SM-2123: Engineering Physics I Syllabus
Dr. German Colón - Spring 2023

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Office Hours: MWF 2:00-2:50p; or by appointment
Course Website: Accessed via Blackboard

Prerequisites: SM-1212 – Calculus I; **Corequisites**: SM-2113 – Calculus II

Course Description: An introduction to the fundamental principles of physics with an emphasis in rigid-body mechanics. This course focusses on the classical theory of motion as understood using Newton's laws and the conservation principles of energy and momentum. These laws and principles describe the motion of both everyday objects and celestial bodies.

Course Materials:
1. [Recommended, not required] **Textbook:** *Physics for Scientists and Engineers*, Volume 1, 5th edition, by Randall D. Knight, Pearson.
2. [**Required**] **Mastering Physics**, an online homework system. An access code comes bundled with a new textbook in the bookstore; or you may purchase through the publisher's website (see instructions on page 4).
3. [**Required**] **iClicker Response System**. You may use iclicker+, iclicker2 or iclicker Gen1. You may purchase or rent it.

Learning Outcomes: At the end of this course each student should be able to:
1. Perform appropriate dimensional and unit analysis.
2. Perform vector analysis in one and two dimensions.
3. Apply the concepts of kinematics to various problems where acceleration is constant.
4. Apply Newton's Law of motion to analyze and solve various problems involving acceleration, gravitation, and friction in one and two dimensions.
5. Analyze the relationship between work, energy, and power.
6. Use knowledge of momentum and impulse to analyze and solve problems in one and two dimensions.
7. Use knowledge of uniform circular motion to analyze and solve various rotational problems.
8. Use knowledge of force, torque, and equilibrium to solve various problems.
9. Demonstrate a sufficient understanding of the required mathematics (including differential and integral calculus) that allows solutions to various problems to be obtained.

10. Demonstrate an understanding of the applicable physics by assessing the accuracy and correctness of all results.
11. Verify the theoretical ideas and concepts covered in lecture by completing a host of experiments.
12. Apply the scientific method to experiments performed in the laboratory.
13. Develop procedural and observational skills as experimental data is taken.
14. Apply analytical techniques and graphical analysis to data taken during an experiment.

Grading: The expected breakdown of your grade will be as follows:

Laboratory		15%
Online Homework	up to	12%*
Supplemental Activities		16%
Partial Exams	at least	37%*
Final Exam		20%
Total		100%

*__Note__: Discrepancies wherein the average homework grade is substantially better than the average partial exams grade, by an amount greater than 25 points, may result in a reduced homework percentage and a corresponding higher exam percentage. The reweighting is as follows: For any residual beyond 25 points, the homework percentage will be reduced by an amount δ = residual * 0.5%.

Students often ask for their "average" grade during the semester but this term is misleading because different components have different weights (e.g. scoring 60% on one exam earns you more points than scoring 100% on a quiz). Instead, students should consider their *weighted average*, named *accumulated score* in this class, which is the number of points earned out of their goal of 100 points at the end of the semester.

Final letter grades will be determined using the following guideline:

A:	93.10 – 100.0%	**C**:	73.10 – 76.99%
A-:	90.00 – 93.09%	**C-**:	70.00 – 73.09%
B+:	87.00 – 89.99%	**D+**:	68.51 – 69.99%
B:	83.10 – 86.99%	**D**:	66.51 – 68.50%
B-:	80.00 – 83.09%	**D-**:	65.00 – 66.50%
C+:	77.00 – 79.99%	**F**:	< 65.00%

The final grade, before any of the penalties described below, is calculated as:

$$\text{FinalGrade} = 0.15*\text{LabGrade} + 0.16*\text{SupplementalActivities} + [0.12 - \delta]*\text{Homework} + [0.37 + \delta]*\text{PartialExams} + 0.20*\text{FinalExam}.$$

Course Components
Blackboard will be our main hub to access many components of the course. There will be content areas dedicated to the posting of: announcements and reminders, lecture slides, lesson videos, handouts and worksheets, and assessments.

