SYLLABUS – PHYSICS 206 - UP: Mechanics Spring 2021

Course Information

Course Number:	PHYS 206 – UP (University Physics)	
Course Title:	Newtonian Mechanics for Engineering and Science	
Sections:	485 – 489 (Lecture A)	579 – 584 (Lecture B)
Lecture Times:	M W F 10:40 – 11:30 am	M W F 1:35 – 2:25 pm
Location:	Online only – Remote, via Zoom	
Credit Hours:	3 SCH	
Zoom meeting IDs:	Online lectures require a TAMU login.	
Lecture A (10:40am):	https://tamu.zoom.us/j/93914189886?pwd=S3AycG5Uajc3Y2h0SGQ2aUR3d2djUT09	
Lecture B (1:35pm):	https://tamu.zoom.us/j/95342623821?pwd=W	VNJaGhYRIIZbHRCbUtzeVFDbjlqZz09

Instructor Information

Name:	Prof. Wayne Saslow
Office:	<u>MPHY</u> 455
Telephone:	(979)845-7717 (Physics Department; no office phone)
E-mail:	wsaslow@tamu.edu (please start Subject line with PHYS206-A or PHYS206-B)
Office Hours:	MWF 12:00 – 1:00pm, M 3 – 4pm and/or by appointment. Office hours will be held
	online using the Zoom meeting ID
	https://tamu.zoom.us/j/97263930063?pwd=S20wdjRVQ29RN1BUS2xkYINCKzZGUT09.
Email questions encou	raged: Be specific. Include screenshots (<1MB, please).

Course Description: This calculus-based introduction to Newtonian mechanics is the first of two semesters of physics. primarily for students in the STEM fields. Students completing the course will know how to: describe motion (kinematics); apply Newton's laws of motion to both static and dynamical problems.

Course Pre-requisite: MATH 151 or 171. You must be able to employ plane geometry, trigonometry, and algebra. As the semester progresses you also must be able to employ simple derivatives and integrals, and vectors (addition, subtraction, dot and cross products). Students who do not remedy any math deficiency should recognize that the likelihood of doing well in this course is small; and I want you to do well.

Learning Outcomes:

Conceptual knowledge to gain:

- Understanding Newton's laws of motion, static and dynamical mechanics, and harmonic motion.
- To think more critically/scientifically, and develop skills needed to solve complex multi-step problems.

Upon successful completion of this course, students will be able to:

- Give a mathematical description of motion in 1, 2, and even 3 dimensions (circular planetary orbits).
- Transform positions, velocities, and accelerations from one coordinate system to a second coordinate system moving at constant velocity relative to the first (Galilean transformations).
- For a given body, identify the forces, their type, and their points of application relative to that body.
- Identify and isolate a body and pictorially represent the direction and location of forces acting on it.
- For objects of various basic shapes, compute the center of mass position and moment of inertia.
- Apply Newton's Laws to quantitatively predict linear and rotational motion.
- Apply conservation laws to quantitatively describe linear and rotational motion.
- Understand the conditions for static equilibrium and quantitatively deduce the forces involved.

Core Course Objectives

At the end of the semester a student is expected to master the following core objectives:

- 1. *Critical Thinking*: the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication.
- 2. *Communication*: to include effective development and interpretation and expression of ideas through written, oral, and visual communication.
- 3. *Empirical and Quantitative Skills*: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions.
- 4. *Teamwork*: to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal.

Textbook and required materials

- Primary textbook: Physics for Scientists and Engineers, by Mosca and Tipler, Vol. 1, 6th edition, published by MacMillan. The TAMU bookstore has a custom package (ISBN: 978-1319334420) for \$80 (your cheapest option) which is a loose-leaf version with access to the eBook and Sapling Learning for one semester. If you buy the textbook elsewhere without access to Sapling Learning, you will need to separately purchase access to Sapling Learning, which you may do through ecampus (described below).
- Homework: All PHYS 206-UP sections use the <u>Sapling Learning</u> system for the online homework. You do <u>not</u> need a course access code; go to <u>eCampus</u>, login with your NetID and password, and click the link on the left menu under "Sapling Learning", which will link to the correct course automatically.
- Clicker: In-class and remote participation and conceptual testing will be made using the <u>iClicker</u> system. We will utilize the iClicker Cloud Reef polling using smartphones or laptops rather than physical clickers, to allow remote students to participate synchronously with the online lectures. To encourage class participation, credit for iClickers will primarily be based on simply responding, whether or not your answer is correct. To get this app, first sign up for Sapling Learning. Then, from the main page of Sapling, use the link to "Purchase iClicker Reef HERE", which will prompt you \$5.99 to pay for a 6-month access. Please direct all technical issues to the iClicker support team at <u>iclicker.com</u>.
- Pre-Lectures: To help prepare you for class, you are required to view the pre-lecture videos on Sapling Learning prior to attending lectures. This is <u>graded</u> and includes <u>graded</u> follow-up "bridge assignments"
 -- short quizzes on the pre-lecture material to verify your basic understanding of the pre-lecture material.

