

# PHYS 510: CLASSICAL MECHANICS

SYLLABUS (2025 Spring)

*Department of Physics, Southern Illinois University–Carbondale*

Last updated: January 13, 2025

## 1 General information:

Instructor: K. V. Shajesh

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

Class meetings: TR 9:35-10:50 AM, in Neckers 410.

Office hours: MWF 9:30-11:00 AM; MF 3:00-4:00 PM.

## 2 Prerequisites:

Exposure to Newton's laws of motion and Newton's law of gravitation will be assumed. Familiarity with the following mathematical techniques will be assumed: linear algebra, vector algebra, partial differential equations.

## 3 Course description

We shall cover the following topics: Hamilton's action principle, Lagrangian equations of motion, Hamiltonian equations of motion, the Kepler problem, Special theory of relativity.

### References

1. *Classical Mechanics*, by Goldstein, Poole, and Saffko. (Available in <http://archive.org>.)
2. *Mechanics*, by L.D. Landau and E.M. Lifshitz. (Available in <http://archive.org>.)
3. *Mechanics*, by Arnold Sommerfeld. (Available in <http://archive.org>.)
4. *Mathematical Methods of Classical Mechanics*, by V. I. Arnold. (Available in <http://archive.org>.)
5. *Calculus of Variations*, by I. M. Gelfand and S. V. Fomin. (Available in <http://archive.org>.)

### Webpage

Lecture notes and homework will be posted at

<http://www.sphics.com/tc/202501-SIU-P510/>.

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

### Lectures

The lectures will be recorded if the technology is available. These recordings will be made available on YouTube as 'Unlisted' videos. These videos will not be available in public in the sense that it will not show up under a search, but anyone with the link to the video can access it. The lectures were recorded Spring 2022 and Spring 2021 and are good representations of the lectures for this course. They are available at <http://sphics.com/tc/>.

## 4 Course work

### Evaluation

Quizzes	10 % and $y$ in Eq. (1)
Homework	30 %
Midterm Exams ( $2 \times 20$ %)	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 1	February 20 (Thursday)
Midterm Exam 2	March 27 (Thursday)
Final Exam	Will be announced after third week of classes

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 quizzes (out of 1.00). Thus, to benefit from the curve one needs to do well in the quizzes. 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 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: .....**01/13/2025**  
Last day to add full-term course (without Dean's signature): .....**01/19/2025**  
Last day to withdraw from the University with a full refund: .....**01/24/2025**  
Last day to drop a full-term course for a credit/refund: .....**01/26/2025**  
Last day to drop a full-term course (W grade, no refund):.....**03/30/2025**  
Final examinations: .....**05/05/2025–05/09/2025**

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>

## SPRING SEMESTER HOLIDAYS:

Martin Luther King, Jr.'s Birthday 01/20/2025  
Spring Break 03/08/25-03/16/25

**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 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, 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](mailto: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](mailto: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](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: <https://class.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/>