

# Physics 621: Classical Mechanics

## Syllabus - Fall 2019

**CRN: 74781, F01**

**Lecture:** MWF 9:15-10:15, REIC 207

**Instructor:** Ataur R. Chowdhury

**Office:** REIC 118

**Office Hours:** MWF 2:00-3:30 pm, and any other time I am in my office.

**Contact:** Phone (907) 474-6109  
Fax (907) 474-6130  
Email archowdhury@alaska.edu

**Prerequisites:** Graduate standing or permission of instructor.

**Text:** **Classical Mechanics** by Goldstein, Poole & Safko, Third Edition, Addison Wesley (ISBN 0-201-65702-3).

**Useful Resources:**

1. J. Marion and S. Thornton, *Classical Dynamics of Systems and Particles* (Thomson-Brooks/Cole, 2004). An excellent undergraduate textbook on classical mechanics. If you find Goldstein a little difficult, this will be an excellent resource to bank on.
2. M. Boas, *Mathematical Methods in the Physical Sciences*, Second Edition (Wiley, 1983). A useful mathematical resource for most of the mathematical tools you need for this course. The math course (Phys 611) you have taken or will be taking concurrently with course will also be very useful.
3. L. Landau and Lifshitz, *Mechanics* (Vol. 1 in the Course of Theoretical Physics). It is condensed but very insightful text that is the popular equivalent of Goldstein in Russia.

**Description:** Lagrange's equations, two-body problem, rigid body motion, special relativity, canonical equations, transformation theory, and Hamilton-Jacobi method.

**Schedule:** Materials covered in this course will be based on chapters 1-10 of Goldstein. Additional material will be provided in class as needed.

**Course Objective:**

1. To acquire a basic understanding of advanced concepts and formulation of classical mechanics.
2. To learn advanced mathematical methods that are useful through-out physics.
3. To develop and sharpen high-level problem solving skills.

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4. To be able to apply the knowledge learned in this course to real-world problems in mechanics.

**Credits:** 3 credits: 3 hr. of lecture 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. For many of you this will be the first graduate physics course that deals with the fundamentals of advanced mechanics and many of you may find this course a little difficult and mathematically intense. However, if you attend classes and work out all the assignments, you will learn and possibly master the material. This is why it is highly expected that the students will commit themselves to attend 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.

#### Homework:

Homework is the single most important aspect of this course. The best possible way to learn physics, and perhaps any science, is through doing problems. This is a graduate course and you may find homework challenging. However, if you find your homework difficult, please come and ask me for help. On the average, 6-8 problems will be assigned on most 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 extremely effective in achieving a greater understanding of the subject material, and it is highly encouraged for solving problems. For additional help with the homework the students are most welcome to consult the instructor during the office hour or any other time by prior appointment. Any homework you submit should reflect your own best effort. **Copying of homework from your friend or any online sources is absolutely not acceptable and will result in a grade of zero for the assignment.**

#### Examinations:

There will be two midterm examinations (October 11, Friday 9:15-10:15 and November 18, Monday 9:15-10:15) and a final comprehensive examination (December 11, Wednesday, 8:00 am-10:00 am) for this course. Examinations will consist of, in most part, problems similar to those in the homework and those worked out in class. Midterms will cover the material covered in class and homework prior to the date of test, and the final will be comprehensive and will include material covered during the entire semester.

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### Grading Policy:

Homework	34%
Midterm I	18%
Midterm II	18%
<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) the majority of 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.”

### Academic Honesty

UAF expects and requires academic honesty from all members of the University community, and takes any act of plagiarism and cheating seriously. It is expected that all assignments, including homework and reports, that are turned in for this course must be the original work of the individual student. Failure to comply with this policy will result in penalty as stipulated under UAF regulations.

### Student Protections and Services:

**Protection:** Every qualified student is welcome in my classroom. Students at this university are protected against sexual harassment and discrimination (Title IX), and minors have additional protections. As required, if I notice or am informed of certain types of misconduct, then I am required to report it to the appropriate authorities. For more information on your rights as a student and the resources available to you to resolve problems, please go the following site: [www.uaf.edu/handboo](http://www.uaf.edu/handboo)

UA is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual: [alaska.edu/nondiscrimination](http://alaska.edu/nondiscrimination).

**Services:** As needed, I am happy to work with you, disability services, veterans' services, rural student services, etc to find reasonable accommodations.

**Effective communication:** Students who have difficulties with oral presentations and/or writing are strongly encouraged to get help from the UAF Department of Communication’s Speaking Center (907-

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474-5470, [speak@uaf.edu](mailto:speak@uaf.edu)) and the UAF English's Department's Writing Center ( 907-474-5314, Gruening 8th floor), and/or CTC's Learning Center (604 Barnette st, 907-455-2860).

### **Disabilities Services**

The UAF Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. Any student who may need assistance with disabilities, should feel free to contact the instructor or directly to the Office of Disabilities Services (208 WHIT) by calling 907- 474-5655, or through email: [uaf-disability-service@alaska.edu](mailto:uaf-disability-service@alaska.edu).

### **General Remarks**

*"Physics is just the refinement of everyday thinking," A. Einstein*

Physics is the subject that requires you to think and ponder. Physics is not mathematics, but it does require mathematics to make it useful. In order for you to succeed in this course you may pay heed to the following suggestions.

1. Read the chapter before it is discussed in class so that you know the material and know what questions to ask for clarification.
2. Start your homework on day one so that you have ample time to think about the questions and get the help you need.
3. Think the problems through and follow the logical sequence to get the result.
4. Do not hesitate to ask for help. We wish all of you to excel and we are here to help.