

PHYSICS 103-01 TR 0800 - 0915 DL312

<http://people.uncw.edu/morrisonj/courses/PHY103Syllabus.htm>

GREAT IDEAS IN PHYSICS

SYLLABUS

INSTRUCTOR: JOHN M. MORRISON

OFFICE: DL-201 and MYRTLE GROVE 2331

EMAIL: morrisonj@uncw.edu – Preferred Method of Communication

PHONE: 910-962-2333

OFFICE HOURS: TUESDAY AND THURSDAY, 0915 - 1015 DL201
or
CALL OR EMAIL FOR APPOINTMENT

ALSO, IF YOU HAVE QUESTIONS AT ANY TIME WHEN
YOU ARE STUDYING, EMAIL ME, I MIGHT BE ONLINE
AND ANSWER YOU IMMEDIATELY!!!

COURSE PREREQUISITES OR RESTRICTIVE STATEMENTS: None

STUDENT LEARNING OUTCOME:

- An understanding of the nature of science by the nonscientist by emphasizing the concepts underlying four great ideas in physics: the conservation of energy, the second law of thermodynamics, the relativity of time, and the wave-particle duality of nature. Explores the mutual influence of science and the humanities
- Physics deals with the study of nature in terms of matter and energy. In our course we will deal with only four fascinating topics which will hopefully allow us to learn how scientists develop concepts and how these concepts

are used to study nature. We will also spend some time studying how science and the humanities influence each other!

- Alas, the equations! The language of science is mathematics, and it is impossible to appreciate science without equations and quantitative problems. The mathematical treatment of these topics is based on high school mathematics, without calculus. A review of the mathematics needed for this course is presented in Appendix A.

REQUIRED TEXT: *"GREAT IDEAS IN PHYSICS"*, 3rd Edition
by Alan Lightman

SYLLABUS: Course work based on CHAPTERS 1 through 4 of TEXT

COURSE ORGANIZATION AND SCOPE:

- **CHAPTER 1: Conservation of Energy**
 - Conservative Laws
 - Gravitational Energy
 - Kinetic Energy
 - Units of Length, Mass, Weight, and Energy
 - Heat Energy
 - The Conservation of Energy and the Limited Lifetime of the World
 - Reactions to Possible Violations of the Conservation of Energy
- **CHAPTER 2: The Second Law of Thermodynamics**
 - Reversible and Irreversible Phenomena
 - States of a System and Probability of Configurations
 - Mechanical Energy and Heat
 - The Irreversible Flow of Heat
 - Doing Work with Heat
 - Entropy and order
 - Resistance to Implications of the Second Law
 - The Second Law Applies to Human Society
 - The Second Law Used to Refute the Theory of Evolution
- **CHAPTER 3: The Theory of Relativity**
 - The Relativity of Time*
 - Relativity in Brief
 - Science Leading to the Theory of Relativity
 - The Theory of Relativity

- Abolition of Absolute Space and Time
- Einstein's Approach to Science
- The Influence of the Theory of Relativity on Literature
- Relativity and Sculpture

- **CHAPTER 4: Quantum Mechanics**

The Wave-Particle Duality of Nature

- Waves
- The Photoelectric Effect
- The Double-Slit Experiment
- The Role of the Observer and the Nature of Reality
- Quantum Physics and Language
- The Heisenberg Uncertainty Principle and the Demise of Determinism in Science
- Determinism, Causality, and Choice in the Quantum World

Appendix A: A review of basic mathematics

Appendix B: Problems and Discussion Questions

GRADING:

- | | |
|---|----------------|
| • EXAM 1: Multiple Choice and Short Problems on Ch1 | 50 pts |
| • EXAM 2: Multiple Choice and Short Problems on Ch2 | 50 pts |
| • EXAM 3: Multiple Choice and Short Problems on Ch3 | 50 pts |
| • EXAM 4: Multiple Choice and Short Problems on Ch4 | 50 pts |
| • SHORT ESSAYS: 2 TO BE ASSIGNED | 100 pts |
| • HOMEWORK: | 100 pts |
| • CLASS PARTICIPATION: | <u>100 pts</u> |

Final grade based on percentage of **500 pts**

Final grades will be based on a plus/minus grading scale as follows:

A = 93-100; A- = 90-92; B+ = 87-89; B = 83-86; B- = 80-82; C+ = 77-79; C = 73-76; C- = 70-72; D+ = 67-69; D = 63-66; D- = 60-62; and F < 60.

