

PHYS 500A: MATHEMATICAL METHODS

SYLLABUS (Fall 2025)

School of Physics and Applied Physics, Southern Illinois University–Carbondale

Last updated: September 26, 2025

1 General information:

Instructor: K. V. Shajesh

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

Class meetings: MF 9:35-10:50 AM, in Neckers 404.

Office hours: MWF 11 AM-12:30 PM; MW 3-4 PM.

2 Prerequisites:

Familiarity with the following topics will be assumed: vector calculus, matrix algebra, linear differential equations.

3 Course description

We will cover the following topics: tensor algebra, contour integration in complex analysis, Green's function method to solve nonhomogeneous partial differential equations, spherical harmonics, perturbation techniques.

Essential learning outcomes

The students will be exposed to concepts and ideas that can be deduced from fundamental laws. They will master and perfect these concepts using problem solving techniques by making errors and mistakes in their homework. By reflecting on their thought process in problem-solving they will learn to think critically, honestly, without bias, and cultivate methods to develop instincts from their problem-solving experiences.

References

1. *Methods of Theoretical Physics*, Part 1 and 2, by Philip M. Morse and Herman Feshbach.
2. *Mathematical Methods for Physicists*, 6th Edition, by George B. Arfken and Hans J. Weber.

Webpage

Lecture notes and homework will be posted at

<http://www.sphics.com/tc/202508-SIU-P500A/>.

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

Lectures

The lectures from past years are good representations of the lectures for this course. They are available on the course webpage.

4 Course work

Evaluation

Classroom Quizzes	10 % and y in Eq. (1)
Homework	30 %
Midterm Exams (2×20 %)	40 %
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

Three examinations (including the Final Exam) will be administered.

Midterm Exam 01	September 26 (Friday, in class)
Midterm Exam 02	October 31 (Friday, in class)
Final Exam	December 12 (Friday, 8:00-10:00 AM)

The midterm exams will assess you on concepts covered in lectures and homework. 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 curve parameter chosen by the instructor and $0 \leq y \leq 1$ is determined by your score in Classroom Quizzes (out of 1.00). For example, for $a = 0.50$ and $y = 0.75$, a Raw Score of 60 will lead to Your Score of 75.

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

Fall 2025

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:08/18/2025
Last day to add full-term course (without Dean's signature):08/24/2025
Last day to withdraw from the University with a full refund:08/29/2025
Last day to drop a full-term course for a credit/refund:08/31/2025
Last day to drop a full-term course (W grade, no refund):.....10/26/2025
Final examinations:12/08/2025–12/12/2025

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>

FALL SEMESTER HOLIDAYS:

Labor Day 09/01/2025
Fall Break 10/10/2025
Veterans Day 11/11/2025
Thanksgiving Break 11/22/2025 - 11/30/2025

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](#).

OFFICE FOR ACCESS AND ACCOMMODATIONS: SIU Carbondale is committed to providing an inclusive and accessible experience for all students with disabilities. Office for Access and Accommodations coordinates the implementation of accommodations. If you think you may be eligible for accommodations but have not yet obtained approval please contact OAA immediately at (618) 453-5738 or <https://access.siu.edu>. You may request accommodations at any time, but timely requests help to ensure 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, SIUC 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 <http://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: <http://safe.siu.edu>.

PREGNANCY: Title IX makes it clear that students who are pregnant or have a related condition may contact the Title IX Coordinator to request accommodations or to report any allegations of discrimination. The Title IX Coordinator may be contacted at: Nick Wortman, Associate Vice Chancellor for Human Resources, Southern Illinois University Carbondale, 0135 Woody Hall, 900 S. Normal Avenue, Mail Code 6520, Carbondale, IL 62901, (618) 453-6667, equity@siu.edu.

SIU COUNSELING AND PSYCHOLOGICAL SERVICES (CAPS): Mental health counseling services are available by calling [CAPS](#) at (618) 453-5371. CAPS offers confidential same-day services and ongoing counseling. For after hours crisis care, students are encouraged to call 988, 911, or present to their nearest emergency room.

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 SIUC visit: <https://registrar.siu.edu/students/withdraw.php>.

SIUC'S EARLY WARNING INTERVENTION PROGRAM (EWIP): Students enrolled in courses participating in SIUC's Early Warning Intervention Program might be contacted by University staff during a semester. More information can be found at the University Core Curriculum's Overview webpage: <https://corecurriculum.siu.edu/for-faculty/>.

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

CATALOGS:

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

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

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>

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

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

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