

# Elementary Mechanics, Heat & Matter Physics 105 Fall 2008 Course Document

Andrew Carmichael  
SUNY Cortland  
Department of Physics

version: Friday 5<sup>th</sup> September, 2008 13:40

## Instructor: Andrew Carmichael

- Email: [andrew.carmichael@cortland.edu](mailto:andrew.carmichael@cortland.edu)
- Office: Bowers 147
- Phone: 607 753 5697
- Official office hours:
  - Monday 2:00 to 5:00 p.m.
  - Thursday 3:00 to 5:00 p.m.
  - Or by appointment
- If you come by my office unexpectedly outside of the office hours and I'm there, I'll be happy to talk to you unless I'm doing something ultra-critical.
- Department web site: [www.cortland.edu/physics/](http://www.cortland.edu/physics/)

## Course Text

- *Physics* by Cutnell & Johnson published by Wiley.
- The accompanying student's solutions manual.
- The laboratory manual, available from the campus bookshop.
- The book has a companion website at <http://bcs.wiley.com/he-bcs/Books?action=index&bcsId=1346&itemId=0471151831>
- The book also has online resources at Wiley Plus <http://edugen.wiley.com/edugen/secure/index.uni?protocol=http>
- You may use an earlier edition than the latest one, but be aware that changes, in particular regarding homework problems, may have been made.
- The book covers most topics to some degree. However, I may introduce material scantily covered in or omitted from the text, so keeping good lecture notes is important.
- The main library may have some useful books covering the topics in the course. You can check at <http://library.cortland.edu/>
- Some cheap books can be found at:
  - [www.studentmarket.com/textbooks.html](http://www.studentmarket.com/textbooks.html)
  - [www.directtextbook.com/](http://www.directtextbook.com/)

## Additional Resources

- Here are some more links:
  - A free online general physics book exists at <http://www.lightandmatter.com>
  - Understanding vectors: <http://id.mind.net/zona/mstm/physics/mechanics/vectors/vectors.html>

- Physics news:  
<http://physicsworld.com/cws/home>  
<http://www.physicstoday.org/>
- Physics history:  
<http://www.physlink.com/Education/History.cfm>
- Google physics.  
<http://directory.google.com/Top/Science/Physics/>  
For this course, the pertinent sections are classical mechanics and thermodynamics:  
[http://directory.google.com/Top/Science/Physics/Classical\\_Mechanics/](http://directory.google.com/Top/Science/Physics/Classical_Mechanics/)  
<http://directory.google.com/Top/Science/Physics/Thermodynamics/>

## Course Content Overview

The course will give a general algebra based introduction to physics, in particular the subjects of classical mechanics, heat and matter. The methods of science and applications to diverse fields are stressed. Three lectures and one two-hour laboratory each week. The subject matter is divided into the following parts:

- **Classical Mechanics:** the branch of physics first explored by Isaac Newton which describes the motion of objects and gives meaning to the terms force, momentum and energy.
- **Newtonian Gravitation:** Newton's description of the gravitational interaction between massive objects and its implications, for example, for the planets.
- **Thermodynamics:** The science of heat & temperature.
- **Properties of Matter:** The behaviour of materials, theory of elasticity, phase changes.

## Lecture

- Monday, Wednesday, Friday; 8:00-8:50 a.m. Bowers room 109.
- Do not use any electronic devices (other than a calculator) such as cellphones, portable music players etc. during class.

## Laboratory

- See the attendance policy in the 'Preparation...' section below.
- Bring a notebook to lab to write down notes from the board and observations before writing up the report.

## Homework

- I shall give homeworks most weeks.
- You are allowed (and encouraged) to work together on homeworks.
- You are also required to read the relevant sections of the book each week. The provisional list of topics is on the last page of this document, but topics may change.
- I may decide to keep either originals or copies of any of your work.

## Exams

- We shall have two exams during the course of the semester and one final.
- Always write your full name, school ID number, course and section number and my name on your exam.

