“Education is not the piling on of learning, information, data, facts, skills, or abilities – that is training or instruction – but is rather making visible what is hidden as a seed.”
- Sir Thomas Moore

I. INSTRUCTOR INFORMATION

Dr. David Johnston

Office: Masters Hall 207
Office Hours: MWF 2:00 – 4:00 pm, or by appointment
Phone: (717) 337-6022
E-mail: djohnsto@gettysburg.edu

Peer Science Mentor (PSM): Nicolo Montecalvo (Physics, ’15)
montni01@gettysburg.edu

II. COURSE INFORMATION

Title: Introductory Physics II; PHY 110
Meeting Times: MWF 10:00 – 10:50 am, Masters Hall 117
Final Exam: Monday, May 5 (8:30 – 11:30 am)

Pre-requisites: Introductory Physics I, PHY 109
Co-requisites: You must also register for the PHY 110 Lab session (L1)


III. COURSE DESCRIPTION

Physics 110 is the second semester calculus based Physics course designed to satisfy the major requirements for Chemistry, and Biochemistry and Molecular Biology majors but can be taken by other students that meet the requirements. The course will explore a wide range of topics including, simple harmonic motion, waves, vibrations and sound, light, optics, electricity and magnetism, and electric circuits.

The goal of this course is not only to survey the physical phenomena that occur in our world, but, also, to learn to think critically and analytically when solving problems, regardless of the context. Analytical problem solving skills are essential in this class, so we will spend a lot of time practicing quantitative problems, as well as evaluating our conceptual understanding.

This is an active learning course; it is your responsibility to come to class prepared and engaged. We shall highlight the main concepts in lecture and then spend our time working with and reinforcing our understanding of the concepts.
“Research has shown that learning to do physics has more in common with learning to play a sport or musical instrument than it does with memorizing a body of information. This course is structured to fit this metaphor. This means that you should consider class sessions and homework to be practice, exams to be games or recitals, and your professors and student assistants to be coaches. You will receive credit for both practice and performance in this course.”

As well as being a required component of the chemistry/BMB major, this course contributes to the Gettysburg College curricular goals and is designated a “natural science with lab.” Furthermore, this class will improve your skills of skeptical inquiry and problem solving. The physical principles and analytic techniques you learn in this class, will allow you to better understand, for example, the problems of climate change and alternative energy that are facing our world; and, in turn, you will be better equipped to make informed decisions.

Ultimately, I want to share with you the beauty and power of physics. For those of you who will continue onto a scientific career, physics will allow you to more fully understand the chemical or biological process that you will study. Even if you do not pursue a career in the sciences, an understanding of physics, even a basic one, will help you to appreciate the harmony and beauty of our world.

IV. TOPICS

A. Waves, (Chps. 14 – 16)
   a. Oscillations, (Chp. 14)
   b. Wave Motion, (Chp. 15)
   c. Sound, (Chp. 16)

B. Light, (Chps. 31 – 35)
   a. Light as an Electromagnetic Wave and the Electromagnetic Spectrum, (Chp. 31.6)
   b. Light: Reflection and Refraction, (Chp. 32)
   c. Lenses and Optical Instruments, (Chp. 33)
   d. The Wave Nature of Light; Interference, (Chp. 34)
   e. Diffraction and Polarization, (Chp. 35)

C. Electricity and Magnetism, (Chps. 21 – 30)
   a. Electric Charge and Electric Field, (Chp. 21)
   b. Gauss’s Law, (Chp. 22)
   c. Electric Potential, (Chp. 23)
   d. Capacitance, Dielectrics, Electric Energy Storage, (Chp. 24)
   e. Electric Currents and Resistance, (Chp. 25)
   f. DC Circuits, (Chp. 26)
   g. Magnetism, (Chp. 27)
   h. Sources of Magnetic Fields, (Chp. 28)
   i. Electromagnetic Induction and Faraday’s Law, (Chp. 29)
   j. Inductance, Electromagnetic Oscillations, and AC Circuits, (Chp. 30)

