

# Syllabus for Classical Physics I, PHYS 341, Fall 2025

**CRN: 75391, F01**

**MWF 2:15-3:15 PM, REIC 203 (Lecture)**  
**T 1:15-2:15 PM, REIC 203 (Recitation)**

- Instructor:** Ataur R. Chowdhury
- Office:** REIC 118
- Office Hours:** TR 10:00-11:30, or feel free to drop in whenever I am in my office.
- Contact:** Phone (907) 474-6109  
Fax (907) 474-6130  
Email archowdhury@alaska.edu
- Prerequisites:** PHYS 211X; PHYS 212X; Phys 220; PHYS 301; or permission of instructor
- Texts:** **Required:** *Classical Mechanics* by J R. Taylor, 1<sup>st</sup> Edition, University Science Books.
- Reference Texts:**
1. *Classical Dynamics of Particles and Systems* by Marion & Thornton, Brooks/Cole (1995).
  2. *Mechanics* by K. R. Symon, 3<sup>rd</sup> Edition, Prentice Hall.
  3. *Introduction to Classical mechanics* by A. Arya, Prentice Hall (1998).
  4. *Classical Mechanics* by H. Goldstein, Addison-Wesley (2002) (a graduate level text).
- Course Objectives:** To acquire a basic understanding of the fundamentals of dynamical motion of objects in light of the Newton's laws and Lagrange's concepts.
- Student Learning Outcomes:**
1. Students should be able to understand the logistics of static and dynamic motion of objects.
  2. Students should be able to express the essential elements of object's motion in terms of Newton's laws and using Lagrange's concepts.
  3. Students should be able to set up equations of motion and be able to solve for relevant quantities of interest.
  4. Students should be able to simulate approximate motion of objects where analytical solutions are not possible.
  5. Students should understand the fundamentals of all physical concepts involving the motion of objects.
- Course Outline:** Newtonian mechanics, conserved mechanical quantities, motion of system of particles, rigid body statics and dynamics, moving and accelerated coordinate systems, rigid body rotations and Lagrangian mechanics.

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**Credits:** 4 credits: 3 hr. of lecture, and 1hr. of tutorial per week.

## **Course Requirements/ Policies:**

### Class Attendance/Participation:

For a better understanding of the course material attendance and participation in classroom activities are very important. This course is generally regarded as one of the founding courses that deal with the fundamentals of classical physics, and it is highly expected that the students will commit themselves to attending the class regularly. There will be supplemental materials for this course and the students will be held responsible for all the materials that will be brought in from outside the text. The students will be expected to participate in class activities and take part in meaningful discussion and ask questions to better comprehend the subject material.

**It is highly expected that the students will cause the least disruption of class activities by showing up before the class starts, not leaving the class before it stops, keeping cell phones in silent mode, and refraining from talking during the class.**

### Tutorial Session:

One hour per week (T 1:15-2:15 PM, RECI 203) will be devoted to doing problems not included in the homework. Both the instructor and students will take part in solving a pre-selected set of problems during this session. Students may also bring in subjects' materials for further discussion and clarification during this session. Attendance at this session is required. This session is designed to promote a better understanding of the subject and will not be a part of the grade

### Homework:

On average, 6-8 problems/exercises/questions will be assigned each week on Fridays. The homework will be due back at the beginning of class the following Friday. **NO LATE HOMEWORK WILL BE ACCEPTED. NO EXCEPTIONS** (barring emergencies and extreme situations). Group work is highly encouraged for solving problems, and for additional help with the homework the students are most welcome to consult the instructor during office hours or any other time by prior appointment. Any homework you submit should reflect your own best effort. Copying of homework is not acceptable and will result in a grade of zero for the assignment.

