Physics 341 - Classical Physics I: Particle Mechanics - Fall 20

Instructor	Renate Wackerbauer, Office Location: REIC 106 phone: 474-6108 e-mail: rawackerbauer@alaska.edu
Open Office hours	Due to Covid19 there are no walk-in office hours unless the situation improves; meeting via zoom works; email is effective for straight-forward questions. additional recitation classes can be scheduled on request.
Course Info	Phys341, 4 credits
Prerequisites	Phys220, 301; or permission of instructor.
Lectures	MWF 2:15 to 3:15 am, T 1:15-2:15, REIC 203 Lectures will be/start f2f; they will be recorded, uploaded to "google classroom", and shared with all students in class. Due to the fluid situation with covid, the course modality can change throughout the semester. In the case of online course delivery, lectures would be offered synchronously (tablet with whiteboard), recorded, and uploaded into google classroom.
Noyes Lab	Access to the Noyes Computer Lab (REIC 101) is provided to all students enrolled in a Physics course. Your polar express card lets you in.
Text	Required text: *Classical Mechanics* by J.R. Taylor, University Science Books (1st edition, 2005) Supplementary readings: *Classical dynamics of particles and systems*, by Marion, Thornton, Brooks/Cole (1995) - many examples and pictures *Mechanics* by K.R. Symon, Prentice Hall (3rd edition, 2001) - that's the book we have used before in phys311/312 *Introduction to Classical Mechanics*, by A. Ayra, Prentice Hall (1998) - not as complete as symon, but more examples *Classical Mechanics*, by H. Goldstein, Addison-Wesley (2002) - for advanced reading, usually at graduate level *There are many books on introductory classical mechanics in the library that almost all cover the material presented in the lectures. Please explore them to see different approaches to our topics.*
Course Content **Tentative course calendar**	Newtonian mechanics, conserved mechanical quantities, motion of systems of particles, rigid body statics and dynamics, moving and accelerated coordinate systems, rigid body rotations, and Lagrangian mechanics.
Course Goals	This course provides an introduction into the theoretical principles of classical mechanics. First we explore particle dynamics based on Newton's laws of motion. Then we discuss particle dynamics in terms of the Lagrangian concept, which is based on energy concepts.
Student Learning Outcomes	Students learn, --how to describe and solve problems in theoretical classical mechanics --how to describe particle dynamics with Newton's and Lagrangian concepts --to critically compare Newton's concept and Lagrange's concept for certain physical proble
Homework **homework**	Homework (10 assignments, each counting 100pts) will be assigned weekly via "google classroom" and will be due by **2:00 pm** on the following Friday, unless explicitely altered at the time of assignment. Late homework will not be accepted. Finished homework should be uploaded as a pdf-file to "google classroom". You can earn 100 bonus points in the homework by giving a 10min presentation to class on a topic related to class, for example the life of a classical physicist, an application of classical mechanics, experiments on classical mechanics, etc. in case of issues with the homework link use: ffden-2.phys.uaf.edu/wacker/CLASS/341.html
Examinations	Two one-hour in-term examinations and a two hour final examination will be held during the semester. In-term exams will be held in the classroom. Upon request, an additional review class may be scheduled before each exam. The exams will be closed books and closed notes. No calculators, computers, or communication devices are allowed.

Exam 1 (in class)	Friday, Oct 2	Taylor: approx. chapt. 1-5
Exam 2 (in class)	Friday, Nov 6	Taylor: approx. chapt. 6-8, 13
Final Exam	Wednesday, Dec 9, 1-3pm	Taylor: approx. chapt. 1-10, 13, 14

	The maximum score for each homework will be 100 points. A solution (homework, exam) that presents nothing more than a restatement of the problem will receive zero credit. *Illegible work will not be graded*. To pass the course with a grade higher than an "F", you need 40% of the total credits. Grades A to D are assigned equal weight for total credits between 40% and 100%. So, A+ (>97.5), A(>87.5), A-(>85), B+(>82.5), B(>72.5), B-(>70), C+(>67.5), C(>57.5), C-(>55), D+(>52.5),