1 Thomas Moore. *The Six Ideas that Shaped Physics*
D. Quantum Mechanics & Radioactivity, (Chps. 37 – 42)
   a. Early Quantum Theory and Models of the Atom, (Chp. 37)
   b. Quantum Mechanics, (Chp. 38)
   c. Quantum Mechanics & Atoms, (Chp. 39)
   d. Nuclear Physics and Radioactivity, (Chp. 41)
   e. Nuclear Energy: Effects and Uses of Radiation (Chp. 42)

V. MOODLE & EMAIL

All reading quizzes, homework, post-lecture PowerPoint slides, homework solutions, as well as course announcements will be posted on Moodle. Please check the Moodle site often. I will also send announcements to your Gettysburg College email; so check that frequently as well.

VI. REQUIRED MATERIALS

- Textbook.
  - I expect you to bring this to class AND lab
- A decent scientific calculator.
  - NO cell phone calculators
  - You should have your calculator with you for class and lab
- Student Response Device, (‘clicker’).
  - A small response keypad which will be used for in-class participation
  - Available at the bookstore
  - With care one set of batteries should last the entire semester
- A quadrille-lined, non-spiral notebook.
  - You will need this for your labs

VII. IN-CLASS WORK & PARTICIPATION (CLICKERS)

Everyday we will use class time to work through questions, problems, examples, etc. Whether it is just you and your calculator or you are discussing ideas with others around you, each person is responsible for participating. In-class work will include conceptual questions, quantitative problems, and anything else that helps us process and internalize the course material.

We will measure our comprehension of concepts using the clickers. Therefore, please be sure to bring your clickers with you for every class. Starting this week, you will lose participation points if you do not respond to the in-class questions. Everyone is permitted three free drops of the in-class work, after that you will begin to lose participation points.

Since you are receiving course credit for your participation in class, per the Gettysburg College honor code, YOU must be there with your own clicker. If someone is not in class but his/her clicker is, that is a violation of the honor code, and all involved parties will be turned over to the Dean of Academic Advising.
In-class work cannot be made up.

VIII. READING QUIZZES

Reading quizzes are short, multiple-choice and true/false quizzes that test your familiarity with the concepts presented in the text. They will be posted on Moodle and I will inform you when they are up. These are timed quizzes, typically 30 minutes, and you can only take them once, so be certain that when you take it you are ready to complete it. Although you are permitted to use your textbook while taking the quiz, you are not allowed to discuss the quiz with anyone else during the time in which it is open on Moodle, share questions after you have completed the quiz, or help anyone with his/her quiz.

Remember, the honor code applies to ALL work that is to be assessed. If you have questions about the quizzes please ask in class or during office hours. Once again, there will be no make-up quizzes.

IX. HOMEWORK

Homework will be assigned on a weekly/biweekly basis, and will be posted on Moodle. You will be graded on both the completeness and correctness of your quantitative work. In order to receive full credit for your work, not only must it be correct, you must clearly and thoroughly support and convey your solution.

Solutions to the homework will be posted on Moodle on the due date, after it has been collected. Therefore, NO late homework will be accepted. To shorten the turnaround time, only a few problems will be graded per assignment. It is your responsibility to work through the posted solutions for all problems and ask questions about anything you do not understand. Revisiting these problems is a great way to study for the exams.

Be very careful when working together with others on the homework problems. Two or more papers should not show identical work, in part or in whole, nor should your homework resemble previously posted or available Internet solutions. You are allowed to work in groups on the homework assignments as long as you acknowledge whom you are working with on the front page of your work. If I determine that you have not properly acknowledged your collaborators, this will be reported as an honor code violation. Again, as a member of the Gettysburg College community you are expected to uphold the Honor Code at all times.

For legitimate absences, contact me as soon as possible regarding homework. However, in general, if you know you will be gone on a day an assignment is due, you will need to hand it in ahead of time.