Quizzes: There will be one quiz every week of the semester on Fridays, except the first week and week of midterm and final. These quizzes will be administered during the last 20 minutes of the class and are designed to test students' understanding of the subject material covered during the preceding week. The quiz may include problems like the homework and may also include 'intuitive' question pertaining to the subject materials. Of all the quizzes only ten bests will be considered for grading. **Make-up quizzes, if you miss class for valid reasons, may be arranged with approval from the instructor.**

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## Examinations:

There will be a midterm examination (October 10, Friday, 2:15-3:15 PM) and a final comprehensive examination (December 11, Thursday, 1:00-3:00 PM) for this course. Examinations will consist of, in most part, problems like those in the homework and those worked out in class. Midterm will cover the material covered in class and homework prior to the date of test, and the final will cover material covered in chapters 1-10, with more weight on material covered after the midterm. **Make-up exams, for valid reasons, may be arranged with approval from the instructor.**

## **Grading Policy:**

|               |            |
|---------------|------------|
| Homework      | 25%        |
| Participation | 5%         |
| Midterm       | 20%        |
| Quiz          | 20%        |
| <u>Final</u>  | <u>30%</u> |
| Total         | 100%       |

The final grading for this course will be based on a curve. For a given score, your letter grade will not be lower than what it would be expected based on standard grading scale (90-100 = A, 80-90 = B, etc.). Allowed grades are limited to letter grades A, B, C, D, F, I, BN, and no plus-minus grades will be given for this course.

Incomplete Grade Policy: “The letter “I” (Incomplete) is a temporary grade used to indicate that the student has satisfactorily completed (C or better) most of the work in a course but for personal reasons beyond the student’s control, such as sickness, has not been able to complete the course during the regular semester. Negligence or indifference are not acceptable reasons for an “I” grade.”

## **University AI Policy:**

UAF does not have a central university policy for AI to be abided by. Depending on how you use this, this could be a very useful tool for learning. But please make sure you are not using AI to cheat and copy things out of online sources of any kind. The university takes cheating seriously and it reserves the right to take lawful actions

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Syllabus Addendum (Revised 8/22/2022)

**COVID-19 statement:** Students should keep up-to-date on the university's policies, practices, and mandates related to COVID-19 by regularly checking this website:

<https://sites.google.com/alaska.edu/coronavirus/uaf?authuser=0>

Further, students are expected to adhere to the university's policies, practices, and mandates and are subject to disciplinary actions if they do not comply.

**Student protections statement:** UAF embraces and grows a culture of respect, diversity, inclusion, and caring. Students at this university are protected against sexual harassment and discrimination (Title IX). Faculty members are designated as responsible employees which means they are required to report sexual misconduct. Graduate teaching assistants do not share the same reporting obligations. For more information on your rights as a student and the resources available to you to resolve problems, please go to the following site: <https://catalog.uaf.edu/academics-regulations/students-rights-responsibilities/>.

**Disability services statement:** I will work with the Office of Disability Services to provide reasonable accommodation to students with disabilities.

**ASUAF advocacy statement:** The Associated Students of the University of Alaska Fairbanks, the student government of UAF, offers advocacy services to students who feel they are facing issues with staff, faculty, and/or other students specifically if these issues are hindering the ability of the student to succeed in their academics or go about their lives at the university. Students who wish to utilize these services can contact the Student Advocacy Director by visiting the ASUAF office or emailing [asuaf.office@alaska.edu](mailto:asuaf.office@alaska.edu).

## Student Academic Support:

- Speaking Center (907-474-5470, [uaf-speakingcenter@alaska.edu](mailto:uaf-speakingcenter@alaska.edu), Gruening 507)
- Writing Center (907-474-5314, [uaf-writing-center@alaska.edu](mailto:uaf-writing-center@alaska.edu), Gruening 8th floor)
- UAF Math Services, [uaf-traccloud@alaska.edu](mailto:uaf-traccloud@alaska.edu), Chapman Building (for math fee paying students only)
- Developmental Math Lab, Gruening 406
- The Debbie Moses Learning Center at CTC (907-455-2860, 604 Barnette St, Room 120, <https://www.ctc.uaf.edu/student-services/student-success-center/>)
- For more information and resources, please see the Academic Advising Resource List ([https://www.uaf.edu/advising/lr/SKM\\_364e19011717281.pdf](https://www.uaf.edu/advising/lr/SKM_364e19011717281.pdf))