FINAL EXAM: THURSDAY, DECEMBER 11, 0800 - 1100

LATE ASSIGNMENTS AND INCOMPLETE GRADES:

- Extensions for late assignments will be granted individually in consultation with the professor under extenuating circumstances. Incomplete grades will be issued in extenuating circumstances to students who are passing the course.

ABSENCES AND SCHEDULING MAKEUP WORK:

- Attendance is highly recommended as 1/7 of the grade from class participation. More than three (3) absences will result in a loss of 5 pts on your class participation grade for each additional absence unless you have an excused absence.
- Extensions will be granted on homework deadlines for students with excused absences. Partially completed work will be given partial credit. Absences from tests will result in a zero being registered for that test except for excused absence. If you miss a test due to an excused absence, it will be the responsibility of the student to make arrangements with the professor for a makeup exam.
- *Excused Absence: Case of illness documented with a note from a doctor or (when presented before the scheduled class period) officially sanctioned university activities that conflict directly with the class time or when excused from class by the professor prior to the scheduled class period.*

STATEMENT ON ACADEMIC INTEGRITY:

- University Policy on Academic Integrity: The instructor of this course is committed to upholding the University policy on academic integrity, described in the Code of Student Conduct, which can be found at: <http://www.uncw.edu/stuaff/doso/documents/HonorCode09.10.doc>
- *“As a student at The University of North Carolina Wilmington, I am committed to honesty and truthfulness in academic inquiry and in the pursuit of knowledge. I pledge to uphold and promote the UNCW Student Academic Honor Code.”*
- “It is the responsibility of every faculty member, student, administrator and staff member of the university community to uphold and maintain the highest academic standards and integrity of the university. Any member of the university community who has reasonable grounds to believe that an infraction of the Honor Code has occurred has an obligation to report the alleged violation to the faculty member teaching

the class who, in turn, must report the allegation to the Office of the Dean of Students. This obligation is a core value of the Honor Code, and must be fulfilled by each and every member of the university.”

- Faculty Expectation: The instructor of this course is committed to upholding the University policy on academic integrity.

STATEMENT REGARDING PLAGIARISM: Please be especially familiar with UNC–W’s position on plagiarism as outlined in the UNCW Student Handbook. Plagiarism is a form of academic dishonesty in which you take someone else’s ideas and represent them as your own. Here are some examples of plagiarism:

- You write about someone else’s work in your paper and do not give them credit for it by referencing them.
- You give a presentation and use someone else’s ideas and do not state that the ideas are the other persons.
- You get facts from your textbook or some other reference material and do not reference that material.

STATEMENT REGARDING VIOLENCE AND HARASSMENT.

- UNCW practices a zero tolerance policy for any kind of violent or harassing behavior. If you are experiencing an emergency of this type contact the police at 911 or UNCW CARE at 962–2273. Resources for individuals concerned with a violent or harassing situation can be located at <http://www.uncw.edu/wsrc/crisis.html>.

STATEMENT FOR STUDENTS WITH DISABILITIES:

- Students with disabilities are invited to schedule an appointment with the instructor to discuss any needed accommodations. Reasonable accommodations will be made for students with verifiable disabilities.
- In order to take advantage of available accommodations, students must present documentation to Disability Services for Students at Westside Hall, First Floor, Phone: 910–962–7555 – Fax: 910–962–7556 – TDD: 910–962–3853.

<http://www.uncw.edu/stuaff/disability/contact.htm>

- For more information on UNCW's policy on working with students with disabilities, please see

<http://www.uncw.edu/stuaff/disability/contact.htm>

STATEMENT ON LABORATORY SAFETY OR RISK ASSUMPTION:

- Any laboratory work associated with this course has no special risks that would make it less safe than any other classroom. The Department of Physics and Physical Oceanography is committed to maintaining an environment in which students can safely pursue their required laboratory assignments.