

PHYS 4319 – Advanced Mechanics

Spring 2019

Instructor(s): Dr. Ramon Lopez

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Office Hours: 11-12, Thursday or by appointment. Email is the best way to communicate with me.

Section Information: PHYS 4319 001

Time and Place of Class Meetings: Science Hall, rm 129, Tuesday/Thursday 9:30 am – 10:50 am

Description of Course Content: We will cover, some basic math and physics (matrix algebra, vector calculus, a review of Newton's Laws), Lagrangian and Hamiltonian dynamics, central forces (particularly gravity) and orbits, linear and nonlinear oscillators, and special relativity (time permitting).

Student Learning Outcomes: Your learning outcomes include an understanding of the theoretical basis of classical mechanics as evidenced by the ability to solve a variety of problems in the area listed above and the ability to describe what fundamental principles are involved in solving these problems.

Required Textbooks and Other Course Materials: Classical Dynamics of Particles and Systems, by Thornton and Marion, 5th Edition

Descriptions of major assignments and examinations:

Homework- Homework will be assigned regularly from the book. You will do better if you work in study groups. Some homework problems will be solved collaboratively in class.

- All homework **MUST** be submitted by email as a single PDF file for the entire assignment.
- You **MUST** use as the email subject: HW# (where # is the number of the homework).
- The Filename **MUST** be in the form: hw#lastname.firstname.pdf

Homework not submitted with this format will not be graded and instead get a zero. Please note that the format is case-sensitive.

Notecards- At the end of each class you are to fill out an index card with a question you have about the class content and turn it in.

Class Structure - This class will be taught as partially "flipped" class. Selected lectures will be on line and class will consist of a mix of lecture and collaborative solving of homework problems. Online lecture will also include "concept questions." When you get to one of these, I will give you a chance to stop the lecture and write your answer in your notebook. I will examine

notebooks in class. Concept questions will also be used during the lecture portions of class. Discussing concept questions and participating in problem-solving constitutes class participation.

Exams – There will be 3 midterm exams and a comprehensive final.

Attendance: Attendance is not required, but if you are going to miss a class, let me know since class participation is part of the grade. Failure to attend class is generally correlated with failing the course as a whole. If for some reason, you will miss an exam, you must let me know as soon as possible and make arrangements to take a make-up exam before the following class when the exam solution is discussed. Failure to do so will result in a zero on the exam.

Grading:

3 midterm Exams – 45% (the lowest exam grade will be dropped)

Homework– 20%

Notecards and class participation – 5%

Final Exam – 30%

Expectations for Out-of-Class Study: Beyond the time required to attend each class meeting, students enrolled in this course should expect to spend at least an additional 8 hours per week of their own time in course-related activities, including reading the textbook, completing assignments, preparing for exams, etc. This class will be taught as a “flipped” class. You are expected to go through the chapters on your own time before class, using the short lectures provided. Please use the following link to sign up and do it ASAP.

<https://www.educrations.com/sr/TKJMJHY>

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://www.uta.edu/aao/fao/>).

Disability Accommodations: UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA)*, *The Americans with Disabilities Amendments Act (ADAAA)*, and *Section 504 of the Rehabilitation Act*. All instructors at UT Arlington are required by law to provide “reasonable accommodations” to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of a **letter certified** by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting: **The Office for Students with Disabilities,**

(OSD) <http://www.uta.edu/disability/> or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.

Counseling and Psychological Services (CAPS) www.uta.edu/caps/ or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

Non-Discrimination Policy: The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos.

Title IX Policy: The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. *For information regarding Title IX, visit www.uta.edu/titleIX or contact Ms. Michelle Willbanks, Title IX Coordinator at (817) 272-4585 or titleix@uta.edu*

Academic Integrity: Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code in their courses by having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University. Additional information is available at <https://www.uta.edu/conduct/>. Faculty are encouraged to discuss plagiarism and share the following library tutorials <http://libguides.uta.edu/copyright/plagiarism> and <http://library.uta.edu/plagiarism/>

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

Campus Carry: Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit <http://www.uta.edu/news/info/campus-carry/>

Student Feedback Survey: At the end of each term, students enrolled in face-to-face and online classes categorized as "lecture," "seminar," or "laboratory" are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback via the SFS database is aggregated with that of other students enrolled in the course. Students' anonymity will be protected to the extent that the law allows. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit <http://www.uta.edu/sfs>.

Final Review Week: for semester-long courses, a period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest usable exit. The exits are located on the same floor as the classroom at the ends of the hallways. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.
(<http://www.uta.edu/police/EvacuationProcedures.pdf>)

Active Shooter: The safety and security of our campus is the responsibility of everyone in our community. Each of us has an obligation to be prepared to appropriately respond to threats to our campus, such as an active aggressor. Please review the information provided by UTA Police regarding the options and strategies we can all use to stay safe during difficult situations.
<https://police.uta.edu/activeshooter>

Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include [tutoring](#), [major-based learning centers](#), developmental education, [advising and mentoring](#), personal counseling, and [federally funded programs](#). For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a

message to resources@uta.edu, or view the information at <http://www.uta.edu/studentsuccess/success-programs/programs/resource-hotline.php>

The **IDEAS Center** (2nd Floor of Central Library) offers **FREE tutoring** to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. Students can drop in, or check the schedule of available peer tutors at www.uta.edu/IDEAS, or call (817) 272-6593.

Course Schedule

Chapter 1 - 1/15, 1/17 rotations, vectors and vector calculus

Chapter 2 - 1/22, 1/24, 1/29 Newtonian mechanics, air resistance, conservation principles

Chapter 10 - 1/31, 2/5 Non-inertial reference frames, pseudoforces, tides, review for Exam 1

Exam 1 - 2/7

Chapter 6 - 2/12, 2/14 Calculus of variations

Chapter 7 - 2/19, 2/21, 2/26, 2/28 Lagrangians and Hamiltonians

Chapter 5 - 3/5, 3/7 - Central forces and gravity, review for Exam 2

Spring Break - 3/12, 3/14

Exam 2 - 3/19

Chapter 8 - 3/21, 3/26 - Central forces, orbits

Chapter 3 - 3/28, 4/2 - Simple harmonic oscillator, phase diagrams

Chapter 4 - 4/4, 4/9 Non-linear oscillations, chaos

Chapter 12 - 4/11 Coupled oscillations

Chapter 13 - 4/16 Mechanical waves

Chapter 14 - 4/18, 4/23 - Special Relativity, review for exam 3

Exam 3 - 4/25

General topics TBD - 4/30

Review for final - 5/2

Final Exam - Thursday, May 9, 11:00-1:30

As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. – Dr. Ramon Lopez

Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911. Non-emergency number 817-272-3381

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