PHYS 221: Elements of Physics I – Fall 2020

Instructor Information:

Instructor: Dr. Nau Raj Pokhrel, Department of Physics & Astronomy

Office: 611 Nielsen Physics Building

Email: npokhrel@utk.edu or, via the Canvas message system

Class: Synchronous Lecture via Zoom

Class Time: Monday, Wednesday and Friday, 3:30 – 4:20 PM

Office Hours: Wednesday from 1 pm to 2:30 pm (or by email appointment)

Communication: The majority of classroom communication will be conducted via the Zoom and Canvas site for this class. To ensure prompt response from me, follow the email policy:

- Please put "**PHYS 221**" in the subject line of all course related emails. This practice will help me identify course related emails and respond promptly.
- You can expect up to a 24-hour delay in responding to emails; I will try to minimize such delays, but do not email me on the evening an assignment is due or before an exam expecting an immediate response.
- Before emailing me with questions about the course, please ensure that the information is not already provided in the course syllabus or on Canvas.

Course Description & Goals:

Course Overview: Physics 221 is a 4 credit-hour introductory physics course with laboratory. This course covers the introduction to Mechanics, Heat and Thermodynamics. The goal is to make you familiar with basic physical principles and applications required in pre-medical, pre-pharmacy and pre-veterinary programs, and give you the skills needed to work with these concepts to solve problems.

Pre/corequisites: The course and text assume you have the background of mathematics. The prerequisite(s) of the course are MATH 125 or MATH 130 or MATH 131 or MATH 132 or MATH 141 or MATH 151 or MATH 152. Any calculus course is also an appropriate prerequisite.

Resources(s): You will need the following materials for the course:

1. Pearson OpenStax Tutor, College Physics
   This is an online textbook with spaced practice problems and feedback. You can access this textbook for this class on Canvas under Modules. The College Physics textbook by itself can be found at this Link: (OpenStax College Physics) and can also be downloaded as a PDF.

2. Contemporary Introductory Physics Experiments, 2nd Edition by James E. Parks, Hayden-McNeil Publishing, ISBN 978-0-7380-6168-9. **You are required to purchase a current edition of the Laboratory manual. Please wait to hear from your TA for the details about the book and other lab resources.**

Course Format:

- We will cover chapter 1 through 17 of the textbook. We will build heavily on concepts presented in your previous physics courses. The course consists of two 50 minutes lecture hours/week, which does not leave enough time to cover every aspect of each chapter in detail. We will, therefore, proceed using a mix of traditional lecturing, and problem-solving demonstrations/active-learning exercises.
- *For this approach to succeed, you have to come to meeting prepared*. I strongly encourage you to read the chapter content at least a day before the class where it will be discussed. That way, you will have an opportunity to email me questions you might like to have addressed during the meeting.

Class Schedule: The following is a class schedule along with lecture topics, assignments etc. This is a tentative schedule, and might differ as our class speed. We will discuss in the class if there are any changes, and notices made in the classes/announcements supersede the schedule.

Fall 2020 Class Schedule (P 221, MWF)

First day of the Class August 19, Wednesday

Day	Week	Chapters 1-17	Topics	HW
19-Aug	1	Chapter 0/1	Introduction	HW 1
21-Aug		Chapter 1	Introduction (Physical quantities & Units, Significant figures & approximation)	
24-Aug	2	Chapter 2	Kinematics (vectors & scalars, displacement, speed, velocity & acceleration)	HW 2
26-Aug		Chapter 2	Kinematics (Equations of motion Problems)	
28-Aug		Chapter 2	Kinematics (Falling objects, graphical analysis of 1-D motion)	
31-Aug	3	Chapter 3	2-D Kinematics (Vectors analysis-graphical and analytical, Projectile)	HW 3
2-Sep		Chapter 3	2-D Kinematics (Projectile problems, velocity addition)	
4-Sep		Chapter 4	Dynamics (Force and Newton's Laws of Motion)	HW 4
7-Sep	4	Labor Day Holiday		
9-Sep		Chapter 4	Dynamics (Normal, Tension and other forces)	
11-Sep		Chapter 5	Dynamics problem solving, Application of Newton's laws	
14-Sep	5	Chapter 5	Application of Newton's laws (friction Drag & elasticity)	
16-Sep		Chapter 6	Uniform circular motion and Gravitation (angular velocity, acceleration and centripetal force)	HW 6
18-Sep		Chapter 6	Uniform circular motion & Gravitation (Newton's law, Kepler's laws)	
21-Sep	6	Chapter 7	Work, Energy, and Power (Work-energy theorem, KE, PE)	
23-Sep		Chapter 7	Work, Energy, and Power (Conservation of energy, Problems)	
25-Sep		Chapter 8	Linear Momentum, Collisions (linear momentum, impulse, and conservation of momentum)	HW 7
28-Sep	7	Exam I Review		
30-Sep		Exam I	Chapters 1-7	
2-Oct		Chapter 8	Linear Momentum, Collisions (elastic & inelastic collisions, problems)	
5-Oct	8	Chapter 9	Statics and Torque (Equilibrium conditions)	HW 8
7-Oct		Chapter 9/10	Statics and Torque (Stability, Torque problems) Rotational Motion & Angular Momentum	
9-Oct		Fall Break		
12-Oct	9	Chapter 10	Rotational Motion & Angular Momentum (Angular kinematics, rotational inertia, rotational KE)	HW 9