Course Web Pages:

- <u>mechanics.physics.tamu.edu</u> website with information common to all PHYS 206 sections using the 'Physics for Scientists and Engineers' textbook by Mosca and Tipler. In particular, a couple of pages here will be most useful:
 - <u>zoom-info-2021A.php</u> contains all Zoom links, lecture and recitation information specific to you. This is likely not to be complete until after the 1st week of classes, and may not recognize you as a student until after the Add/Drop deadline.
 - **FAQ** a list of some common questions; please check here before writing your instructor with questions as it is quite possibly answered there.
- <u>ecampus.tamu.edu</u> this class site has lecture notes and grades, and permits Sapling Learning sign-up.
- <u>www.saplinglearning.com</u> the online system for homework submission, and access to pre-lectures with follow-up bridge assignments (register through ecampus.tamu.edu).
- <u>freshman.physics.tamu.edu/p218</u> to check your status on achieved learning objectives.

Course Policies

COVID-19 safety precautions: Not applicable, because the course is online only (but see below for the University's COVID-19 response).

Recitations: Information regarding the format and grading of the recitations may be found on the common webpage at https://mechanics.physics.tamu.edu/recitations.shtml. You **must** attend recitation each week. The policy for absences in recitations is the same as for the exams. Even with a valid excused absence, you must first consult with your TA.

Homework: The weekly online homework assignments from <u>Sapling Learning</u> are accessed through eCampus. You are responsible for completing and understanding these problems in preparation for the exams. By the end of the first week you should complete the first homework assignment.

Do the online problems by yourself. Having someone else do the homework for you not only violates the Aggie Honor Code, but prevents you from obtaining essential exam preparation; exams often contain problems very similar to the Homework and the Bridge assignments. Keep up with the weekly deadlines —the <u>Sapling Learning</u> site posts the activity due dates. Late homework submissions **are** accepted, but there is a 10% per day penalty after the deadline. You have 10 attempts to get the correct answer for each question, with a 3% penalty for each incorrect response. The solutions for problem sets become available only after their due date.

Exams: There are 3 midterm exams and one comprehensive exam, all of which occur on specific Fridays beginning at 6:00 pm. The exams are common to all PHYS 206 sections, and they are online multiple-choice exams using eCampus (with a computer) under and proctored via Zoom (with a cellphone or webcam). Exams generally consist of problems similar in content and difficulty to the end-of-chapter homework questions in the textbook. For each exam <u>formula sheets</u> and an online calculator will be provided. Appeal of an exam's grading <u>must</u> be brought to my attention within <u>**1** week</u> of its (online) return to you.

Absences: If you miss an exam due to an <u>authorized excused absence</u>, as outlined in University Regulations, Rule 7 (<u>http://student-rules.tamu.edu/rule07</u>), you must email me (<u>wsaslow@tamu.edu</u>) prior to the exam. If that is not possible, then email me no later than the end of the week of the missed exam. If you miss a noncomprehensive midterm exam due to an excused absence, your final cumulative exam grade will be based on the set of tested learning objectives in the other exams (including the comprehensive exam). A make-up comprehensive exam will be offered <u>only</u> if you miss that exam due to a university-excused absence. Note: Few conditions qualify as authorized excused absences, so avoid missing exams except for an extreme circumstance.

Course Grade

The final letter grade on the course is based upon the final numerical course score as given in the table below:

Course Score	Final Letter Grade
≥ 90 %	А
≥ 80 %	В
≥ 65 %	С
≥ 50 %	D
< 50 %	F

The numerical score (left column) is computed as a weighted average over all the different components of the course, with the weights as specified in the table below. With the exception of the clicker quizzes, the details of all components of the course (*i.e.* the exams, recitations, homework and pre-lectures) are common to all sections of PHYS 206-UP.

Course Component	Fraction of final grade
Exams (three midterms + the comprehensive exam)	80%
Recitations	5%
Online homework	5%
Pre-lectures and bridge assignments	5%
In-class clicker quizzes	5%
Total:	100%

The "Exams" portion includes the three midterm exams as well as the comprehensive exam. Exams are graded in terms of learning objectives. The complete list of learning objectives to be mastered by the end of the semester is posted at <u>mechanics.physics.tamu.edu/los.html</u>.

Each exam tests several different learning objectives and might test the same learning objective multiple times. During the grading we track every case where a learning objective is tested and whether in that case instance the learning objective was passed or failed. Learning objectives will also be tested multiple times across exams. During the semester you may view your status on each learning objective by logging on with your NetID at https://freshman.physics.tamu.edu/p218.

At the end of the semester, achieved learning objectives are defined as those that satisfy either of these criteria:

- were marked as passing ≥60% of their tested occurrences in the comprehensive exam. Thus, if an LO is tested 5 times on the comprehensive, and it is passed 3 times, then the LO is passed.
- were marked as passing ≥60% of their tested occurrences in all exams, including the comprehensive. Thus, if an LO is tested 9 times on all exams, and it is passed 6 times, then the LO is passed.