- I'll give you a formula sheet for the exams, a copy of which I'll give you ahead of time. You may quote anything from the formula sheet without proof (unless specifically asked for proof). For any other formula you remember or derive, you must clearly explain its derivation.
- The final exam will be cumulative. Exams 1 & 2 will cover select topics.
- I may decide to keep either copies or originals of any of your exams.
- For the final exam schedule, check the page:  
<http://www.cortland.edu/registrar/finalexamschedule.html>
- The location of the final is listed on the above site. It may not be our usual classroom.
- Exams 1 & 2 and the reviews will, unless I announce otherwise, be in our usual classroom.
- You may not miss an exam without a well documented reason.
- Anybody who cannot attend an exam for legitimate reasons must contact me immediately.
- If you have other exams or tests on the same day as in-class exams, tell me and we may be able to reschedule for you. For conflicts around the final, you must contact the dean's office.

## General

- **Disabilities:** If you are a student with a disability and wish to request accommodations, please contact Disability Services located in Van Hoesen Hall, Room B-40, or call (607) 753-2066 for an appointment. Any information regarding your disability will remain confidential. Because many accommodations require early planning, requests for accommodations will be reviewed in a timely manner to determine their appropriateness to this setting.
- **Scheduling:** Be sure to deal with any scheduling conflicts as early as possible, preferably within the first week of classes.
- **email:** Be sure to check your college email regularly. I may send assignments or other important information this way. You can check at:  
<http://webmail.cortland.edu/secure/>
- **Websites:** I may put important things such as assignments and formula sheets on the web either on Bannerweb or WebCT.  
<https://blaze.cortland.edu/cp/home/displaylogin>
- **Label your work:** Always write your name, school ID number, course and section number and my name on any work you submit. This includes exams, tests, homeworks, quizzes, etc.
- **Cancellations:** Class and exam cancellations due to emergencies or bad weather are announced in various ways. See  
<http://www.cortland.edu/emergency/index.html>
- Check the academic calendar for important dates  
<http://www.cortland.edu/registrar/calendarinformation.html>
- Some potentially useful info:
  - Student Health Service (607) 753-4811  
<http://www.cortland.edu/sdc/hservices/index.html>

## Preparation & Some Things to Look Out For:

- **Attendance:**
  - **Lecture:** Although I won't make attendance at lectures compulsory, I recommend that you always attend. I may cover material which is either scantily covered in or omitted from the textbook and so you will need your lecture notes as well when studying for the exams.
  - **Lab:** For the laboratory, however, you should always attend. In certain circumstances, I shall grant an excused absence, but you must arrange to make up missed work. Excessive unexcused

laboratory absences could result in a fail grade for the course.

- **Notes:** I recommend that you recopy your notes shortly after the lecture. It is a good idea to make some supplementary notes of your own as well.
- **Formula sheet:** You are not required to memorize any numerical constants, they'll be given on the formula sheet. You should, however, be familiar with the symbols used for those we encounter.
- **Extra work:** You should work out some extra problems from the book on your own. Do this even for topics you feel comfortable with, but most especially for those topics you find challenging. Come to me if you need help.
- **Working:** Always show the method by which you found your answer. How you should best write the solution depends upon the question, but the general procedure is as follows: show the formulae used and how you arranged them into the required form (target quantities on the left, known quantities on the right). Identify the target quantities, the input data given and the final answer. An answer without explanation will win you little or no credit.
- **Units:** Always clearly label any number with units or percentage signs where appropriate.
- **Sig. figs.:** Do not reproduce a string of numbers from your calculator. Always use an appropriate number of significant figures. Unless otherwise stated, 3 are usually sufficient.
- **Presentation:** Try to avoid writing an equation with a combination of symbols and numbers. It's far better to have all of one or the other. Find the symbolic answer, specify the known variables and then the numerical value of the target quantity.
- **Finding difficulties:** After receiving back an exam or an assignment, make sure you thoroughly go through it and understand any mistakes you made. Problems could always make a come-back on future exams or assignments. If you still have difficulty, ask me, each other or a tutor.
- **Presentation:** Presentation counts. Strive for work that is clearly legible. An illegible answer is indistinguishable from a wrong one, and will be treated as such.

