

## ST570-01 --- Electricity – Summer 2015

### Detailed Syllabus/Homework Assignments

The summer semester is very rapid. Homeworks must be completed at the rate of 2 or 3 per week. **I will not penalize late homework up until it is 2 weeks late – however after that I cannot accept it.** (If there is some specific hardship please contact me).

When doing homeworks, please use the assignment numbers from this sheet so you can keep track (and I can keep track) of how far you've gotten. I strongly prefer you submit homeworks into Canvas. If there is a technical difficulty you may e-mail: In that case, please send to [mpsonnenfeld@gmail.com](mailto:mpsonnenfeld@gmail.com) and put ST570 in subject line.

Note that I have tried to synchronize the homeworks with the lectures, but not all assignments are the same length. The first couple of assignments are MORE work (more lectures/labs to watch).

### **Detailed Homework Assignments:**

#### **HW01 Due 6/15/2015:**

Watch this lecture:

*00 LAB - Difference Between Electricity and Magnetism*

#### **HW01-part 1:**

*Write a paragraph of reaction: What parts of this demo do you think you could use in your classroom (if any)?*

*Did you personally learn anything from this demo?*

*What do you think your students might learn?*

*Did it raise any (scientific or technical) questions for you?*

*What questions do you think it would raise for your students?*

Watch these lecture/demos:

01 Lecture - Introduction and Tribocharging

01a LAB - There Are Two Types of Charges

01b LAB - Polarization and Induced Charge

#### **HW01-part 2:**

*Write a reaction to the labs (same questions as in part 1 above).*

#### **HW02 Due 6/15/2015:**

Read sections 10.1 and 10.2 of Hewitt (this material is posted).

<http://kestrel.nmt.edu/~rsonnenf/phys570/phys570.html> (Click "text")

**HW02:**

*Answer Review Questions 10.1-10.10 in Hewitt.*

*Answer Exercises 10.1-10.7 in Hewitt (omit #5).*

**HW03 Due 6/22:**

Watch this lecture:

02 Lecture - Scientific Notation and Coulombs Law

**HW03-part 1:**

*Answer the questions on slides 25, 26, 27 (which you can find here:*

*[http://kestrel.nmt.edu/~rsonnenf/phys570/Lectures/Lecture01\\_02\\_03.pdf](http://kestrel.nmt.edu/~rsonnenf/phys570/Lectures/Lecture01_02_03.pdf))*

**HW03-part 2:**

*Do the worksheet entitled HW03b\_Scientific\_Notation*

*Show your work. (Note: Each page of the worksheet has 10 problems. You may do all 10, but if you feel you understand the material, you can do any five of the problems for full credit).*

[There is also a HW03a which includes solutions. You do not need to submit this. It allows you to check that you understand what you are doing]

**HW04 Due 6/22:**

Watch this lecture:

03 Lecture – Vectors and Electric Field

*Do the worksheet entitled HW04\_CoulombsLaw.*

**HW05 Due 6/29:**

Read section 10.3 and 10.4 of Hewitt.

*Do Review Questions 11 thru 14 and Exercises 8 thru 17.*

Watch these lectures:

04 Lecture - Superposition of Electric Force Vectors

**HW06 Due 6/29:**

Watch these lecture:

05 Lecture – Electric Field

06 Lecture – Vector Components

*Do the worksheet entitled 06\_VectorAdditionAll*

**HW07 Due 7/6:**

**[This is the most difficult assignment in the course ... it gets easier after this]**

Watch this lecture:

Lecture 7 – Calculating Electric Field and Force using Coulomb's Law and Vector

## Components

*Use superposition and components to calculate the force and field for problems 6, 7 and 8 (that were shown in Lecture #7).*

*Also send pHeT screenshots demonstrating that you used pHeT to calculate the field for these same three problems. (as you were directed to do in Lecture 7)*

## **HW08 Due 7/6:**

Watch this lecture:

### 08 Lecture - Work Potential energy and Kinetic Energy

*Do the problems covered in Lecture 8 on the page #s given below. Show your work. I explain all of these in the lecture, but it is useful for you to reproduce the work with your own pencil and your own mind.*

<http://kestrel.nmt.edu/~rsonnenf/phys570/phys570.html> (Click "Lectures")

Specifically, answer the multiple choice on page 7.

Do "Problem 1" on page 14.

Do problem 2 on page 16.

Do problem 3 on page 18.

## **HW09 Due 7/13:**

Watch this lecture:

### 09 Lecture – Work, Electric Potential, Potential Energy, Voltage

*Do problems 9-1 through 9-8 on the lecture 9 notes. These problems can be found on slides 5, 8, 10, 12, 19 and 20. (Use the pdfs of the notes I posted rather than trying to work on the video. I have clarified the language in the pdfs).*

## **HW10 Due 7/13:**

Watch this lecture:

### 10 Lecture - Current Power Resistance and Ohms Law

*10-1: Based on the first few slides of lecture 10, can you explain the difference between electrical conductors and electrical insulators?*

*10-2: Electrical conductors are also good conductors of heat. Do you want to speculate on why this may be true?*

*10-3: On page 9 of lecture 10 is the hydraulic analogy for Charge, Current and Voltage. Can you explain this in your own words?*

*10-4: This problem is on slide 10.*

*From slide 10 on you will find problems 10-4 through 10-9.*

*Please complete. Show your work.*

**HW11 Due 7/20:**

Watch this lecture:

11 Lecture - Working with Power and Ohms Law

*Do Problems 11-1, 11-8 on lecture 11 slides 5-15*

**HW12 Due 7/20:**

Watch this lecture:

12 Lecture - Resistance and Resistivity

*Do Problems 12-1, 12-3 on lecture 12 slides*

**HW13 Due 7/20:**

Watch this lecture:

13 Lecture Equivalent Resistance

*Do the "HW13\_Equivalent Resistance" lab and write it up.*

**HW14 Due 7/27:**

Watch this lecture:

14 Lecture - Ideal Circuits with Lightbulbs

*Do the "HW14\_lightbulbs\_computer" lab and write it up.*

**HW15 Due 7/27:**

Watch this lecture:

15 Lecture - Real Circuits with Lightbulbs

*Do the "HW15\_lightbulbs\_real" lab and write it up.*

**HW16 Due 7/31:**

Watch this lecture/demos:

16 LAB - Intro LEDES and Limes

16a LAB - Lime Lights

*Do the "HW16\_limelight" lab and write it up.*

