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# ***Physics 1140 Fall 2011***

Prof. Markus B. Raschke

Lecture #1:

1. Introduction to Course

2. Measurements and Significant  
Figures

# ***Format of Physics 1140***

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- This is a 1 unit lab class
  - Yes– there is a lot on the schedule for 1 unit of credit!
    - But we try to restrain ourselves 😊
  - Coursework is “frontloaded.” More work at beginning, but all work is done well before finals week
- Weekly 2 hr lab session
  - All work done within G2B66 area– lab books do NOT leave area
  - Each unit corresponds to ~3 hrs/wk– expect to spend time outside lab session to complete writeups
  - First week: Orientation to MathCAD
  - Then: 6 labs, each 2 weeks in duration
- 6-7 lectures, Weekly through September
  - Mo or Tu 4-5pm
  - Homeworks due Mondays by 4 pm, in G2B66

# *Prof. Markus Raschke*

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- Office Hours M, Tu, 3:00 – 4:00 pm

# Grading

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- The course consists of two components:
  - 1. error analysis lectures, and HW(25% of the total grade)
  - 2. labs (75% of the total grade).
- 5 homework sets on error analysis
  - 25% of grade on HW
- The labs have two parts to the grade:
  - A) The prelab questions (10% of total grade)
  - B) The lab report (65% of total grade).
- Your 6 labs are chosen from a total of 15 different labs
  - Lab 1 in weeks 2 and 3 must be Lab M1 on the **Simple Pendulum**
  - Lab 4 in weeks 8 and 9 must be Lab E1 on **Circuits**
  - the other 4 labs need to be chosen by you. Your TA will discuss more with you on this issue.

## *A few words about deadlines:*

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- Homework due Mondays 4:00 pm (4 sets)
  - HW scores might be 15% of grade, but are a much larger part of spread in final grades.
- Prelabs due **before** you begin a lab.
- Lab report due 4:00 pm, **seven working days after** each lab
- **All materials to be turned-in to G2B66 box for your TA.**

## ***Lab books***

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- We supply your lab books, and they are kept in the 1140 area at all times.

## ***Format of the lab***

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- In this lab, you will make simple measurements that you can relate, *quantitatively*, to the physics you learn in 1110/1120.
  - Measurements of length, force, mass, time for mechanics labs
  - Measurements of voltage, current for electromagnetism
  - Pressure, wavelength, etc..

## ***Why we measure— what you'll be doing in lab***

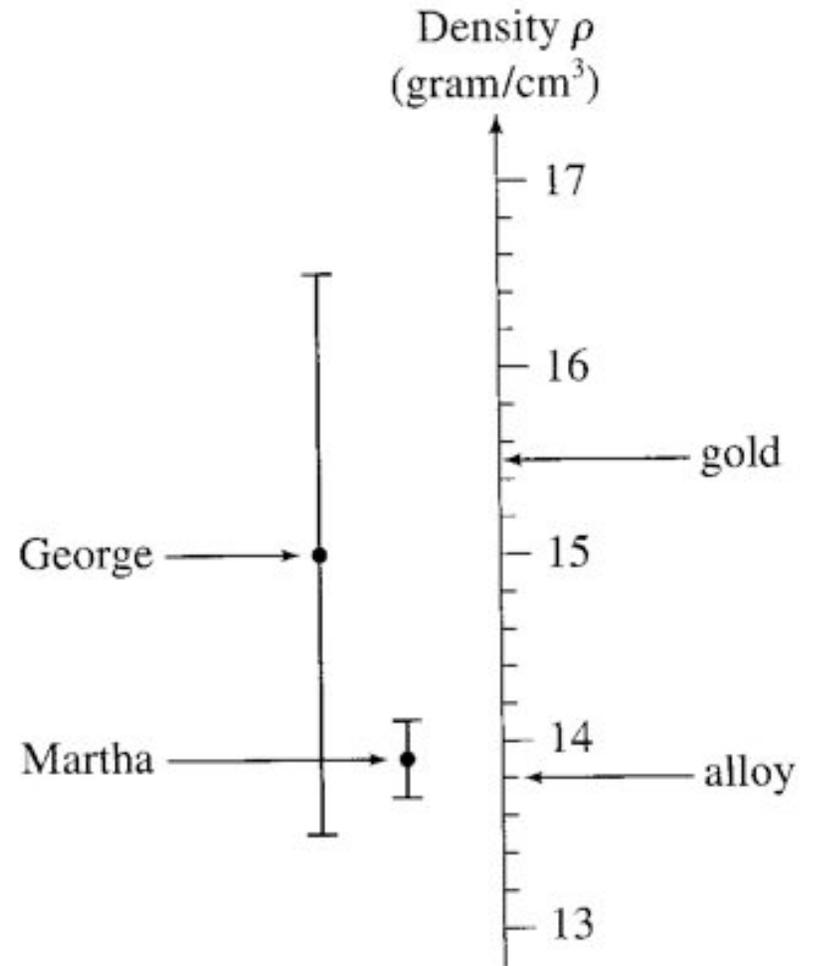
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- Scientists like measuring things 😊
  - But, that's not just because we like writing down digits
- We measure to make ***decisions***, or to test a ***hypothesis***.
- Example: Archimedes



## Is the crown pure gold?

- Density
  - Gold– 15.5 g/cm<sup>3</sup>
  - “diluted” gold (alloy) 13.8 g/cm<sup>3</sup>
- George measures 15 g/cm<sup>3</sup>
- Martha measures 13.9 g/cm<sup>3</sup>
- Who’s right?
  - Depends on estimated error
- George:  $15 \pm 1.5$  g/cm<sup>3</sup>
- Martha:  $13.9 \pm 0.1$  g/cm<sup>3</sup>
- The crown is not pure gold!!!



# ***Making Measurements and Calculating values***

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- Exact numbers
  - Counted; i.e. I have 4 apples
  - Unit conversions; i.e. 1 meter= 100 cm
- Measured Numbers
  - When you use a measuring tool it is used to determine a quantity such as your height or weight, the numbers you obtain are called *measured numbers*.
  - Measured numbers generally will have an ***uncertainty (error)*** associated with them.
- Derived Quantities
  - Quantities obtained by processing data are called *derived quantities*.