Lesson Delivery and Attendance: Lessons will be delivered in-person. Attendance is mandatory and will be taken at the beginning of each class. It is your responsibility to be on time and participate in every class. Excused absences must be supported by appropriate documentation. All unexcused absences will result in a decrease in your final grade by 1%.

Lectures: During lectures we will discuss the main ideas of the material listed in the schedule. Observe the non-traditional ordering of the topics. To fully understand the material, it is necessary to read each specified section and/or to watch the posted videos.

Classroom Etiquette: Students are expected to be respectful of others and to practice common courtesy. These behaviors enhance your ability to learn in this class, and to avoid distractions and disruptions to others.

Use of Electronic Devices:

1. The use of cell phones, smart phones, smart watches, or other mobile communication devices is disruptive and disrespectful. Therefore, these devices must be **turned off** and **stowed away**. Violations will affect your *Participation and Engagement* grade (described on page 5).
2. The use of laptops or tablets for note-taking is strongly discouraged. They are not suitable for this course. They may be used for approved activities only. If you choose to use your laptop/tablet during class, please sit in one of the designated areas of the lecture room (e.g. first row).

Laboratory: ALL students are required to participate in the laboratory, even if they are repeating the course.

Note: Failure in the lab component of the course automatically triggers FAILURE of the course!

Homework: To asses understanding and exam preparedness, there will be daily homework assignments. They will be posted in *Mastering Physics* at least one week prior to the due date. Typically, homework assignments will be due at 11:59p on lecture days, with a few exceptions (see the schedule).

You will be given ten (10) chances to answer most questions without penalty (not applicable to multiple choice questions). Many questions have hints; using a hint will not reduce your score. Late homework will be accepted with a penalty of 25% of the total points for each day the assignment is late, including weekends (but will not exceed 90%).

Only the late questions within an assignment are penalized. Accruing a total of 135 points will earn you 100% on your final homework grade.

Students are strongly discouraged from using online platforms like Chegg or Google to assist them in the completion of the assignments.

Failure to complete at least 30% of the homework assignments will result in failure of the course.

Homework Notebooks: While homework is submitted online, students are encouraged to work out the problems in a notebook or loose-leaf binder. This is good practice on presenting proper physics solutions (see Policy on Problem Solving).

***Mastering Physics*:** Homework will be assigned daily online through the *Mastering Physics* website. *Mastering Physics* provides instant feedback on most problems; it also provides hints for some problems to point you in the correct direction.

To get started you will need: (1) an email account, (2) a Course ID, and (3) an Access Code or a credit card.

Join the course by following these directions:

1. Go to https://mlm.pearson.com/enrollment/colon17255
2. Sign in with your Pearson student account or create your account.
3. Select any available access option, if asked.
   - Enter a prepaid access code that came with your textbook or from the bookstore.
   - Buy instant access using a credit card or PayPal.
   - Select **Get temporary access** without payment for 14 days.
4. Select **Go to my course**.
5. Select **2023SP, Engineering Physics I, SM-2123** from My Courses.

That's it! You should see the Course Home page for the course.
If you contact Pearson Support, give them the course ID: colon17255.

Consider completing the *Introduction to Mastering Physics* and *Physics Primer* assignments (not for credit) as soon as possible so that you can familiarize yourself with the system before the first for-credit assignment.

Note: Failure to sign in to *Mastering Physics* will result in FAILURE of the course.

Supplemental Activities: Several other types of activities will contribute to your grade including Pre-Lecture/videos questions, iclicker questions, quizzes, worksheets, and supplemental problems. All students are expected to participate and complete these exercises.

Pre-Lectures and Panopto Questions (3/16): To assess readiness for class, most lessons include pre-lecture assignments based on the reading or the Panopto video(s) assigned for the day (see the schedule). Pre-Lectures will be accessed via Blackboard. They will be due at 9:59a (i.e. before class); late pre-lectures will not be accepted. Blackboard questions will be graded on correctness; embedded video questions will be graded on completion. Accruing a total of 25 points will earn you 100% on your final pre-lecture grade.

ic*licker Questions (5/16)*: Frequently (almost daily) I will ask iclicker questions in class. These items will be graded on completion or correctness, depending on the question. These activities cannot be made up. Make sure to bring your iclicker to every lesson.

