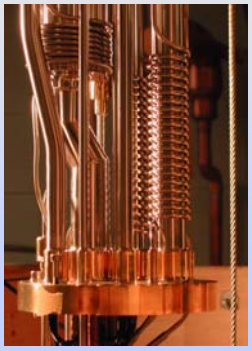
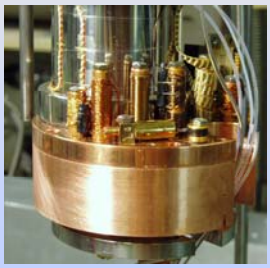
Newtonian Mechanics
8.01

8.01
W01D2

Physics at MIT





Technology Enhanced Active Learning

- Introduction to TEAL: Learning Objectives
- Weekly Integrated Modules with Schedule
- Interactive Presentations: Personal Response System, Peer Instruction
- Problem Solving Opportunities
- Experiments
- Interactive Online Homework (Mastering Physics)
- Grading
- WWW page

Learning Objectives of TEAL

- Create an engaging and technologically enabled active learning environment
- Move away from passive lecture/recitation format
- Incorporate hands-on experiments
- Enhance conceptual understanding and problem-solving ability

Broader Educational Learning Objectives

- Develop communication skills in Core Sciences
- Develop collaborative learning
- Create an environment conducive to learning and teaching

Integrated Module Approach

Sun: Physics Resource Center 26-152; tutoring. Mastering Physics assignment due at 8:30 pm focusing on weekly reading assignment and material up to W-R class of previous week.

Mon-Tues: Presentation, concept tests, and short table problems.

Wed: Problem Set due at 11:00 am covers material from previous week and a pre-lab question.

Wed-Thurs: Presentation, concept tests, short table problems, and occasional experiment.

Thurs: Mastering Physics assignment (due at 11:30 pm) covers material up through M-T class.

Fri: Problem solving recitation section, (long group problems). Occasional quizzes.

Mon-Wed-Fri Schedule

	Su	M	T	W	R	F
Day	Sunday Tutoring (26-152): 13:00-17:00	Hour 1: Presentation Hour 2: Presentation		Hour 1: Presentation Hour 2: Experiment Problem Set due at 11 am		Hour 1: In-Class Problem Solving; Quiz 1: Sept 21 Quiz 2: Sept 28 Quiz 3: Oct 5 Quiz 4: Oct 26 Quiz 5 Nov 2 Quiz 6 Nov 30
Night	Weekly Reading and Mastering Physics due: 8:30 pm				Mastering Physics due: 11:30 pm 2 tests (7:30-9:30 pm): Thursday Oct 11 , and Tuesday Nov. 20	

Tue-Thur-Fri Schedule

	S	M	T	W	R	F
Day	Sunday Tutoring (26-152): 13:00-17:00		Hour 1: Presentation Hour 2: Presentation	Problem Set due at 11 am	Hour 1: Presentation Hour 2: Experiment	Hour 1: In-Class Problem Solving; Quiz 1: Sept 21 Quiz 2: Sept 28 Quiz 3: Oct 5 Quiz 4: Oct 26 Quiz 5 Nov 2 Quiz 6 Nov 30
Night	Weekly Reading and Mastering Physics due: 8:30 pm				Mastering Physics due: 11:30 PM 2 tests (7:30-9:30 pm): Oct 11 and Nov. 20	

Tests

Test One: Thursday Oct 11 7:30 pm -9:30 pm
Test One Conflict: Friday Oct 12

Test Two: Tuesday Nov. 20 (week of Thanksgiving)
Test Two Conflict: Wednesday Nov 21

Final Exam TBA

In-Class Presentations

- Students are expected to complete weekly reading assignment before the first class of the week.
- Active Participation mixed with 'traditional lecture-style'
- Concept Questions using Personal Response System (PRS)
- Short Group/Table Problems with student presentation of work at boards
- Presentation of material using boards (or slides)

Interactive On-Line Homework (Mastering Physics)

- On-Line homework with hints and tutorials
- Sunday Assignment due at 8:30 pm focuses on the weekly reading assignment
- Thursday assignment due at 11:30 pm focuses on the material covered that week.
- Test review problems with hints
- First Assignment due: Sun Sept 10

