Physics 131/(02/03) – Physics I: Mechanics
Course Description & Syllabus– Spring 2018

Instructor: Sheehan H Ahmed
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Course Website: We will use Moodle – http://moodle.lafayette.edu. "PHYS 131.02(04)-Spring 2018 Mechanics" should be in your list of current courses. The syllabus, interesting links, etc., can all be accessed from this site. Announcements about class or homework logistics will be emailed to you through Moodle so make sure you are receiving emails from it.

Course Location and Times:

Class: Hugel Science Center 100
Monday, Wednesday, Friday; 9:00 - 9:50 AM **(Section 02)**
Monday, Wednesday, Friday; 1:10 - 2:00 PM **(Section 04)**

Office Hours:
Tuesday: 10:00 – 12:00 PM
Wednesday: 10:00 - 12:00 PM

If you cannot make it to office hours email me to set up a meeting. Please walk in with smaller questions whenever I am in my office. My door is usually closed due to mechanical difficulties so feel free to knock.

Classes on Snow Days, Kaiju Attacks and Other Emergencies: If I am unable to make it to class/class is cancelled or changed, I will send an email message via Moodle.

Description: This course is a rigorous introduction to the study of physics for science and engineering majors; a foundation on which an understanding of physics, physical chemistry, or engineering can be built. Kinematics and dynamics will be studied with an emphasis on conservation laws for linear momentum, angular momentum, and energy

Goals: This course will enable you to understand, identify and apply the fundamental principles of classical mechanics to a wide variety of situations, from solving simple end-of-chapter problems to understanding how the world around you works. It will emphasize both qualitative reasoning and quantitative problem-solving. A secondary goal is to introduce the student to the process of doing physics, *i.e.,* developing and testing models, solving problems and communicating results in a clear and coherent way. Many of the skills developed in this course are readily transferable to any field of study requiring logical, critical thinking.

Student Learning Outcomes:

- Students will be able to apply the laws of mechanics, dynamics and kinematics to a wide variety of situations, including those encountered in everyday life.
- Will see the mathematical interconnectedness of various topics such as circular motion, simple harmonic motion and wave motion.
- Will be able to identify and/or formulate a testable scientific hypothesis

- Will be able to generate and evaluate evidence necessary to test and/or revise a hypothesis
- Will understand how scientific uncertainty informs the evaluation of scientific hypotheses
- Will acquire or sharpen the mathematical skills necessary to describe physical phenomena.
- Will sharpen critical thinking skills and continue developing their analytical skills as they analyze ever more complicated physical systems.
- Will acquire an impressive array of problem-solving tools and cultivate a mindset of rational exploration
- Will appreciate the foundational nature of Physics and its relationship to other related disciplines as well as its connection with the solution of real-world problems.
- Will learn general problem solving skills including representing problems using simple physical models, reformulating problems into diagrammatic forms and identifying intuitive solution routes rather than brute force methods.

Text book: Young and Freedman, ***University Physics with Modern Physics, 14th edition***. It is a great reference book and has almost everything you might want to know if you look hard enough. If you did not purchase Mastering Physics with the text, you can buy it online at http://www.MasteringPhysics.com/. You can also use the 12th or 13th editions if need be, however remember that if you do so you will need to purchase Mastering Physics separately to do the online homework. Going to the Mastering Physics website and signing up for the course name (as listed in the Homework Problems section below) will give you the option to purchase the just the online homework package.

Physics 131 - Laboratory Manual is available in the bookstore.

Grade breakdown

Homework:	25%
Tests 10% each x 3:	30%
Lab:	25%
Final exam	20%

Homework Problems: Homework problems will be a combination of **online Mastering Physics problems** and **one or two written problems**. Your lowest homework grade will be dropped at the end of the semester. All assignments and other relevant course information will be available on Moodle. **Note:** The **Mastering Physics course site name** is – **AHMEDPHY13102** (9:00 am section) or **AHMEDPHY13104** (1:10 pm section) depending on your section. **Online homework for the week will usually be due the following week's Wednesday morning before class while the written one will be due in class Wednesday.**

Online homework will go up Wednesday late afternoon and the corresponding written part will go up on Moodle at the same time. Homework is a significant part of your grade so please make sure you do them.

Tests: There will be three hour-long in-class tests on the dates marked on the syllabus. There will also be a cumulative final.

Attendance: Make sure to attend class regularly and participate in class discussions. Asking questions during class is highly encouraged, not just for your own benefit but for the benefit of your classmates. Looking over/skimming the relevant chapters from the book *before* the class lecture is highly advised. Foreknowledge of where things are going aids greatly in understanding the material.

Supplemental Instruction (details of SI sessions will be discussed in class):
SI Leaders
Joaquin Font (fontj@lafayette.edu)
Sam Miller-Brown (millersl@lafayette.edu)
Keith Vreeland (vreelank@lafayette.edu)

Ethos for grading written material: What I am looking for is your understanding of the material. If you show me your steps and thought processes clearly, and assuming those are correct, you will get most of the points. The actual final answer has minimal impact.

