



上海财经大学

Shanghai University of Finance & Economics

中国上海市国定路777号 邮编200433 777 Guoding Road, Shanghai, 200433, China

## Shanghai University of Finance & Economics

### 2020 Summer Program

### PHY 101 Introduction to Physics with Lab

#### Course Outline

**Term: June 1 – June 26, 2020**

**Class Hours: 16:00-17:50 (Monday through Friday)**

**Course Code: PHY 101**

**Instructor: Dr. Jiang Yu**

**Home Institution: Fitchburg State University, Massachusetts, USA**

**Office Hours: TBA and by appointment**

**Email: [jyu@fitchburgstate.edu](mailto:jyu@fitchburgstate.edu)**

**Credit: 4**

**Class Hours:** This course will have 52 class hours, including 32 lecture hours & lab sessions, 8-hour TA discussion sessions, 4-hour review sessions, professor 8 office hours.

#### **Course Description:**

Physics 101 is an introductory college physics course. The mathematical language required is algebra/trigonometry. The physics principles explored are of Newtonian Mechanics, including the core physical concepts, laws, principles, and processes that provide a broad way of thinking about the mechanical physical world.

#### **Course Objectives:**

To learn and develop a good understanding of the core concepts, laws, and principles of the classical mechanics, including 1-D and 2-D kinematics, forces and Newton's Laws, gravitation, rotational motion, conservation laws of energy and momentum, and oscillations and mechanical waves.



### Required Textbooks:

- College Physics, 4th Ed., by Knight, Jones, & Field.
- MasteringPhysics, online access purchased via Pearson Publishing website

### Also required:

- A laptop, tablet, or smart phone to access MasteringPhysics. This is required for every class.
- A scientific calculator is desirable. Phone will not be allowed to use during exam time.

### Grading & Evaluation:

- Homework Assignments: 20% (10% pre-lecture homework and 10% post-lecture homework, daily)
- In-Class Quizzes: 20% (every class)
- Labs: 20% (2 labs each week, including performance and report)
- Midterm Exam: 20% (kinematics, dynamics, and gravitational law)
- End-term Exam: 20% (conservation laws and rotational motion)

### Grades

Course grade will be based on the percentage of composite score of the graded work:

Final Score (%)	90	87	83	80	77	73	70	67	63	60	<60
Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F



### Course Schedule (Tentative)

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1	Linear Kinematics: <ul style="list-style-type: none"> <li>• Position</li> <li>• Displacement</li> <li>• Velocity</li> <li>• Acceleration</li> </ul> Motion diagrams	Motion graphs & equations: <ul style="list-style-type: none"> <li>• <math>x(t)</math></li> <li>• <math>v(t)</math></li> <li>• <math>a(t)</math></li> </ul> Motion of $a = \text{constant}$	Lab: Free Fall & measurement of gravitational $g$	Rotational kinematics: <ul style="list-style-type: none"> <li>• Position</li> <li>• Displacement</li> <li>• Velocity</li> <li>• Acceleration</li> </ul> Uniform circular motion	TA session
Week 2	Forces: <ul style="list-style-type: none"> <li>• Tensional</li> <li>• Normal</li> <li>• Frictional</li> <li>• Weight</li> </ul> Newton's laws	Applications of Newton's laws: <ul style="list-style-type: none"> <li>• Equilibrium</li> <li>• Dynamic problems</li> </ul>	Universal gravitational law  Lab: uniform circular motion & measurement of gravitational $g$	Fluids: <ul style="list-style-type: none"> <li>• Density, Pressure</li> <li>• Archimedes' Principle</li> </ul> Lab: Measurement of density of a liquid	TA session
Week 3	Momentum: <ul style="list-style-type: none"> <li>• Impulse</li> <li>• Momentum</li> <li>• Conservation of linear momentum</li> </ul> Collisions	Mechanical Energy: <ul style="list-style-type: none"> <li>• Work</li> <li>• Kinetic energy</li> <li>• Potential energy</li> <li>• Conservation of mechanical energy</li> </ul>	Lab: Atwood's Machine & conservation laws	Rotational dynamics: <ul style="list-style-type: none"> <li>• Angular momentum</li> <li>• Rotational energy</li> </ul> Lab/demo: Conservation law in Rotation	TA session
Week 4	Oscillations: <ul style="list-style-type: none"> <li>• SHM</li> <li>• Simple Pendulum</li> <li>• Mass-spring system</li> </ul>	Mechanical waves: <ul style="list-style-type: none"> <li>• Longitudinal</li> <li>• Transverse</li> </ul> Lab: Description of waves	Sound: <ul style="list-style-type: none"> <li>• Frequency</li> <li>• Speed</li> <li>• Decibel</li> <li>• Doppler Effect</li> </ul>	Lab: Measurement of the speed of sound	TA session