Class Participation and Engagement (2/16): This component assesses your class participation and engagement beyond iclicker submissions. Factors that have a positive impact include asking questions, offering responses and participating in discussions; while those that affect negatively include the use of unapproved electronic devices (see Classroom Etiquette) and other distractions.

Quizzes/Supplemental Problems (6/16): These activities may be administered as either in-class or take-home assessments. They will be graded on completion or correctness, depending upon the activity. Some in-class activities cannot be made up.

Review the Policy on Academic Integrity regarding non-tolerated actions.

Partial Exams: There will be four fifty-minute cumulative partial exams. Efforts will be made to administer these exams in-person during class time.

The exams will include material covered in lectures, assigned readings, labs and supplemental problems. The partial exams comprise (at least) 37% of your final grade. Exams will be weighted by score: your highest scoring exam will be worth a greater percentage (e.g. 7%, 9%, 9%, 12%). Exam grades are **not** scaled.

You will be allowed to bring a note card to exams and a calculator. The note card should be no larger than 8" x 5" and it may only contain formulas and definitions; worked-out examples, or results derived from them, are **not allowed**. You will submit your note card along with your exam.

It is imperative that you check the exam schedule so that you do not miss any of the scheduled exams. In general, there will be **no** make-up exams. Exceptions to this rule

will be considered on a case-by-case basis, and immediate communication is required. While appropriate documentation justifying your absence is required for a make-up exam, it does not guarantee it.

Review the Policy on Academic Integrity regarding non-tolerated actions. Violations will result in stricter examination policies.

Final Exam: There will be one final cumulative exam during finals week. A grade of at least 40% in the final is necessary to **pass the class**. The final exam assesses retention of the material.

Review the Policy on Academic Integrity regarding non-tolerated actions.

Policy on Problem Solving and Grading: An important distinction is made between the terms "solution" of and "answer" to a problem. The **solution** refers to the set of steps that describe the way, process or strategy utilized to achieve an outcome. The **answer** is generally the last step in the solution; it shows a final expression or numerical value.

In most *Mastering Physics* homework questions, only the answer is requested. However, in all submitted work (e.g. exams, quizzes, worksheets) it is the **solution** what is graded. The (final) answer is only worth about 10-15% of the problem.

Students often argue that they are penalized for not following the instructor's method. This view is generally incorrect, based on confusing answer with solution. To earn full credit in a problem, the solution must be complete, clear, and with correct physics grammar. It is possible to get a 'correct' answer by chance or with flawed physics/mathematics.

Simply stated, a correct (final) answer with missing or unclear steps earn little to no credit; while an incorrect answer with proper solution may earn most credit.

Policy on Academic Integrity: Adherence to the Honor Code is expected. Cheating, plagiarism or any other type of academic dishonesty will not be tolerated. In all assessments, especially exams and quizzes, you may not share your problems, solutions, thoughts, ideas or any comment with another student or post them on any online/offline platform. You may not use textbooks, answer keys or any online sources such as Google, Chegg, or similar sites, to search for the solutions. These actions are considered violations of Academic Integrity.

