

# PHYS 520B: ELECTROMAGNETIC THEORY

SYLLABUS (2021 Spring)

*Department of Physics, Southern Illinois University–Carbondale*

Last updated: March 31, 2021

## 1 General information:

Instructor: K. V. Shajesh

Office: Neckers 491, Tel.: +1-618-453-5212.

Email: [shajesh@siu.edu](mailto:shajesh@siu.edu)

Zoom Meeting ID: [934 4515 4889](#)

Web-page: <http://www.sphics.com>

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

Office hours: MWF 9:00-11:00 AM.

## 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.sphics.com/tc/202101-SIU-P520B/>.

It is advised to download relevant materials to your computer, because the website (or the internet) could be occasionally down.

## Lectures

Lectures will be delivered on Zoom during the scheduled class periods. The lectures will be recorded using a web camera and the recording feature in Zoom. These recordings will be made available on YouTube as ‘Unlisted’ videos. These videos will not be public in the sense that it will not show up under a search, but anyone with the link to the video can access it.

## 4 Course work

### Evaluation

Homework	40 %
Midterm Exams (2 × 15 %)	30 %
Quizzes	10 % and $y$ 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 23 (Tuesday)
Midterm Exam 2	March 30 (Tuesday)
Final Exam	May 6 (Thursday, 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 2021

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

Semester Classes Begin:	01/19/2021
Last day to add full-term course (without Dean's signature):	01/24/2021
Last day to withdraw from the University with a full refund:	01/29/2021
Last day to drop a full-term course for a credit/refund:	01/31/2021
Last day to drop a full-term course (W grade, no refund):	03/28/2021
Final examinations:	05/03-05/07/2021

Note: Please verify the above dates with the Registrar calendar and find more detailed information on deadlines at <http://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 <http://registrar.siu.edu/schedclass/index.php>

## SPRING SEMESTER HOLIDAYS

Spring Break - not offered this semester

## 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: <http://diversity.siu.edu>. Additional [informational flyer](#).

## 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 <http://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 [suicares@siu.edu](mailto:suicares@siu.edu), or <http://salukicares.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: <http://safe.siu.edu>

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

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

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

WRITING CENTER: <http://write.siu.edu/>

## COVID-19

As a condition of on-campus enrollment, all SIUC students are required to engage in safe behaviors to avoid the spread of COVID-19, including the requirement that all students wear a mask in campus buildings, including classrooms, laboratories, and studios when others are present, regardless of social distancing. Students are expected to follow physical or social distancing guidelines by keeping at least 6 feet from others, and practicing good hand hygiene. Failure to comply with this policy may result in dismissal from the current class session. If the student refuses to leave the classroom after being dismissed, the student may be referred to the Office of Student Rights and Responsibilities. SIUC will follow federal, state and county public health recommendations and mandates in all decisions relating to university operation. Students should regularly review the link for the [SIUC COVID-19 response](#).

Masks for residential students will be furnished upon move-in to their residence hall rooms. Off-campus students can pick up a mask at the Student Center ID Office, the Student Services Building main desk, the check-in desk at the Student Health Center, the equipment desk at the Student Recreation Center, the Dean of Students Office and at the circulation desk of Morris Library. Students will need to show their student IDs to claim their masks. A limited number of masks will be available in the academic deans' offices. All questions can be directed to the Dean of Students Office. Email: [deanofstudents@siu.edu](mailto:deanofstudents@siu.edu) Phone #: (618) 453-2461

## 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: <http://registrar.siu.edu/students/withdrawal.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 webpage: <https://corecurriculum.siu.edu/for-faculty/>

## 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: <http://emergency.siu.edu/>

## CATALOGS

[catalog.siu.edu](http://catalog.siu.edu)

[gradcatalog.siu.edu](http://gradcatalog.siu.edu)

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

## CENTER FOR LEARNING AND SUPPORT SERVICES

Tutoring : <http://tutoring.siu.edu/>

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

## PLAGIARISM

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

## INCOMPLETE POLICY~ Undergraduate only

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

## REPEAT POLICY

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

Need help with an issue? Please visit SALUKI SOLUTION FINDER at <http://solutionfinder.siu.edu/>