PHY 2048C – General Physics A
Spring 2020

Motion, Forces, Energy, Heat, Waves

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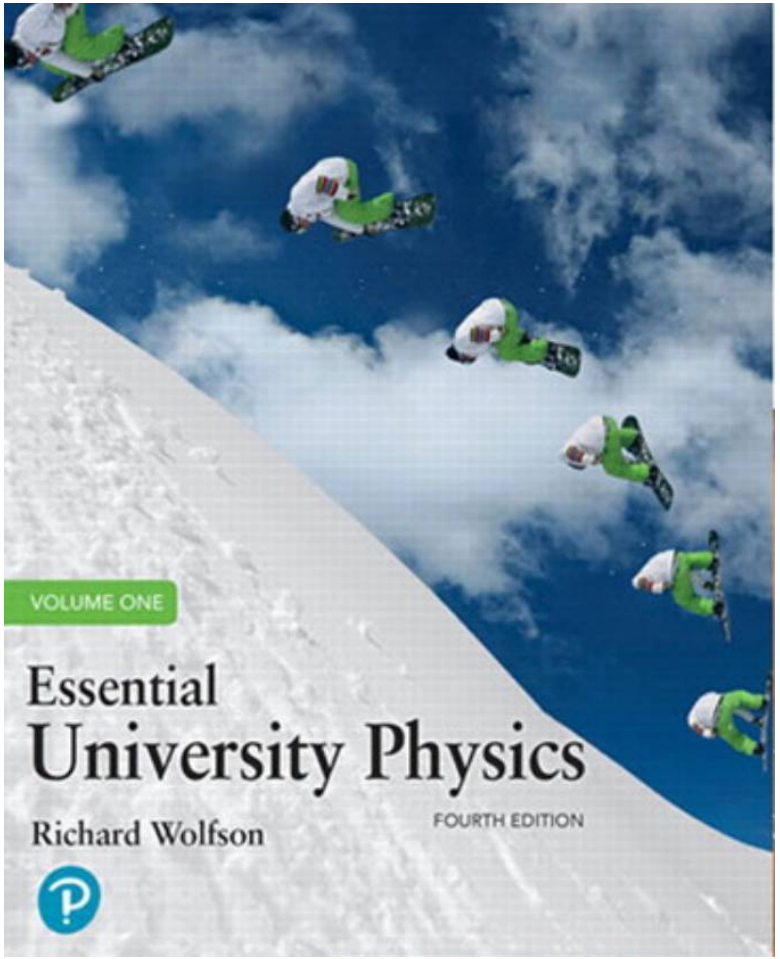
Today:
1) Organization and Introduction
2) Physics: Units Matter

Textbook

R. Wolfson:
Essential University Physics

- Annotated Figures
- Graphical “Chapter Summaries”
- To the point



Course Organization

- Lectures: 101 UPL
  Monday,Friday 12:20 to 1:10
- three separate Lab- and Studio sections Tuesdays and Thursdays
  Dr. F. Febres-Cordero, Sect 8: TR, 8:00 am -10:20, MCH 315
  Dr. V. Crede, Sect 9: TR, 11:00 am -1:20, MCH 315
  Dr. M. Spieker, Sect 10: TR, 2:00 pm -4:20, MCH 315
- Help-sessions / office hours

You need your “my.fsu” account in order to log in at Canvas:
Goto http://canvas.fsu.edu, select “PHY2048C.sp20”

Central to all course components:
Announcements, Syllabus, Lecture presentations,
LonCAPA homework, communicate, check your grades

Class Meetings: Labs and Studios
Carothers MCH 315

Labs usually on Tuesdays

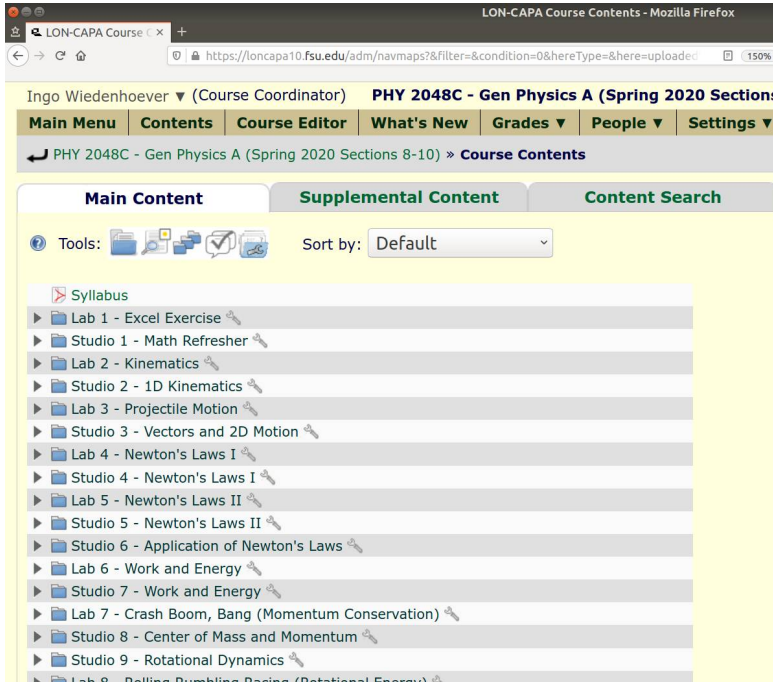
- "Learning through inquiry" approach: hands-on experience of the material
- Come prepared for laboratory; read lab instructions beforehand
- Perform experiments
- Write lab-report (one per student), will be graded.