Academic Honesty: Discussing homework and collaborating with others is encouraged but make sure that the work you hand in is yours. Discussing concepts with others is always a great way to gain new perspectives but you must also truthfully demonstrate your own abilities. Cheating and other forms of academic dishonesty hurts no one but you in the long run.

Laboratory: You are responsible for completing all the assigned experiments at the scheduled times. If you can't make it to your scheduled lab, please try to attend another lab session and email your lab instructor about the change (this is a last resort solution, please attend your own lab at all times). You can't count on the equipment being available outside of the scheduled lab times.

Diversity, Inclusion and Equity Statement: Students should view this classroom as an inclusive space and safe haven for the free exchange of ideas. As your instructor one of my primary goals is to assure that the background, perspective and beliefs of each student are respected and appreciated regardless of race, ethnicity, gender, social class, sexual orientation, religion, political affiliation, ability level or learning style. Accordingly, I am committed to creating an atmosphere conducive to learning that respects diversity and inclusion and further promotes equity by removing educational barriers. As we work together to build this community of scholars, consider the following actionable points:

- Be open to the views of others.
- Feel free to share your own unique experiences.
- Honor and be enriched by the uniqueness of your classmates.
- View your classmates as respected resources of information and knowledge.
- Appreciate the opportunity to learn from classmates who may possess skill sets that complement your own.

Meeting Federal Credit Hour Standards: The student work in this course is in full compliance with the federal definition of a four-credit hour course.

Moodle & Privacy: Moodle contains student information that is protected by the Family Educational Right to Privacy Act (FERPA). Disclosure to unauthorized parties violates federal privacy laws. Courses using Moodle will make student information visible to other students in this class. Please remember that this information is protected by these federal privacy laws and must not be shared with anyone outside the class. Questions can be referred to the Registrar's Office.

Physics 131/02(04) Lecture Schedule Spring 2018

Date	Topics Discussed	Chapter: Section	Problem Set
Jan. 22	Introduction	Ch. 1:1-6	
Jan. 24	1D Kinematics & Vectors	Ch. 1:7-8	HW #1
Jan. 26	Vector Manipulations in 2D/3D	Ch. 1:9-10	
Jan. 29	Key Motional Vectors	Ch. 2:1-3	
Jan. 31	Constant Acceleration in 1D	Ch. 2:4	HW #2
Feb. 02	Free Fall Motion & Integration	Ch. 2:5-6	
Feb. 05	Acceleration in 2D	Ch. 3:1-2	
Feb. 07	Projectile Motion	Ch. 3:3-4	HW #3
Feb. 09	Circular and Relative Motion	Ch. 3:5-6	
Feb. 12	Newton's Laws of Motion	Ch. 4:1-5	
Feb. 14	Free-Body Diagrams	Ch. 4:6	HW #4
Feb. 16	Newton's Laws with Friction	Ch. 5:1-3	
Feb. 19	Dynamics of Circular Motion	Ch. 5:4	
Feb. 21	Problem solving session	-	
Feb. 23	**Exam I**	Chapters (1-4)	
Feb. 26	Work and Kinetic Energy	Ch. 6:1-2	
Feb. 28	Work - Energy Theorem & Power	Ch. 6:3-4	HW #5
March 02	Calculating Potential Energy & Work	Ch. 7:1-2	
March 05	Conservative/Non-conservative Forces	Ch. 7:3-4	
March 07	Law of Conservation of Energy	Ch. 7:4-5	HW #6
March 09	Conservation of Momentum	Ch. 8:1-2	
March 12	**Spring Break**		
March 14	**Spring Break**		
March 16	**Spring Break**		
March 19	Collisions in 1D & 2D	Ch. 8:3 -4	
March 21	Collisions in 2D & Center of mass	Ch. 8:4-5	HW #7
March 23	Rotational Kinematics	Ch. 9:1-3	
March 26	Moment of Inertia and Energy	Ch. 9:4-6	
March 28	Problem solving session	-	
March 30	**Exam II**	Chapters (5-8)	
April 02	Torque	Ch. 10:1-2	
April 04	Rolling Motion & Angular Momentum	Ch. 10:3-5	HW #8
April 06	Conservation of Angular Momentum	Ch. 10:6	
April 09	Newton's Law of Gravity	Ch. 13:1-3	
April 11	Orbits/Energy/Angular Momentum	Ch. 13:4-6	HW #9
April 13	Simple Harmonic Motion	Ch. 14:1-3	
April 16	Energy Approach/Applications	Ch. 14:4-6	
April 18	Mechanical Waves (Types)	Ch. 15:1-2	HW # 10
April 20	Wave Functions and Equation	Ch. 15:3-4	
April 23	Energy/Power/Intensity	Ch. 15:5	
April 25	Problem solving session	-	HW # 10
April 27	**Exam III**	Chapters (9-10, 13-14)	
April 30	Interference and Superposition	Ch. 15:6-7	
May 02	Standing Waves and Normal Modes	Ch. 15:7-8	HW #11
May 04	Final Review	-	
	Final Exam (Scheduled by Registrar)	Cumulative	