

# Three Rivers Community College

## PHY K222 Calculus-Based Physics II

### Syllabus

#### Spring 2011

**Credit Hours: 4**

**January 20-May 16, 2010**

**Lecture: Tue & Thurs at 9:30-10:45 AM**

**Lab: Wednesday at 9:00-11:45 AM**

Instructor	eMail Addresses	Phone	Office Hours
Philip C. Ross, Ph.D.	<a href="mailto:pross@trcc.commnet.edu">pross@trcc.commnet.edu</a> <a href="mailto:philross29@msn.com">philross29@msn.com</a>	Office 860-823-2820 Home 860-443-1129 Cell 860-705-4460	by appointment E205

**Course Description:** This course is a continuation of PHY\* K221. Major topics will include continuation of the study of solids, electromagnetic phenomena, Maxwell's equations, and atomic and sub-atomic phenomena. Laboratories will center around studying electromagnetic phenomena and enhancing student knowledge of the relationship between electricity, magnetism and light.

**Learning Outcomes:** See last page of this syllabus.

**Lecture Textbook (required):** Physics for Scientists and Engineers, 4<sup>th</sup> edition, by Douglas C. Giancoli

**Lab Manual:** Lab Experimental Procedures provided by instructor

**Graphing Calculator (required):** same as Precalculus course (TI-83, TI-84, TI-89 or TI-Nspire)

**Prerequisite:** PHY 221      **Prerequisite/Co-requisite:** Math 254

**Vista blackboard:** <http://my.commnet.edu/> is the official location for assignments, grades, lecture notes and course information. The student will review their grades at this website to determine their ongoing grade status and to identify any missing materials that they need to make up.

**Lab Reports:** You work with lab partners in the lab, but you must each prepare your own lab report, due at the beginning of the next lab period. Unexcused late lab reports will have 2 pts per week deducted (2 pts if turned in during the first week after it is due, 4 pts if turned in during the 2<sup>nd</sup> week, etc.). Each of the 13 lab reports is worth 10 points. The lab reports contribute as much as 2.5 letter grades towards your final grade.

**Attendance:** Attendance will be recorded. Attendance for scheduled tests is mandatory. Notify the instructor in advance (phone, email, or in person) if you will be unable to take a test. Make-up exams will be provided to the student if the absence is approved by the instructor; it is the student's responsibility to contact the professor and schedule the make-up exam.

**Tests:** The student is permitted two sheets of personal study notes, copies of the inside covers of the textbook and a graphing calculator during the test.

**Grading Policy:** *When solving problems, use the GECCA format (described on page 3) to demonstrate understanding, reinforce learning, and possibly earn partial credit if your final result is incorrect.*

Grade equivalents:

A	93-100	B	83-86	C	73-76	D	63-66
A-	90-92	B-	80-82	C-	70-72	D-	60-62
B+	87-89	C+	77-79	D+	67-69	F	59 or less

**Grade Point Totals:** *The four exams are worth 100 points each. The lab reports are worth 130 points. Your average is determined by the sum of all of these, divided by 530.*

**Questions?** I have office hours for an hour after each class; you can also phone or email me.

**Learning Resources:** Three Rivers offers tutoring and other learning resources

([http://www.trcc.commnet.edu/Div\\_academics/TASC/TASC.shtml](http://www.trcc.commnet.edu/Div_academics/TASC/TASC.shtml)).

**Academic Integrity Policy:** Cheating on an exam, handing in another's work as your own, or falsifying records of laboratory or other data is a violation of the Three Rivers Academic Integrity Policy

([http://www.trcc.commnet.edu/Div\\_StudentServices/StudentPrograms/PDF/TRCC-StudentHandbook.pdf](http://www.trcc.commnet.edu/Div_StudentServices/StudentPrograms/PDF/TRCC-StudentHandbook.pdf)).

**Disabilities:** If you have a hidden or visible disability, please see me as soon as possible.

([http://www.trcc.commnet.edu/Div\\_StudentServices/LDResources/LDResources.shtml](http://www.trcc.commnet.edu/Div_StudentServices/LDResources/LDResources.shtml))