Studios usually on Thursdays

- Understand concepts further - Work through examples, homework
- Be prepared ! Prepare the homework – set for the week, written preparation will count towards participation grade
- Group work and presentations to class

Homework and Lab Material

- There will be one (or two) homework sets per week (see syllabus)
- The work will be performed within the LonCAPA – system, available free of charge
- login directly at loncapa.fsu.edu
  with your fsu-account
  or through the canvas – link
- Due date Friday (or Wednesday) midnight, firm ! (see syllabus)



- Lab instructions are also available through LonCapa

The Lectures and Quizzes

The Monday and Friday lectures are used for “lecturing”, outline of new course material, spectacular demonstration experiments.

Five Mini-Exams in last 20 min of some Friday lectures
See schedule on syllabus
First Test: Friday, January 24th

Midterm-exam during lecture time:
Friday, March 6th

The Final Exam will be
Tuesday, April 28th, 7 am !!!!

Participation Points

Up to 20% of the final score will be earned through class participation:

- Studio participation points: 15%
  Attendance and preparation, present solutions
- Two to three questions will be given to the whole class in each lecture and you will answer the questions using the "iclicker" system: 5%
  Right answers give 3 points, wrong answers give 1 point.
- Do it now:
  Either purchase iclicker-remote hardware,
  Register your iclicker in CANVAS:
  Iclicker Classic Registration → Remote Registration"
- Or Register with "iClicker Reef" app on your cell phone

Grading of the Course

In order to pass, you must:

- Earn enough points
- Attempt the final exam

Your grade is calculated from all of these components:

1.) Best 4/5 Mini-Exams	25%
2.) Final Exam	20%
3.) Studio participation	15%
4.) Labs	15%
5.) CAPA homework	10%
6.) Mid-term Exam	10%
7.) Lecture presentation	5%

Letter grade: See table in Syllabus

Where and how to get help

Many students think, physics is hard.

It is, if you don't let us help you !

- Attend lectures
- Check Canvas for announcements
- Come to professor's help session / tutorials
  (times will be updated soon... state of flux)

  Dr. Ingo W. MW 2:00-3:00 pm, 214 Keen
  Dr. V. Crede MW 1:00-2:00 pm, 212 Keen
  Dr. F. Febres-Cordero W 2:00-3:00 pm, 504 Keen
  Dr. M. Spieker MW 3:00-4:00 pm, 217 Keen
- Find a study partner
- Work hard

Remaining Lecture Outline

- Units
  - fundamental and derived quantities
- Dimensions of physical quantities
  - How to check your answers using dimensions

Units: fundamental quantities

- Units:
  How to measure physical properties (length, area, volume, velocity, acceleration, mass, force, work, energy, momentum, temperature,....)
  How to communicate the results between humans (and machines!)
- Units are arbitrary, but necessary conventions.
- We use SI (Systeme International)
  All units are (can be) derived from only the following three fundamental units:

  Length: meter (m)
  Originally defined : $1 \cdot 10^{-7}$ of distance from Earth's equator to north pole

  Time: second (s)
  Originally defined : 1/60 of 1/60 of 1/24 of Earth's day

  Mass: kilogram (kg)
  Originally defined: international prototype – kilogram in Paris
  (based on mass of 1 liter of water, 1 liter = 10^{-3} m^3)

Units: fundamental quantities…

- The SI contains a number of “historic” units based on convention
  These could, in principle, be replaced by units derived from
  m, kg, s, but they are not.
- They are treated as fundamental, which means that other units will be derived from them.

  - Temperature (Kelvin, K)
  - Amount of a substance (moles, mol)

    These are used in this course (thermodynamics)

  - Electrical current (Ampere, A)
  - Light intensity (candela, cd)

    These are used in the following, phy2049c course

Units: derived quantities

- All other units are derived from these:
  Examples:
  velocity, acceleration
  Force, Energy, Pressure

- The biggest advantage of the SI system:
  If you start a calculation in SI units, your results will be automatically in SI units !
  (Note: “kilogram”, not “gram” is the “standard” unit.)
- Coming in a minute:
  Use this to check your calculation

Dimensions of physical quantities

Dimensions of Physical Quantities

Quantity	Symbol	Dimension
Area	A	L^2
Volume	V	L^3
Speed	v	L/T
Acceleration	a	L/T^2
Force	F	ML/T^2
Pressure (F/A)	p	M/LT^2
Density (M/V)	ρ	M/L^3
Energy	E	ML^2/T^2
Power (E/T)	P	ML^2/T^3

Many physical quantities are derived from others by products and powers..

Therefore, their units contain powers of other units, or “Dimensions”

These dimensions are actually independent of the unit system.

Dimensions and Units…

You can find errors, and check your answers, using **dimensional analysis**:

0. If two quantities are added, they must have the same dimensions and units.
1. If the answer you seek is a physical quantity, check the dimensions and units of your answer !
   Observation: This requires that all intermediate calculations include the units ! Units are part of the solution.
2. Exponentials, trig functions … can not have units in their arguments.

Little Bits of Advice from Dr. Ingo

- Use symbolic notation and Algebra to solve your problems
- Here you should check the dimensions.
- Enter the numbers and units of a numerical problem only as the last step !
- Make sure the units “work”
- Does the answer make sense ?

Observation from many years of teaching:
Students who enter numbers first will not find their mistakes !
Physics is about understanding where solutions come from, not about memorization of a particular solution !

Stay tuned...

- Tuesday (tomorrow !): Lab class MCH 315
- Thursday: Studio class MCH 315
- Friday Lecture: 1d-Kinematics
- HW 1 is due, this week:

  Friday midnight