At the end of the semester, the percentage of passed learning objectives to tested Learning Objectives (LOs) gives the numerical grade under "Exams" in the table above. Thus a student who has passed 43 objectives out of a total of 50 objectives tested has earned 86% of the exams portion of the course grade. In general, student scores after are significantly higher than before, the Comprehensive exam, but do not let that be an excuse to slack off for any of the exams.

Course Topics and Calendar of Activities

All exams will be online at fixed dates; for reference keep them in a convenient place:

- Midterm Exam I: Fri Feb 12, 6:00 8:00 pm, covering Chapters 1 3.
- Midterm Exam II: Fri Mar 12, 6:00 8:00 pm, covering Chapters 4 6.
- Midterm Exam III: Fri Apr 9, 6:00 8:00 pm, covering Chapters 7 10.
- Comprehensive Exam: Fri Apr 23, 6:00 9:00 pm, covering Chapters 1 12.

Weekly homework and prelecture assignments will follow the schedule in Sapling Learning. The weekly schedule of topics, given below, is subject to change depending on the pace of the class.

Week	Lecture Topic
1	Introduction to the course; units
2	Vectors, Pythagoras and Math Review
3	Motion along a straight line (Kinematics, descriptive)
4	Motion in 2 and 3 dimensions (Kinematics, descriptive)
5	Newton's 2 nd law of motion: <i>F=ma</i> . (Dynamics: apply <i>F</i> , get <i>a</i> .)
6	Lots of applications of Newton's laws (Dynamics, predict motion)

Week	Lecture Topic
7	Work, kinetic energy and work-energy theorem (some prediction)
8	Conservative forces, energy and conservation of energy
9	Centre of mass, momentum, its conservation, and collisions
10	Rotation of rigid bodies (kinematics), moment of inertia I
11	Newton's 2^{nd} law for rotation: torque $\tau = l\alpha$, angular momentum
12	Conservation of angular momentum; static equilibrium of bodies
13	Gravitation, satellite motion and Kepler's Laws (3d motion)
14	Contingency and/or review
15	Simple harmonic motion, pendula

Study Hard, Good Luck, and May the Force (and the Torque) Be with You!

University Policies

Academic Integrity Statement and Policy: "An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" (Section 20.1.2.3, Student Rule 20).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at <u>aggiehonor.tamu.edu</u>.

Americans with Disabilities Act (ADA) Policy: Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit <u>disability.tamu.edu</u>. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Title IX and Statement on Limits to Confidentiality: Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see <u>University Rule 08.01.01.M1</u>):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with <u>Counseling and Psychological Services</u> (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's <u>Title IX webpage</u>.

Statement on Mental Health and Wellness: Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.

Campus Safety Measures: To promote public safety and protect students, faculty, and staff during the coronavirus pandemic, Texas A&M University has adopted policies and practices for the Spring 2021 academic term to limit virus transmission. Students must observe the following practices while participating in face-to-face courses and course-related activities (office hours, help sessions, transitioning to and between classes, study spaces, academic services, etc.):

- Self-monitoring—Students should follow CDC recommendations for self-monitoring. Students who have a fever or exhibit symptoms of COVID-19 should participate in class remotely if that option is available, and should not participate in face-to-face instruction.
- Face Coverings—<u>Face coverings</u> (cloth face covering, surgical mask, etc.) must be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is difficult to reliably maintain. Description of face coverings and additional guidance are provided in the <u>Face Covering policy</u> and <u>Frequently Asked Questions (FAQ)</u> available on the <u>Provost website</u>.
- Physical Distancing—Physical distancing must be maintained between students, instructors, and others in course and course-related activities.
- Classroom Ingress/Egress—Students must follow marked pathways for entering and exiting classrooms and other teaching spaces. Leave classrooms promptly after course activities have concluded. Do not congregate in hallways and maintain 6-foot physical distancing when waiting to enter classrooms and other instructional spaces.
- To attend a face-to-face class, students must properly wear an approved face covering If a student refuses to wear a face covering, the instructor should ask the student to leave and join the class remotely. If the student does not leave the class, the faculty member should report that student to the <u>Student Conduct office</u> for sanctions. Additionally, the faculty member may choose to teach that day's class remotely for all students, or dismiss the class in the case of a traditional face to face lecture.

Personal Illness and Quarantine: Students required to quarantine must participate in courses and course-related activities remotely, if that option is available, and **must not attend face-to-face course activities**. Students should notify their instructors of the quarantine requirement. Students under quarantine are expected to participate in courses and complete graded work unless they have symptoms that are too severe to participate in course activities.

Students experiencing personal injury or Illness that is too severe for the student to attend class qualify for an excused absence (See <u>Student Rule 7, Section 7.2.2</u>.) To receive an excused absence, students must comply with the documentation and notification guidelines outlined in Student Rule 7.