Registering for Mastering Physics

- Go to http://www.masteringphysics.com
- Select MP for Young/Freedman
- Register with the access code in the front of the access kit in your new text, or pay with a credit card if you bought a used book.
- WRITE DOWN YOUR NAME AND PASSWORD
- Log on to Masteringphysics.com with your new name and password.
- The MIT zip code is 02139
- The class ID is MPMIT801FALL2007

Desktop Experiments

- Use to present core material
- Introduce via Reading, Concept Questions, In-Class Problems, and Pre-Experiment Question on Problem Set
- Groups of three students take data in class using *LabView software*.
- Hand in Worksheet summary of main concepts of experiment
- Analyze data as part of take-home problem set

Problem Solving

- On-Line Introductory Assignments/Tutoring
- In-Class Concept Questions and Table Problems
- In-Class Group Problems (Friday)
- Weekly Problem Sets
  1. Multi-concept analytic problems
  2. Pre-lab questions
- Practice Exam Problems
- Exams

Grading policy: Weighting scheme

- 6 Quizzes +2 Tests + Final Exam
  = 15%+30%+25%=70% (Individual Work)
- You must pass the test portion in order to pass the course (passing total test score > 46/70)
- Homework Problem Sets 10% (Individual Work)
- Mastering Physics 8% (Individual Work)
- Experiments, in class work and PRS 12% (Group Work)

Grading policy: Breakpoints

A+ ≥ 96	A ≥ 92	A- ≥ 88
B+ ≥ 84	B ≥ 80	B- ≥ 76
C+ ≥ 72	C ≥ 68	C- ≥ 66
	D ≥ 63	
	F < 63	

Website
web.mit.edu/8.01t/www

1. Daily Schedule
2. Course Notes
3. Problem Set Assignments and Solutions
4. Experiments write-ups
5. Exam Prep
6. Group Problems and Solutions
7. Course Information
8. Office and Tutoring Hours

Please indicate which of the math subjects (if any) that you are currently enrolled in.

1) 18.01
2) 18.01A/18.02A
3) 18.014
4) 18.02
5) 18.022
6) 18.023
7) 18.03
8) 18.100 or higher level
9) no math subject

Which best describes the physics background you had in high school?

1. Only one year of introductory physics: 9th or 10th grade
2. Some introductory physics and physics without calculus: 11th or 12th grade
3. Some introductory physics and physics with calculus 11th or 12th grade
4. Some introductory physics and AP physics
5. Some introductory physics and A level physics
6. Some introductory physics and Physics equivalent to AP or A level
7. Some High School physics and college or university physics course
8. No physics
9. other

Problem Solving

- Measure understanding in technical and scientific courses
- Problem solving requires factual and procedural knowledge, knowledge of numerous schema, plus skill in overall problem solving.
- Schema is loosely defined as a “specific type of problem” such as principal, rate, and interest problems, one-dimensional kinematic problems with constant acceleration, etc..

Four Stages of Attack

1. Understand the Problem and Models
2. Plan your Approach – Models and Schema
3. Execute your plan (does it work?)
4. Review - does answer make sense? - return to plan if necessary

Models

- Models represent some features of some thing
- Physical Models represent pattern(s) found in physical reality
  - Pattern includes structure, relationships, properties.
  - Pattern is a simplified/approximate of reality
  - More useful if pattern occurs often in reality.
- Solution to physics problem is a model
  - Solution may combine several standard models.

Structure of Models

- System – separate part of universe
- Description of System:
  - Objects
  - State variables
  - Interactions, agents:
- Multiple Representations
  - Ways to see it
  - How to relate them
- Law of Change, Interaction

Models for **8.01** in 2007

1. One-Dimensional Motion: One-Dimensional Motion with constant acceleration; One-Dimensional Motion with constant velocity; One-Dimensional Motion with non-constant acceleration
2. Two-Dimensional Motion: Projectile motion (with and without drag; Circular motion
3. Momentum and Impulse: Dynamics
4. Energy Conservation: Work and Heat; Mechanical Energy; Work-Energy; Potential Energy
5. Simple Harmonic Motion: Springs and pendulums
6. Angular Momentum: motion in plane; three dimensional gyroscopic motion

Powers of Ten Film

Voice of Professor Phillip Morrison