## Student Resources:

- Disability Services (907-474-5655, [uaf-disability-services@alaska.edu](mailto:uaf-disability-services@alaska.edu), Whitaker 208)

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- Student Health & Counseling [6 free counseling sessions] (907-474-7043, <https://www.uaf.edu/chc/appointments.php>, Gruening 215)
- Center for Student Rights and Responsibilities (907-474-7317, [uaf-studentrights@alaska.edu](mailto:uaf-studentrights@alaska.edu), Eielson 110)
- Associated Students of the University of Alaska Fairbanks (ASUAF) or ASUAF Student Government (907-474-7355, [asuaf.office@alaska.edu](mailto:asuaf.office@alaska.edu), Wood Center 119)

**Nondiscrimination statement:** The University of Alaska is an affirmative action/equal opportunity employer and educational institution. The University of Alaska does not discriminate on the basis of race, religion, color, national origin, citizenship, age, sex, physical or mental disability, status as a protected veteran, marital status, changes in marital status, pregnancy, childbirth or related medical conditions, parenthood, sexual orientation, gender identity, political affiliation or belief, genetic information, or other legally protected status. The University's commitment to nondiscrimination, including against sex discrimination, applies to students, employees, and applicants for admission and employment. Contact information, applicable laws, and complaint procedures are included on UA's statement of nondiscrimination available at [www.alaska.edu/nondiscrimination](http://www.alaska.edu/nondiscrimination). For more information, contact:

UAF Department of Equity and Compliance  
1692 Tok Lane, 3rd floor, Constitution Hall, Fairbanks, AK 99775  
907-474-7300  
[uaf-deo@alaska.edu](mailto:uaf-deo@alaska.edu)

Additional syllabi statement for courses including off-campus programs and research activities:

University Sponsored Off-Campus Programs and Research Activities

We want you to know that:

1. UA is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual: [www.alaska.edu/nondiscrimination](http://www.alaska.edu/nondiscrimination).
2. Incidents can be reported to your university's Equity and Compliance office (listed below) or online reporting portal. University of Alaska takes immediate, effective, and appropriate action to respond to reported acts of discrimination and harassment.
3. There are supportive measures available to individuals that may have experienced discrimination.
4. University of Alaska's Board of Regents' Policy & University Regulations (UA BoR P&R) 01.02.020 Nondiscrimination and 01.04 Sex and Gender-Based Discrimination Under Title IX, go to: <http://alaska.edu/bor/policy-regulations/>.
5. UA BoR P&R apply at all university owned or operated sites, university sanctioned events, clinical sites and during all academic or research related travel that are university sponsored.

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For further information on your rights and resources [click here](#).

## Tentative Schedule

### Lecture, Reading, Quizz and Exam

| <u>Dates</u> | <u>Topics</u>                              | <u>Reading Assignment</u> |
|--------------|--|---------------------------|
| Aug. 25      | introduction, overview                     |                           |
| 27           | review of mechanics                        | Ch 1: sections 1-2        |
| 29           | Newton's laws, inertial frame              | Ch 1: sections 3-4        |
| Sept. 1      | <b>Labor Day</b> (no classes)              |                           |
| 3            | conservation of momentum                   | Ch 1: section 5           |
| 5            | motion in two-dimensions                   | Ch 1: sections 6-7        |
|              | <b>Quiz # 1</b>                            |                           |
| 8            | projectile motion                          | Ch 2: sections 1-3        |
| 10           | air resistance                             | Ch 2: sections 3-4        |
| 12           | motion of charge particle in B field       | Ch 2: sections 5-7        |
|              | <b>Quiz # 2</b>                            |                           |
| 15           | momentum conservation, rocket              | Ch 3: sections 1-2        |
| 17           | center of mass, angular momentum           | Ch 3: sections 3-4        |
| 19           | systems with many particles                | Ch 3: sections 4-5        |
|              | <b>Quiz # 3</b>                            |                           |
| 22           | kinetic energy, work                       | Ch 4: sections 1-2        |
| 24           | potential energy, time dependent-potential | Ch 4: sections 3-5        |
| 26           | one-dimensional system, central force      | Ch 4: sections 6-8        |