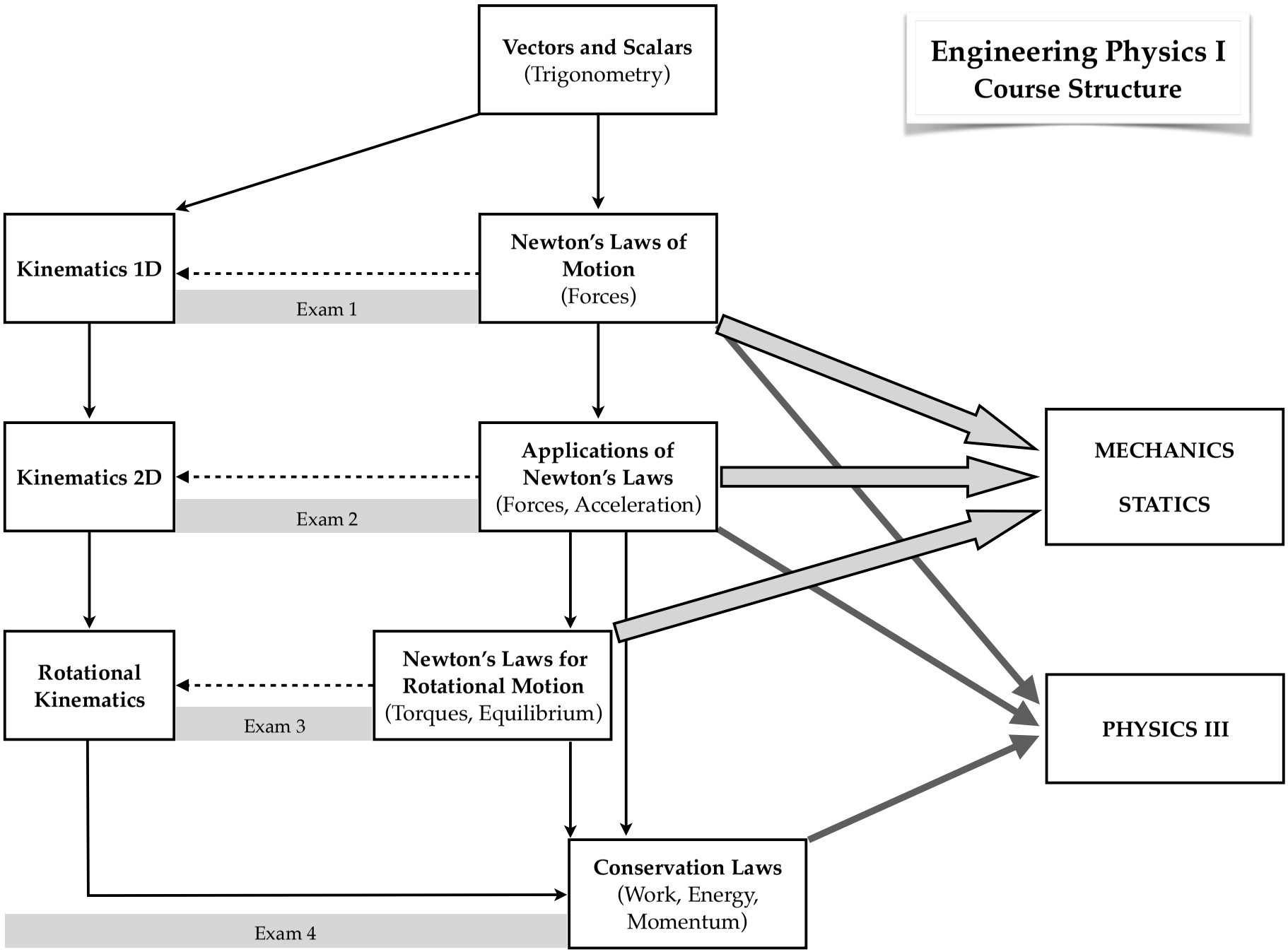
Any evidence of academic misconduct will result in a score of zero for that assessment. Depending on the severity of the infraction, it may result in failure of the course and the incident to be reported to the Dean. Academic dishonesty will prevent you from mastering the course content. Being forthright in your academic endeavors will prepare you for life as a professional in your field.

Policy on Diversity and Inclusion: It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups.

Disability Compliance: If you have a documented disability and feel you may need accommodations in this course, please contact the ADA Compliance Coordinator, Dr. Elaine Craghead (ADAcompliance@maritime.edu or x5120), within the first week of classes for the appropriate paperwork.

Other Notes and Expectations:

- Physics is a subject that requires students to be active learners. As a result, all students must take notes during class and actively participate in problem solving.
- Some students believe that for an introductory class of this nature, their previous knowledge of physics and mathematical skills will be sufficient to get them through the class without much work. While this may be true, it is uncommon. If you are not putting a concerted effort into reading the textbook, completing the homework problems, and understanding the material, your grades will demonstrate that lack of effort.
- A skeletal outline of my lecture slides (with information intentionally left out) are generally posted on Blackboard at least a day before class. They should complement but not substitute taking notes in class.
- Students often complain that they do not see enough example calculations in class. While it is important to see examples, you will learn more from actually working through example problems yourself than by watching someone solve problems.
- Please email me a picture related to forces by the second Friday of the semester, to show that you have read the syllabus. This will be worth five points on your next quiz.
- Tutoring is available by faculty and students at the Academic Resource Center (ARC); make sure you take advantage of this.
- While this is a general outline of this course, I reserve the right to make any changes to the syllabus as I see fit. An up-to-date version of the syllabus will be posted on Blackboard.
- The graphic syllabus on the next page illustrates the course structure, how the topics are interconnected and for which courses they will be relevant. Make sure to address points of confusion early on by attending or scheduling office hours.