The lowest of all homework grades will be dropped.
X. EXAMS

There will be three, one-hour exams, scheduled throughout the semester, and a three hour final. The exams are scheduled for the following days:

- Exam I (Chapters 14 – 16): Wednesday, February 12
- Exam II (Chapters 32 – 35): Friday, March 7
- Exam III (Chapters 25 – 29): Friday, April 18
- Final Exam: Monday, May 5, 8:30 – 11:30 am

Each exam will consist of multiple-choice and short answer conceptual questions, and quantitative problems. You must clearly show all your work for the quantitative problems in order to receive full credit. I will provide you with a formula sheet for each exam with the basic forms of equations and constants.

On each of the three midterm exams you will have the chance to hand in test corrections, for which you can earn up to 50% of the points you lost. We will talk about this more after the first exam.

During all exams, backpacks, purses, and bags must be left at the front of the room. Please have several pens and/or pencils with you, as you will not be permitted to retrieve anything from your bag during the exam. Also, you may not share calculators during the exam, so make sure to have yours and that the batteries are working.

The 4th exam, the final, will be cumulative. However, there will be a higher concentration of questions from the last four chapters.

Exam dates are firm and listed on the course calendar. There are no make-up exams, early exams, or late exams.

XI. LAB

Meeting Times: Wednesdays, 7 – 10pm, Masters Hall 210
Lab Professor: Me!

You must complete all labs to receive credit in this course. Labs begin the first week of classes, so your first lab session is Wednesday, August 28. The labs are a fun, active way to interact with the course material; they help you understand some of the concepts we approach in class and teach you methods that are common to all good lab work.
XII. GRADING

In-class work & Participation: 5%
Quizzes: 5%
Lab: 20%
Homework: 10%
Exam 1: 13%
Exam 2: 13%
Exam 3: 13%
Final: 21%

Final letter grades are assigned based on a standard scale:

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XIII. ACADEMIC INTEGRITY AT GETTYSBURG COLLEGE

Your are held individually accountable for all work that you turn in for a grade. I encourage you to work out concepts and problem solving strategies with your fellow students, but be aware that ‘working together’ can easily cross the line into academic misconduct. How do you know if the work you are handing in is your own? Can you redo the work, starting with a blank page, and with no help from anyone? You should be able to do all of your work using only your text and class notes.

On all assignments that you submit for a grade, you are expected to acknowledge the honor pledge: *I affirm that I have upheld the highest principles of honesty and integrity in my academic work and have not witnessed a violation of the Honor Code.*

Please write out and sign the above statement of academic honor on all homework that you turn in for a grade. The honor pledge will also be on your exams, and you will need to sign it before I will accept your exam.

You can find information regarding academic misconduct and the honor code at the following site: [http://gettysburg.edu/about/offices/provost/advising/honor_code/index.dot](http://gettysburg.edu/about/offices/provost/advising/honor_code/index.dot)

Remember, it is your responsibility to report honor code violations.

Please talk to me if you have any questions about the honor code and how it relates to this class.
XIV. EXPECTATIONS

- I expect you to come to class having read the assigned material in the text AND worked through the examples and practice problems.
- You should also watch the online lectures (and take notes) before class.
- I want you to come to class ready to engage and learn something new everyday.
- I expect you to ask questions about anything you don’t understand.
  - I am here to help you understand the material.
- Unless you present an official document from academic advising which explicitly requires the use of a laptop or tablet during class, I ask that you do not have these or any other electronic devices out and in use during class time. Please silence or turn off cell phones.
- Keep in mind that this course requires at least 6 hours of work outside of class each week.

XV. ACCOMMODATION FOR STUDENTS WITH SPECIAL NEEDS

Students with disabilities requiring accommodations to participate in class activities or meet course requirements should contact me as early as possible in the semester. All disability information will be kept confidential, as required by law.

XVI. ADDITIONAL INFORMATION

Always feel free to e-mail or stop by if you have any questions, concerns, or would just like to talk.