<table>
<tr><td>Grading</td><td>D(>42.5), D-(>40). If this class is in your major you need at least a grade C- for passing the course and fulfilling prerequisites. For the final grade, homework, exams, etc. will be weighted as follows:
<table>
<tr><td>Homework</td><td>20%</td></tr>
<tr><td>Exam 1</td><td>25%</td></tr>
<tr><td>Exam 2</td><td>25%</td></tr>
<tr><td>Final Exam</td><td>30%</td></tr>
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<tr><td>Course policies</td><td>Attendance at lectures is expected. Active class participation, questions are extremely welcome in the lectures. A missed exam will receive 0 credit unless the instructor is notified by email, phone, etc before the exam starts. Make-up exams will be individually scheduled with the student.</td></tr>
<tr><td>Student Obligations</td><td>As students of UAF, you are bound by the policies and regulations of the University of Alaska, UAF rules and procedures, and the Student Honor Code. You are obligated to make yourselves familiar with all conditions presented in the UAF Catalog. Plagiarism on homework or on an exam will result in a failing grade.
Students should keep up-to-date on the university's policies, practices, and mandates related to COVID-19 by regularly checking this website:
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.</td></tr>
<tr><td>Student Protection and Services Statement</td><td>Every qualified student is welcome in my classroom. As needed, I am happy to work with you, disability services, veterans' services, rural student services, etc. to find reasonable accommodations. 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/handbook/.

UA is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual: https://alaska.edu/nondiscrimination/.

Your instructor follows the University of Alaska Fairbanks 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.”

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 (907-474-5470, speak@uaf.edu) and the UAF English Department's Writing Center (907-474-5314, Gruening 8th floor), and/or CTC's Learning Center (604 Barnette Street, 907-455- 2860).</td></tr>
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Tentative weekly course calendar for Phys341

4 lectures per week

Week	Date	Topics covered
1	Aug 24-28	chapt 1: Newtons laws: I, II, III, inertial frame no HW due
2	Aug 31- 4	chapt 2: projectile motion, linear/quadratic air restistance, forces F(v) HW#1 due friday Sept 4: Last day to drop
3	Sept 7- 11	chapt 3: conservation of momentum, rocket, center of mass, angular momentum, HW#2 due friday
4	Sept 14-18	chapt 4: kinetic energy, work, potential energy, conservative force, time-dependent potential HW#3 due friday
5	Sept 21-25	chapt 5: simple harmonic oscillator, damped HO, driven HO HW#4 due friday
6	Sept 28- 2	chapt 6: calculus of variation, Euler-Lagrange equation and applications no HW due this week EXAM1: Friday, Oct 2
7	Oct 5- 9	chapt 7: Lagrange equations, with and without constraints, examples HW#5 due friday
8	Oct 12-16	chapt 7: Lagrange equations, generalized coordinates, conservation laws HW#6 due friday
9	Oct 19-23	chapt 13: Hamiltonian mechanics, Hamilton's equation, ignorable coordinates HW#7 due friday
10	Oct 26-30	chapt 8: central force: CM and relative coordinates, 1/r potential, Kepler orbits, change of orbits HW#8 due friday Oct 30: Last day to withdraw
11	Nov 2-6	chapt 14: collision, Rutherford scattering, cross sections no HW due this week EXAM2: Friday, Nov 6
12	Nov 9-13	chapt 9: accelerating frame, rotational frame, Newton II, (Coriolis force, Foucault pendulum) no HW due this week
13	Nov 16-20	chapt 10: rotation about fixed/any axis, inertia tensor, principal axes HW #9 due this TUESDAY
14	Nov 23-	chapt 10: precession of top, Euler angles no HW due this week

	27	Thanksgiving break: Nov 25-27
15	Nov 30-4	chapt 10: spinning top HW #10 due this TUESDAY Dec 6: Last day of instruction
16	Dec 7-11	FINAL: Wednesday, Dec 9, 1-3 pm Good success!!