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## Quiz # 4

|      |    |                                  |                     |
|------|----|----------------------------------|---------------------|
| Oct. | 29 | energy of a multiparticle system | Ch 4: sections 9-10 |
|      | 1  | simple harmonic motion           | Ch 5: sections 1-2  |
|      | 3  | damped oscillations              | Ch 5: sections 3-5  |

## Quiz # 5

|    |                                |                    |
|----|--------------------------------|--------------------|
| 6  | resonances                     | Ch 5: sections 6-7 |
| 8  | calculus of variations         | Ch 6: sections 1-2 |
| 10 | <b>Midterm Exam</b> (in class) | Ch 1-6             |

|    |  |                    |
|----|--|--------------------|
| 13 | Lagrange's equations                       | Ch 7: sections 1-2 |
| 15 | Lagrange's equations with constraints      | Ch 7: sections 3-4 |
| 17 | generalized coordinates, conservation laws | Ch 7: sections 6-7 |

## Quiz # 6

|    |                               |                     |
|----|-------------------------------|---------------------|
| 20 | Lagrange multipliers          | Ch 7: sections 9-10 |
| 22 | more on Lagrange applications | Ch 7: sections 1-10 |
| 24 | central force                 | Ch 8: sections 1-2  |

## Quiz # 7

|    |                                     |                    |
|----|-------------------------------------|--------------------|
| 27 | CM coordinates, equations of motion | Ch 8: sections 2-3 |
| 29 | one-dimensional problems            | Ch 8: sections 3-4 |
| 31 | Kepler orbits                       | Ch 8: sections 5-7 |

## Quiz # 8

|      |   |                    |                    |
|------|---|--------------------|--------------------|
| Nov. | 3 | changes of orbits  | Ch 8: section 8    |
|      | 5 | accelerating frame | Ch 9: sections 1-2 |
|      | 7 | rotating frame     | Ch 9: sections 3-4 |

## Quiz # 9

|    |  |                     |
|----|--|---------------------|
| 10 | Newton's law, centrifugal force          | Ch 9: sections 5-6  |
| 12 | Coriolis force                           | Ch 9: sections 7-8  |
| 14 | Foucault pendulum, Coriolis acceleration | Ch 9: sections 9-10 |

## Quiz # 10

|    |                              |                     |
|----|------------------------------|---------------------|
| 17 | rotations about a fixed axis | Ch 10: sections 1-2 |
|----|------------------------------|---------------------|

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|        |  |                      |
|--------|--|----------------------|
| 19     | inertia tensor, principal axis                             | Ch 10: sections 3-4  |
| 21     | eigenvalue equations, precising top                        | Ch 10: sections 5-6  |
|        | <b>Quiz # 11</b>   |                      |
| 24     | Euler's equations  | Ch 10: sections 7-8  |
| 26     | <b>Fall Break (no classes)</b>                             |                      |
| 28     | <b>Fall Brerak (no classes)</b>                            |                      |
| Dec. 1 | Euler's angles, spinning top                               | Ch 10: sections 9-10 |
| 3      | makeup lecture   |                      |
| 5      | review for final   |                      |
|        | <b>Quiz #12</b>  |                      |
| 8      | <b>Final Examination</b> (chapters 1-10), 1-3 PM, REIC 203 |                      |



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## Initial Questionnaire

NAME: \_\_\_\_\_ Student # \_\_\_\_\_

Academic Major(s) \_\_\_\_\_

College Physics and Mathematics courses completed:

|  |
|--|
|  |
|--|

Physics and Mathematics courses this semester:

|  |
|--|
|  |
|--|