GENERAL PHYSICS 1 COURSE SYLLABUS: Lecture and Lab

DESCRIPTION:

General Physics 101 is the first semester of a two-semester algebra-based course covering fundamental concepts and problems in physics. Topics covered in the first semester include linear and circular motion in one and two dimensions, forces, momentum and energy, and fluid mechanics.

REQUIREMENTS:

Prerequisites: The only prerequisite for PHYS 101 is mastery of math at the pre-calculus level as demonstrated by passing Math 111 or the Calculus Readiness Test, or by demonstrating that you have mastered the following topics:

- Basic geometry (angles, parallel and perpendicular lines, areas, volumes, triangles)
- Making, reading, and using graphs, including slope, intercept, and best fit curves
- Manipulation of equations and solving simultaneous equations
- Working with logarithms and exponents, including scientific notation
- Using trigonometric functions to determine sides and angles in right triangles

Students must pass PHYS 101 before taking PHYS102.

NOTE: You must take both the lecture and lab courses in the same semester. They can't be taken separately.

Required text: Knight, Jones, & Field, College Physics, a Strategic Approach, 2nd edition (electronic or printed)

Required online subscriptions: Mastering Physics and Learning Catalytics

Optional: Knight & Andrews, College Physics Student Workbook, Vol 1 (Ch 1-16) & Vol 2 (Ch 17-30)
Smith, Kahol, & Simon, Student Solution Manual, Ch 1-16 & Ch 17-30

Provided: Lab handouts will be provided throughout the course

Technology: You'll need a scientific calculator (handles exponents and trigonometric functions). Your cell phone is not acceptable; you will not be allowed to use your cell phone during class or exams.

OBJECTIVES:

Science is a process by which facts and observations are used to discover patterns and relationships in nature, leading to principles that describe the workings of our universe. These principles help us understand and predict the behavior of systems. The scientific method is the process by which we discover, use, and modify our principles.

The goal of this course is to improve your ability to apply scientific methods and to solve problems through logical application of accepted principles of science. This includes equations that scientists use as shorthand for their understanding.

This course should improve your ability to reason through critical thinking. By the end of the course you should be adept at using logic and scientific analysis. Specifically, you should be able to solve problems by applying principles of physics using reasoning and scientific methods, including:

a. analyzing both hypothetical and actual situations to determine the germane principles of physics
b. making predictions based on principles of physics, and testing the predictions through hands-on experiments

This will include interpreting statements and communicating results by understanding and properly using scientific definitions in well-written, reasoned statements.

ASSESSMENTS

Grades are assigned based on points earned throughout the semester in the following categories:

Homework	10%
In-class tests	40%
Final Exam	20%
Lab reports	30%

(Percentages are subject to change based on class and individual performance.)

Letter grades are assigned using the following scale:

90.0-100 A 80.0-89.9 B 70.0-79.9 C 60.0-69.9 D Below 60.0 F

"+" and "-" designations are added at the appropriate levels.

Homework: Homework sets are administered over the web through *Mastering Physics* (www.masteringphysics.com). You are required to enroll in Mastering Physics. Your course ID depends on your lecture section and is given in the section-specific course outline.

Homework sets are due about once a week and consists of two assignments:

- an untimed practice assignment to help you learn the material and gauge your understanding. These will typically take 2 hours to complete. Collaboration is allowed and even encouraged.
- a timed quiz consisting to help you practice for the tests. Quizzes are usually 10 – 15 minutes long. Quizzes should be done on your own and without outside reference beyond your notes.

Exams: Most weeks a short (15 minute) in-class test will be given on material from the homework due that week. The problems will be similar to those in the homework but may require you to apply those principles in a new way.

The final exam will be comprehensive, covering all material from the beginning of the class. You'll get specific information about the final toward the end of the course.

Labs: Labs are designed to reinforce the concepts from the lecture and to help you learn basic science techniques in a hands-on environment. Each lab may consist of data taking, analysis, graphing, questions, and discussion. Your grade will be based on your performance in the lab as well as your lab report.

I will post a handout for each lab on MyCourses. You are required to bring a copy of the handout to lab. The handout provides background for the lab, outlines what you need to do, provides space for recording data, and includes a series of analysis questions for you to answer. Your lab report will consist of your completed handout along with additional graphs, charts, answers, etc.

Labs are done with partners, and I encourage discussion and collaboration. However, each member of the group must turn in his or her own lab report. Your report must be your own work in your own words. I expect you to be able to explain any answer or entry in your report.

Tentative Schedule of Topics – PHYS 101A

Week	Topic	Chapter	Homework & Test	Lab
1	Introduction	Syllabus		Units, Vector math (1.4, 1.5, 3.1)
	The scientific method		Intro to MP (HW) Syllabus (Test)	
2	Kinematics in 1-D	1.1-1.3 2.1-2.3	Sig figs, Units	Linear motion
	Graphs, Eqs.of constant acceleration	2.1-2.6	Scientific method	
3	Free fall, Vectors	2.7, 3.3		Graphing motion
	Vectors, Ramps	3.3, 3.4	a) Uniform Motion b) Motion graphs	
4	Projectile motion	3.7		Acceleration of falling
	Newton's laws – concepts	4		
5	Newton's laws – Eq'm, Weight, Normal	5.1-5.4		Projectile motion
	–Apparent weight, friction	5.5		
6	–Drag, multiple objects	5.6-5.7		Addition of forces
	– Ropes	5.8	a) Acceleration b) Vectors	
7	Newton's laws – Springs Circular motion	8.3, 3.8, 6.1-6.2		Springs
	Centripetal force and orbits	6.3-6.5	a) Motion in 2D b) Newton's laws	
8	Torque & Center of gravity	7.2, 7.3		Drag
	Center of gravity	7.3	Springs, centripetal motion	
9	Equilibrium	8.1-8.2		**No lab**
	No lecture (Fall break)	**———**	**———**	
10	Momentum (linear)	9.1-9.3		Torque and equilibrium
	Collisions	9.4		
11	Collisions in 2-D	9.6		Impulse and momentum
	Energy, Work	10.1-10.2	a) Torque & CoG b) Equilibrium	
12	Kinetic energy, Potential energy	10.3-10.4		Momentum, energy, & collisions
	Collisions, Power, Cons. of energy	10.6-10.8		
13	Conservation of energy	10.6		Energy of a tossed ball
	Density and pressure	13.1-13.3	Momentum & collisions	
14	Buoyancy	13.4		Fluids lab
	Fluid flow, Bernoulli's equation	13.5-13.6	Energy	
15	**No lecture (Thanksgiving break)**	**———**	**———**	**No lab**
	No lecture (Thanksgiving break)	**———**	**———**	
16	Review		Fluids (no test)	**No lab**
	No classes (Reading Day)	**———**		
12/11	**FINAL EXAM**	**All**	**8:30 - 11:30 AM**	