## Lecture Course Outline (subject to change)

Week	Topics (chapters)
20-Jan	Waves (ch 15)
24-Jan	Sound (ch 16); Electric Charge and Field (ch 21)
31-Jan	Gauss's Law (ch 22); Electric Potential (ch 23); <b>February 3 – no class</b>
<b>7-Feb</b>	<b>Test 1 (ch 15, 16, 21, 22);</b> Capacitance, Dielectrics and Electric Energy Storage (ch 24)
14-Feb	Electric Currents and Resistance (ch 25)
21-Feb	DC Circuits (ch 26)
28-Feb	Magnetism (ch 27); Magnetic Fields (ch 28)
<b>7-Mar</b>	<b>Test 2 (ch 23, 24, 25, 26);</b>
<b>14-Mar</b>	<b>Spring break – no classes</b>
21-Mar	Electromagnetic Induction (ch 29)
28-Mar	Inductance and AC Circuits (ch 30)
4-Apr	Electromagnetic Waves (ch 31)
<b>11-Apr</b>	<b>Test 3 (ch 27, 28, 29, 30, 31);</b>
18-Apr	Reflection and Refraction (ch 32); Lenses (ch 33)
25-Apr	Interference and Light (ch 34); Diffraction and Polarization (ch 35)
2-May	Special Theory of Relativity (ch 36)
9-May	Quantum Theory (ch 37)
<b>16-May</b>	<b>Test 4 (ch 32, 33, 34, 35, 36, 37)</b>

## Laboratory Outline (subject to change)

Date	Experiment
26-Jan	Speed of Sound
2-Feb	Fields and Potentials
9-Feb	Ohm's Law
16-Feb	Capacitors
23-Feb	Series/Parallel Circuits
2-Mar	Oscilloscope/AC measurements
16-Mar	Spring Break - <b>No lab this week</b>
9-Mar	Inductors
23-Mar	RLC circuits
30-Mar	Reflection and Refraction
6-Apr	Lens systems
13-Apr	Slits and gratings
20-Apr	The spectrometer
27-Apr	Photoelectric effect
4,11-May	Review/excused makeup section

## GECCA

*(Use GECCA for problem solving in all tests, lab reports and homework)*

**Given:** If possible, draw a picture. List the variables and constraints provided in the problem. Identify the answer needed (your goal).

**Equation:** Write the equation(s) to be used to solve the problem. Include the units.

**Conversions:** Convert any given values needed so that all units are consistent with the equation.

**Calculations:** Work through the calculations

**Answer:** Write the final answer

## Learning Outcomes

The student will be able to:

- Read and follow instructions
- Assemble and use lab equipment used to study sound, electricity, magnetism and optics.
- Collect data in an organized fashion, noting precision of measurement and unit labels.
- Analyze data by creating graphs (by hand and by computer, with slope and intercept, if needed) and by correctly inserting data into equations.
- Round results and state measurements using the concepts of accuracy and precision.
- Calculate % error, where applicable.
- Explain sources of error in an experiment based on the limitations of the equipment used.
- Draw conclusions by relating their results to the appropriate physics principles.
- Use the SI system of measurements in solution of physics problems.
- Perform unit conversions and cancel units correctly during computations.
- Apply calculus to physics problems.
- Compare the types of waves and analyze how energy is transported by waves.
- Explain the characteristics of sound, including the velocity, intensity, pitch and quality of sounds.
- Analyze the fundamental frequency and overtones of sounds created by a tube (e.g., organ pipe).
- Predict the interference of sound waves.
- Explain electric charge and its conservation.
- Explain Coulomb's Law and analyze the electrostatic forces between charges.
- Analyze the electric field surrounding a charges or group of charges.
- Explain Gauss's Law and analyze the electric flux through closed surfaces.
- Explain electric potential and compare the potential related to an electric field or due to point or distributed charges.
- Explain capacitance and analyze the characteristics of capacitors in series and in parallel.
- Explain electrical energy storage and predict the electrical energy stored by capacitors.
- Explain electrical current and resistance and apply Ohm's Law.
- Explain resistivity and electric power.
- Compare direct and alternating current.
- Predict the characteristics of various DC circuits.
- Apply Kirchoff's Rules to predict the characteristics of various circuits.
- Predict and explain the characteristics of RC circuits.
- Explain magnetism and electromagnetism.
- Predict the force on an electric current in a magnetic field.
- Using Ampere's Law, analyze the field inside and outside a conductor.
- Explain electromagnetic induction using Faraday's Law and Lenz's Law.
- Explain inductance and analyze the characteristics of LR and LC circuits.
- Evaluate how Maxwell's Laws explain the production and characteristics of electromagnetic waves.
- Describe the electromagnetic spectrum and analyze characteristics of electromagnetic waves.
- Compare the reflection and refraction of light and analyze the characteristics of systems of lenses.
- Evaluate the credibility of double-slit interference patterns as evidence of the wave nature of light.
- Analyze the line spectra of different light sources using a spectrometer.
- Evaluate consequences of Einstein's special theory of relativity.