## Calculators

- Any standard scientific calculator will be satisfactory.
- You may use a calculator during class and exams. For exams, you must bring your own.
- For exams, clear the memory of any programs or data.
- You may not share calculators during exams.
- During exams, you may not use any other device, such as a cell-phone, as a calculator.
- Do not use the calculator for anything unrelated to the class, such as to play games, during class or exam times.

## Grading Scheme

- Numeric score is based on the following breakdown
  - Exams 1 & 2, 15% each
  - Homework 20%
  - Laboratory 20%
  - Final Exam 30%
- The assignment of letter grades will be decided by me based upon your numeric score. Do not assume any grading rubric not explicitly specified by me.
- If you wish to know of your progress throughout the semester, ask me.

## Academic Misconduct

- The university policy on academic misconduct can be found at:  
[http://www.cortland.edu/handbook/hb08\\_10/part3.html#chapter340-200406](http://www.cortland.edu/handbook/hb08_10/part3.html#chapter340-200406)
- Plagiarism, a serious academic offense, is defined as expropriating the ideas of others and using them as one's own without due credit. Students who cheat in examinations or plagiarize in this course will be disciplined in accordance with university rules and regulations.

## Exam Rules

Strict rules governing exam conditions will apply during exams. Observe exam conditions from my announcing the start of the exam (or beginning to distribute papers) to your having left the room. The rules to be observed during exam conditions are as follows:

### Items you may/ may not bring:

- Bring your ID to all exams.
- You are allowed to have only writing materials and a calculator on your table. You must obtain my permission to have any other items at your table.
- Bags must be placed in the area I designate (usually at the instructor's desk). All unauthorized materials must be in your bag.
- Possession (outside of your bag) of any unauthorized material (e.g. books, notes, cell-phones) will be considered evidence of cheating.
- If I allow you to keep your bags at your feet, they must remain closed and off your table for the duration of the exam.
- See the policy concerning calculators in this document.
- You may not use any electronic device other than the calculator. This includes portable music players and cell phones. Such devices must remain in your bag and silent for the duration of the exam.

### General rules:

- You may not open or turn over the question paper until I or a proctor instructs you to do so.
- Maintain silence for the duration of the exam.
- Do not attempt to communicate in any way with anybody (except me or a proctor) for any reason until you have left the exam room.
- Do not attempt to look at the papers of other students.
- You may not pass anything to another student. This includes, for example, calculators.
- If you have a question for us raise your hand and wait in silence. Barring an emergency, you may not speak, even to us, without our expressed permission. You may ask only questions relating to the exam. You may not express opinions on it. Such matters may be addressed at a later time.
- Barring an emergency, you must remain in your seat from the beginning of the exam until your paper has been collected.
- After you have handed in your paper, proceed silently to leave the room.
- Do not leave without having *handed* your exam to a proctor and shown them your ID. Make sure they give you leave to leave the room.
- Obviously, do not make any attempt to discover the contents of the exam other than by asking me.
- A violation of any of these rules could be considered evidence of cheating. In any case, you could be removed from the exam and a report of your behaviour sent to the Dean's office which could lead to disciplinary action.

- Anybody who cannot follow any of these rules for legitimate reasons, must contact me ahead of time.

## Syllabus

- This list is provisional.
- The book covers most topics to some degree. However, I may introduce material scantily covered in or omitted from the text, so keeping good lecture notes is important.
  
- **Classical Mechanics & Gravitation**
  - Introduction and maths concepts - chapter 1
  - One dimensional motion; velocity and acceleration - chapter 2
  - Two dimensional motion - chapter 3
  - Forces and Newton's laws - chapter 4
  - Forces
  - Uniform circular motion - chapter 5
  - Work, kinetic energy, potential energy - chapter 6
  - Gravitation - chapters 4, 5, 6
  - Impulse, momentum & collisions - chapter 7
  - Rotational kinematics & dynamics - chapters 8, 9
  - Simple harmonic motion - chapter 10
  - Elasticity & materials - chapter 10
  
- **Heat, Temperature & Thermodynamics**
  - Temperature, heat - chapter 12, 13
  - Kinetic theory - chapter 14
  - Thermodynamics & phase changes - chapter 15