Engineering Physics I
Course Structure
Vectors and Scalars
(Trigonometry)
Kinematics 1D
Newton's Laws of Motion
(Forces)
Exam 1
Kinematics 2D
Applications of Newton's Laws
(Forces, Acceleration)
Exam 2
MECHANICS
STATICS
Rotational Kinematics
Newton's Laws for Rotational Motion
(Torques, Equilibrium)
Exam 3
PHYSICS III
Conservation Laws
(Work, Energy, Momentum)
Exam 4

Engineering Physics I - Spring 2023 - Dr. Colón

Lec	Day	Date	Material Covered	Reading Assignments	Pre-Lecture Due	Homework Due
1	W	1-Mar	Course Introduction	Syllabus		Intro MP Due at 11:59 pm
2	F	3-Mar	Trig Review; Vectors: Addition	Appendix A-2, Ch 3.1-3.2	PL #02 Due at 9:59 am	Primer Due at 11:59 pm
3	M	6-Mar	Vectors: Components	Ch 3.2-3.4, 1.3	PL #03 Due at 9:59 am	HW #03 Due at 11:59 pm
4	W	8-Mar	Introduction to Forces	Ch 5.1-5.3	PL #04 Due at 9:59 am	HW #04 Due at 11:59 pm
5	F	10-Mar	Newton's 1st Law: Inertia, Free-Body Diagrams	Ch 5.6-5.7, 6.1	PL #05 Due at 9:59 am	HW #05 Due at 11:59 pm
6	M	13-Mar	Newton's 1st Law: (Translational) Equilibrium	Ch 5.7, 6.1	PL #06 Due at 9:59 am	HW #06 Due at 11:59 pm
7	W	15-Mar	Motion, Kinematic Variables	Ch 1.1-1.6	PL #07 Due at 9:59 am	HW #07 Due at 11:59 pm
8	F	17-Mar	Instantaneous Values, Constant Acceleration	Ch 2.1-2.4	PL #08 Due at 9:59 am	HW #08 Due at 11:59 pm
9	M	20-Mar	Units and Dimensional Analysis	Ch 1.8	PL #09 Due at 9:59 am	HW #09 Due at 11:59 pm
10	W	22-Mar	Constant Acceleration: Free-Fall	Ch 2.5-2.7	PL #10 Due at 9:59 am	HW #10 Due at 11:59 pm
11	F	24-Mar	Newton's 2nd Law	Ch 5.4, 5.5, 6.2	PL #11 Due at 9:59 am	HW #11 Due at 11:59 pm
12	M	27-Mar	Dynamics: Mass, Weight, Weightlessness	Ch 6.3	PL #12 Due at 9:59 am	HW #12 Due at 11:59 pm
E 1	W	29-Mar	***Exam #1: Chapters 5, 6.1, 6.2, 1-3***			
13	F	31-Mar	Newton's 3rd Law: Interactions, Action/Reaction	Ch 7.1-7.3	PL #13 Due at 9:59 am	HW #13 Due at 11:59 pm
14	M	3-Apr	Newton's 2nd & 3rd Laws: Defining Your System	Ch 7.4-7.5, 6.6	PL #14 Due at 9:59 am	HW #14 Due at 11:59 pm
15	W	5-Apr	Dynamics: Friction	Ch 6.4-6.5	PL #15 Due at 9:59 am	HW #15 Due at 11:59 pm
16	F	7-Apr	Motion in 2D: Projectiles	Ch 4.1-4.2	PL #16 Due at 9:59 am	HW #16 Due at 11:59 pm
17	M	10-Apr	Motion in 2D: Projectiles	Ch 4.1-4.2	PL #17 Due at 9:59 am	HW #17 Due at 11:59 pm
18	W	12-Apr	Motion in 2D: Circular Motion (Relative Mot. Optional)	Ch 4.3-4.5	PL #18 Due at 9:59 am	HW #18 Due at 11:59 pm
	F	14-Apr	**No Class - Spring Pause**			
	M	17-Apr	**No Class - Patriots' Day**			
19	W	19-Apr	Dynamics: Circular Motion, UCM, Misc. Problems	Ch 8.1-8.4	PL #19 Due at 9:59 am	HW #19 Due at 11:59 pm
20	F	21-Apr	Vector (Cross) Product, Torque	Ch 12.10, 12.5	PL #20 Due at 9:59 am	HW #20 Due at 11:59 pm
E 2	M	24-Apr	***Exam #2: Chapters 4, 6-8***			
21	W	26-Apr	Torque, Rotational Equilibrium, Center of Mass	Ch 12.2, 12.5	PL #21 Due at 9:59 am	HW #21 Due at 11:59 pm
22	F	28-Apr	Static Equilibrium	Ch 12.8	PL #22 Due at 9:59 am	HW #22 Due at 11:59 pm
23	M	1-May	Static Equilibrium	Ch 12.8	PL #23 Due at 9:59 am	HW #23 Due at 11:59 pm
24	W	3-May	Rotations and Angular Kinematics	Ch 4.5-4.6, 12.1	PL #24 Due at 9:59 am	HW #24 Due at 11:59 pm
25	F	5-May	Angular Kinematics and Rotational Dynamics	Ch 12.4-12.7	PL #25 Due at 9:59 am	HW #25 Due at 11:59 pm
26	M	8-May	Rotational Dynamics	Ch 12.4-12.7	PL #26 Due at 9:59 am	HW #26 Due at 11:59 pm
27	W	10-May	Intro to Work and Energy, Dot Product	Ch 9.2-9.3	PL #27 Due at 9:59 am	HW #27 Due at 11:59 pm
E 3	F	12-May	***Exam #3: Chapters 12, 4.5-4.6***			