14-Oct		Chapter 10	Rotational Motion & Angular Momentum (problems)	
16-Oct		Chapter 11	Fluid Statics (density, pressure, Pascal's & Archimedes principles)	HW 10
19-Oct	10	Chapter 11/12	Fluid statics problems Fluid Dynamics (flow rate, Bernoulli's equation)	
21-Oct		Chapter 12	Fluid Dynamics & Applications (Poiseuille's law, viscosity, problems)	
23-Oct		Chapter 13	Temperature, Kinetic Theory & Gas Laws (Temperature, thermal expansion)	HW 11
26-Oct	11	Chapter 13	Temperature, Kinetic Theory & Gas Laws (Gas Laws, problems)	
28-Oct		Chapter 14	Heat and Heat Transfer Methods (heat capacity, Latent heat)	
30-Oct		Chapter 14	Heat Transfer Methods; problems	
2-Nov	12	Exam II Review		
4-Nov		Exam II	Chapters 8-14	
6-Nov		Chapter 15	Laws of thermodynamics	HW 12
9-Nov	13	Chapter 15	Laws of thermodynamics, Heat engine	
11-Nov		Chapter 15	Entropy, Stat mech.	
13-Nov		Chapter 16	Oscillatory Motion & Waves (Hooke's law, SHM, simple pendulum)	HW 13
16-Nov	14	Chapter 16	Oscillatory Motion & Waves (SHO, oscillation and waves, superposition of waves, interference)	
18-Nov		Chapter 17	Physics of Hearing (sound, speed & intensity)	
20-Nov		Chapter 17	Physics of Hearing (Doppler effect, interference & resonance)	
23-Nov	15	Review	Review Quiz, (Optional HW 14 will be open on Canvas)	HW 14
25-Nov		No class day		
27-Nov		Thanks Giving Day		
30-Nov	16	Study Day		
2-Dec		Final Exam	Cumulative (Chapters 1-17)	

Clicker Information: ***We will be using the clickers in almost all lectures, so, make sure you have the app and it is ready by Monday's class.*** You can visit the UTK OIT website (https://help.utk.edu/kb/index.php?func=show&e=2784) for further instructions. The link is posted on the Modules section as well. Note that **you have to use your UTK email ID** to register otherwise your score won't be integrated into Canvas and won't be registered. So, do not use non-UTK email addresses to register your clicker.

Course Repetition Policy: If you are repeating the course, you may not need to repeat the laboratories. Please refer to the Laboratory policy regarding repeating a course and follow instructions there: http://www.phys.utk.edu/labs/Lab%20Repeat.pdf

Grading & Evaluation:

Clicker Quizzes & Discussion Participation: In the class meeting, you will be responding quizzes at the end of the lecture. Clicker response grade is divided equally to participation (50%) and the correct response (50%). Your participation in discussion forum on canvas also includes the participation grade.

Homework Assignments: You will be assigned homework on Canvas. Please keep on checking Canvas for the HW due dates which could be different than the dates mentioned on the schedule.

Midterm Exams: There will be two midterm tests on canvas. The tentative dates for the midterms are indicated on the schedule. ***Please note that these dates are subject to change as we progress***

through the course material but they will be finalized at least a week prior so that you can plan accordingly. Each midterm exam will be 60 minutes in length.

