

# PHYSICS 117: QUANTITATIVE REASONING

FALL 2014

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## INSTRUCTOR

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Moulton Hall 312A  
Phone: 438-5392  
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Class: MWF 10–10:50 am  
Office hours: 9–9:50 am, or by appointment

## TEXT

“Common Sense Mathematics”, E.D. Bolker and M. Mast  
Free online at <http://quantitativereasoning.net/commonsense/commonsense.pdf>

## OBJECTIVES

In this class we will develop quantitative reasoning skills through many everyday life examples. We will make simple theoretical calculations to support our assessments and learn how to make use of graphics to visualize data. We will insert examples from the physical sciences whenever appropriate.

## FORMAT

Lectures will present the main ideas of the course and include the topics that deserve emphasis. Apart from reading the text, it is essential that you do the exercises. Problems will be assigned and you will be given many opportunities to do them. These exercises are related to concepts discussed in class and should help you to get a better view of what’s going on. All exercises are very important.

## GRADING

The final grade will be based on your performance in three exams, a final exam (non-cumulative), and four homework assignments. The breakdown will be as follows:

3 Exams + final (drop lowest, $3 \times 20\%$ )	60 %
Homeworks ( $4 \times 8\%$ )	32 %
Class participation	4 %
Colloquium essay	4 %
Colloquium participation	extra credits for 0.25 % / seminar participation

Exams and final will be open note and open computer, but no reference to homework solutions is permitted. The boundaries for letter grades are  $A \geq 90\%$ ,  $B \geq 80\%$ ,  $C \geq 70\%$ ,  $D \geq 50\%$ , with a possible curve. Joint homework is permitted with same grades for each contributor. Independent work is expected for exams/final and other components of evaluation where copying is prohibited.

## **LATE HOMEWORK AND ABSENCES**

Make-up exams will be allowed only for excused absences due to serious illness, death in your immediate family, or other significant reasons. Make-up exams will not be the same but similar to the regular exams. Homework will be collected on the announced due date. Late homework will lose points 10% daily. Incomplete homework will be given partial credits. No homework will be accepted after the last day of class.

## **HOMEWORK**

I will assign homework regularly. The solutions you hand in should include full descriptions, analysis, equations, and appropriate graphs or data. Typed homework is expected.

You will be assigned an account on the physics computers available in Moulton rooms 309&307. You are welcome to use software provided on these machines in connection with this class.

## **MISCELLANEOUS**

Homework and test solutions will also be discussed in class.

## **POSSIBLE TOPICS**

Below is a tentative list of the topics. I will be happy to adjust them to meet your needs.

### Relevant chapters and a rough schedule

(1) Calculating on the Back of an Envelope (§1–§4, §6, §7)

(2) Units and Unit Conversions (§1–§8)

Exam#1 in week 4 (Sept 8–12)

(3) Percentages, Sales Tax and Discounts (§1–§8)

(4) Inflation (§1–§6)

(5) Average Values (§1–§4)

Exam#2 in week 8 (Oct 6–10)

(6) Income Distribution – Excel, Charts and Statistics (§1–§9)

(7) Electricity Bills and Income Taxes – Linear Functions (§1–§7)

(8) Climate Change and the Tower of Pisa – Linear Models (§1–§3)

Exam#3 in week 12 (Nov 3–7)

(9) Compound Interest – Exponential Growth (§1–§5)

(11) Probability – Counting, Betting, Insurance (§1–§3, §5)

(12) Break the Bank – Independent Events (§1, §2)

Final in finals week (Dec 8–12)

Colloquium essay due Dec 5