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Lec	Day	Date	Material Covered	Reading Assignments	Pre-Lecture Due	Homework Due
28	M	15-May	Work-Kinetic Energy Theorem	Ch 9.1-9.5	PL #28 Due at 9:59 am	HW #28 Due at 11:59 pm
29	W	17-May	Potential Energy, Gravitational Potential Energy	Ch 10.1-10.3	PL #29 Due at 9:59 am	HW #29 Due at 11:59 pm
30	F	19-May	Conservation of Energy	Ch 10.4-10.7	PL #30 Due at 9:59 am	HW #30 Due at 11:59 pm
31	M	22-May	Impulse and Momentum	Ch 11.1-11.2	PL #31 Due at 9:59 am	HW #31 Due at 11:59 pm
35*	W	24-May	Power (Early Dismissal - Change of Command)			
32	F	26-May	Conservation of Momentum, Collisions	Ch 11.2-11.5	PL #32 Due at 9:59 am	HW #32 Due at 11:59 pm
	M	29-May	**No Class - Memorial Day**			
33	T	30-May	Misc. Problems with Energy, Momentum (Monday Sch.)	Ch 12.11	PL #33 Due at 9:59 am	HW #33 Due at 11:59 pm
34	W	31-May	Angular Momentum	Ch 9-11	PL #34 Due at 9:59 am	HW #34 Due at 11:59 pm
E 4	F	2-Jun	***Exam #4, Chapters 9-11***			HW #36 Due at 11:59 pm
36	M	5-Jun	Review			HW #35 Due at 11:59 pm

- Assignments are numbered by the lecture day. The first pre-lecture is PL #02, due on lecture day #02 (there is no PL #01); while the first for-credit homework is HW #03, because it is due on lecture day #03.
- Pre-lecture assignments include material relevant to their assigned lecture day. For example, PL #04 comprises questions about Forces in Ch. 5, which is planned for day #04.
- Homework assignments generally include material covered up to the previous lesson and none from the due date. For example, HW #05 includes material covered up to lecture day #04.