Final Exam: The final exam will be available on Wednesday, December 2nd on Canvas. If you determine that you have a conflict with that time or have three or more exams scheduled on that day, please let me know as soon as possible. The Final Exam will be two hours in length and cumulative in scope, covering chapters 1 to 17 of the textbook.

A formula-sheet will be available for each exam for a quick reference.

Laboratory: The laboratory sections are mandatory. If you fail the Laboratory section of the course, you will fail the course regardless of your scores in class. Lab reports will be turned in to your Teaching Assistant. Teaching Assistant is responsible for grading them. Please resolve any disputes regarding your laboratory grade with your TA. If you are unable to reconcile the issue, please write to me.

Grading Scheme:

Grades: Your grade is calculated based on many elements of the course. See the table below for details on this.

Course Element	**%**
Laboratory	25%
Mid Term 1	15%
Mid Term 2	15%
Final Exam	20%
Homework	15%
In-class Quiz/Discussion Participation	10%
Total	100%

Letter grade will be obtained using the conversion below:

%	**Grade**
90% and above	A
87% - 89%	A-
83% - 86%	B+
80% - 82%	B
77% - 79%	B-
73% - 76%	C+
70% - 72%	C

67% - 69%	C-
63% - 66%	D+
60% - 62%	D
57% - 59%	D-

Other Information:

Class Rules: Students need to follow the following guidelines and class room etiquette in order to ensure a positive and respectful learning environment for everyone:

- **Please join the Zoom meeting on time:** don't make it a habit to join late. I will lock the meeting after certain time.
- **Be respectful:** Act in a matured/polite manner and be respectful of the learning process, your instructor, follow the guidelines for the Zoom meeting (See the rules posted on Canvas).
- **Raise your hand:** If you have a question or comment during the class, please raise your hand, or type on the chat-room on Zoom.
- **Share the air:** If you have been dominating the discussion or participating disproportionately, let others participate. Alternatively, if you haven't said much, you are encouraged to participate more.
- Please use **respectful and (socially) inclusive language.**

How to succeed and get a good grade in the class: The number of lecture hours in this class are not enough to cover all parts of the syllabus in detail. Hence reading assignments and home works are provided. A good portion of success in this class depends on coming class to prepared, actively participating during the class and completing home works as assigned.

- Read the course material before coming to the class otherwise you will be lost and cannot follow the lecture completely.
- This course assumes that you have calculus background. There is not enough time in the course to review math basics in detail, so it critical that you refresh your vector calculus, differentials, integrals and non-Cartesian coordinate systems. This will help you follow the material presented in the lecture more thoroughly. Otherwise you will be lost.
- For this reason, be critical of your math background. If you are having trouble with the mathematical concepts, please ask for help.
- In the class, participate actively and answer reading quizzes and other clicker questions so you can earn your participation credit. Again, this relies heavily on how prepared you come to the class.
- Follow the class rules and behavior etiquette while in the class. Don't surf the internet or text with your friends.
- Read the textbook ACTIVELY. Active reading means reading the book with a pen and paper nearby. You should try to re-derive equations as you go and be critical of your understanding of how the book gets from point A to point B. Note any questions that you have so you can ask them during lectures, via email, or during office hours.
- Take advantage of all the help you can get, you will need it: Instructor office hours, in-class TA help, Lab TAs tutoring hours etc.

Your Feedback/Suggestions on the course: You are encouraged to provide feedback on any aspect of the course all through the semester using any communication method you prefer. Your **grades will not be impacted by any feedback** you provide, they will be purely based on your coursework and lab

work. However, your discretion in these matters is expected. You will also have an opportunity to give feedback at the end of the semester through the Course Evaluation System. Your feedback is critical in improving the course. Each year I take the information provided in feedback seriously so please take the time to fill out the feedback forms in a thoughtful manner.

Students with disabilities:

If you need course adaptations or accommodations because of a documented disability, please contact the Student Disability Services (SDS). This will ensure that you are properly registered for the services provided by ODS. *University Policy forbids me from making special accommodations without a letter from the Office of Student Disability Services.*

Disability Services Contact Information:

2227 Dunford Hall

Knoxville, TN 37996-4020

Phone: (865) 974-6087

Fax: (865) 974-9552

Email: sds@utk.edu

Website https://sds.utk.edu/

For additional important information (Academic integrity, civility statement, UT alerts, COVID-19 procedures, …) please see the Campus Syllabus (Click here for Campus Syllabus).