

MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
Department of Physics

Physics 8.01X

Fall Term 2002

## SYLLABUS

Text: H. D. Young and R. A. Freedman, *University Physics*, 10th Edition, Addison-Wesley, Reading Mass (2000).

### **Wednesday Sept 4 Lecture 1**

Introduction to 8.01X, measurement standards  
Hand out Experiment ES problem, due Sept 13

### **Friday Sept 6 Lecture 2**

Mechanics Baseline Test I  
Hand out Problem Set 1, due Sept 13, hand out Red Boxes

### **Monday Sept 9 Lecture 3**

Units, dimensions, Fermi problems, Experiment ES

### **Wednesday Sept 11 Lecture 4**

Kinematics: 1D motion, displacement and velocity  
Hand out Project LVPS problem, due Sept 20

### **Friday Sept 13 Lecture 5**

1D motion, velocity and acceleration  
Mechanics Baseline Test II  
Hand out Problem Set 2, due Sept 20  
Experiment ES, Problem Set 1 due

### **Monday Sept 16 Lecture 6**

Vectors, Newton's Laws of motion, force, mass and acceleration

### **Wednesday Sept 18 Lecture 7**

Newton's Laws of motion, force, mass and acceleration  
Hand out Experiment FO, due Sept 27

### **Friday Sept 20 Lecture 8**

Newton's Laws, gravitation and weight, projectiles  
Project LVPS, Problem Set 2 due  
Hand out Problem Set 3, due Sept 27

### **Monday Sept 23 Holiday**

### **Wednesday Sept 25 Lecture 9**

Newton's Laws, normal forces and friction  
Hand out Experiment MF, due Oct 11

**Friday Sept 27 Lecture 10**

Review, applications of Newton's Laws.  
Experiment FO, Problem Set 3 due  
Hand out Problem Set 4, due Oct 4

**Saturday Sept 28**

Optional review session covers Quiz 1 material

**Monday Sept 30 QUIZ 1 In Class**

Covers: fundamental concepts, Fermi problems, 1D kinematics, Experiment ES, Experiment FO, projectile motion, Newton's laws

**Wednesday Oct 2 Lecture 11**

Newton's Laws, spring forces, tension  
Hand out Experiment CF, due Oct 18

**Friday Oct 4 Lecture 12**

Uniform circular motion  
Problem Set 4 due  
Hand out Problem Set 5, due Oct 11

**Monday Oct 7 Lecture 13**

Universal law of gravitation, planetary orbits

**Wednesday Oct 9 Lecture 14**

Levers, statics and torque

**Friday Oct 11 Lecture 15**

Statics and torque  
Problem Set 5, Experiment MF due  
Hand out Problem Set 6, due Oct 18

**Monday Oct 14 Columbus Day Holiday****Wednesday Oct 16 Lecture 16**

Work, kinetic energy

**Friday Oct 18 Lecture 17**

Conservation laws, potential energy  
Problem Set 6, Experiment CF due  
Hand out Problem Set 7, due Oct 25

**Monday Oct 21 Lecture 18**

Conservation of mechanical energy  
Hand out Experiment ET, due Nov 1  
Optional review session covers Quiz 2 material

**Wednesday Oct 23 QUIZ 2 In Class**

Covers: Newton's Laws, circular motion, static equilibrium

**Friday Oct 25 Lecture 19**

Energy: universal gravitation and planetary orbits

Problem Set 7 due

Hand out Problem Set 8, due Nov 1

**Monday Oct 28 Lecture 20**

Energy transformations, heat

**Wednesday Oct 30 Lecture 21**

Restoring forces and harmonic motion, pendulum

**Friday Nov 1 Lecture 22**

Linear momentum, impulse, Newton's 2nd Law

Experiment ET, Problem Set 8 due

Hand out Problem Set 9, due Nov 8

**Monday Nov 4 Lecture 23**

Momentum, center of mass

**Wednesday Nov 6 Lecture 24**

Momentum, collisions

Hand out Experiment VS, due Nov 15

**Friday Nov 8 Lecture 25**

Collisions, kinetic theory

Problem Set 9 due

Hand out Problem Set 10, due Nov 15

**Monday Nov 11 Veteran's Day Holiday**

**Wednesday Nov 13 Lecture 26**

Angular kinematics, torque, rigid bodies, moment of inertia

Hand out Experiment AM, due Nov 22

**Friday Nov 15 Lecture 27**

Moment of inertia, angular momentum

Problem Set 10, Experiment VS due

Hand out Problem Set 11, due Nov 22

**Saturday Nov 16**

Optional review session covers Quiz 3 material

**Monday Nov 18 QUIZ 3 In Class**

Covers: Energy, momentum, conservation laws, collisions

**Wednesday Nov 20 Lecture 28**

Rotational dynamics

**Friday Nov 22 Lecture 29**

Angular dynamics, translation and rotation

Experiment AM, Problem Set 11 due

**Monday Nov 25 Lecture 30**

Properties of materials: solids

**Wednesday Nov 27 Lecture 31**

Properties of materials: fluids

Hand out Problem Set 12, Experiment Flow, due Dec 6

**Friday Nov 29 Thanksgiving Holiday**

**Monday Dec 2 Lecture 32**

Conservation of flow, buoyancy

**Wednesday Dec 4 Lecture 33**

Viscosity

**Friday Dec 6 Lecture 34**

Properties of materials: atomic hypothesis

Problem Set 12, Experiment Flow due

**Monday Dec 9 Lecture 35**

Special relativity, inertial frames

**Wednesday Dec 11 Lecture 36**

Final review