grading

The grading will be done on a scale of 0-100. This Raw Score x (out of 100) should be used to assess your knowledge in the subject. The raw score will be converted to the university scale using the following formula for Your Score x' ,

$$x' = x + ay(100 - x), \quad (1)$$

where $0 \leq a \leq 1$ is the primary curve parameter that is decided by the instructor and y is the total score in Extra Credit submissions (out of 1.00). Thus, to benefit from the curve one needs to do well in the Extra Credit. For example, for $a = 0.40$ and $y = 0.75$ one obtains $ay = 0.30$ and a Raw Score of 80 will lead to Your Score of 86.

5 Syllabus Attachment

The Provost Office has created a “Syllabus Attachment” to assist the student. It lists and provides web links for many elements that are important for a student. Kindly find it attached.

Syllabus Attachment

Spring 2020

MISSION STATEMENT FOR SOUTHERN ILLINOIS UNIVERSITY CARBONDALE

SIU embraces a unique tradition of access and opportunity, inclusive excellence, innovation in research and creativity, and outstanding teaching focused on nurturing student success. As a nationally ranked public research university and regional economic catalyst, we create and exchange knowledge to shape future leaders, improve our communities, and transform lives.

IMPORTANT DATES *

<u>Semester Classes Begin:</u>	01/13/2020
<u>Last day to add full-term course (without Dean's signature):</u>	01/19/2020
<u>Last day to withdraw from the University with a full refund:</u>	01/24/2020
<u>Last day to drop a full-term course for a credit/refund:</u>	01/26/2020
<u>Last day to drop a full-term course (W grade, no refund):</u>	03/29/2020
<u>Final examinations:</u>	05/4—05/8/2020

Note: Please verify the above dates with the Registrar calendar and find more detailed information on deadlines at <https://registrar.siu.edu/calendars>. For add/drop dates that apply to shorter-than-full-term courses, please look at the Schedule of Classes search results at <https://registrar.siu.edu/schedclass/index.php>

SPRING SEMESTER HOLIDAYS

Dr. Martin Luther King, Jr. Birthday 01/20/2020

Spring Break 03/7—03/15/2020

DIVERSITY

Southern Illinois University Carbondale's goal is to provide a welcoming campus where all of our students, faculty and staff can study and work in a respectful, positive environment free from racism and intimidation. For more information visit: <https://diversity.siu.edu/#>

DISABILITY SUPPORT SERVICES

SIU Carbondale is committed to providing an inclusive and accessible experience for all students with disabilities. Disability Support Services coordinates the implementation of accommodations. If you think you may be eligible for accommodations but have not yet obtained approval please contact DSS immediately at 618-453-5738 or <https://disabilityservices.siu.edu>. You may request accommodations at any time, but timely requests help to insure accommodations are in place when needed. Accommodations and services are determined through an interactive process with students and may involve consideration of specific course design and learning objectives in consultation with faculty.

MILITARY COMMUNITY

There are complexities of being a member of the military community and also a student, and military and veteran related developments can complicate academic life. If you are a member of the military community and in need of accommodations please visit Veterans Services at <https://veterans.siu.edu/>

STUDENT MULTICULTURAL RESOURCE CENTER

The Student Multicultural Resource Center serves as a catalyst for inclusion, diversity and innovation. As the Center continues its work, we are here to ensure that you think, grow and succeed. We encourage you to stop by the Center, located in the Student Services Building Room 140, to see the resources available and discover ways you can get involved on the campus. Visit us at <https://smrc.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: call(618) 453-2461, email siucares@siu.edu, or <https://salukicare.siu.edu/>

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: <https://safe.siu.edu>

MORRIS LIBRARY HOURS: <https://libguides.lib.siu.edu/hours>

ADVISEMENT: <https://advisement.siu.edu/>

SIU ONLINE: <https://online.siu.edu/>

WITHDRAWAL POLICY ~ Undergraduate only

Students who officially register for a session must officially withdraw from that registration in a timely manner to avoid being charged as well as receiving a failing grade for those classes. An official withdrawal must be initiated by the student, or on behalf of the student through the academic unit, and be processed by the Registrar's office. For the proper procedures to follow when dropping courses and when withdrawing from SIU visit:

<https://registrar.siu.edu/students/withdrawal.php>

INCOMPLETE POLICY~ Undergraduate only

An INC grade may be assigned when, for reasons beyond their control, students engaged in passing work are unable to complete all class assignments for the course. An INC must be changed to a completed grade within one full semester (undergraduates), and one full year (graduate students), from the close of the term in which the course was taken or graduation, whichever occurs first. Should the student fail to complete the remaining course requirements within the time period designated, the incomplete will be converted to a grade of F and such grade will be computed in the student's grade point average. For more information visit:

<https://registrar.siu.edu/grades/incomplete.php>

REPEAT POLICY

An undergraduate student may, for the purpose of raising a grade, enroll in a course for credit more than once. For students receiving a letter grade of A, B, C, D, or F, the course repetition must occur at Southern Illinois University Carbondale. Effective for courses taken Summer 2013 or later, only the most recent (last) grade will be calculated in the overall GPA and count toward hours earned.

This policy will be applied to all transferrable credit in that only the last grade will be used to calculate grade point average. Only those courses taken at the same institution are considered repeats under this policy. See full policy at

<https://registrar.siu.edu/students/repeatclasses.php>

SIU's EARLY WARNING INTERVENTION PROGRAM (EWIP)

Students enrolled in courses participating in SIU's Early Warning Intervention Program might be contacted by University staff during a semester. More information can be found at the Core Curriculum's Overview webpage:

<https://corecurriculum.siu.edu/program-overview/>

EMERGENCY PROCEDURES

We ask that you become familiar with **Emergency Preparedness @ SIU**. Emergency response information is available on posters in buildings on campus, on the Emergency Preparedness @ SIU website, and through text and email alerts. To register for alerts visit: <https://emergency.siu.edu/>

CENTER FOR 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 : <https://clss.siu.edu/tutoring/>

Math Labs <https://math.siu.edu/courses/course-help.php>

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:

<https://write.siu.edu/>

GRADUATE POLICIES

Graduate policies often vary from Undergraduate policies. To view the applicable policies for graduate students, please refer to the graduate catalog at

<https://gradschool.siu.edu/about-us/grad-catalog/>

Need help with an issue? Please visit SALUKI SOLUTION FINDER at

<https://solutionfinder.siu.edu/>

PLAGIARISM

See the Student Conduct Code <https://srr.siu.edu/student-conduct-code/>