GENERAL PHYSICS II

PHY 202 Instructor: Dr. Romulo Ochoa Science Complex - P132 Phone: 771-3162 e-mail: ochoa@tcnj.edu

Text: "Fundamentals of Physics," Halliday, Resnick, Walker (10th ed.) Electronic homework: Wiley Plus Lab. Write-up: to be posted on Canvas

I. Course Description

Calculus based treatment of laws of electrostatics, magnetostatics, electromagnetism, light, and modern physics. Understanding of the important principles is emphasized. Problem solving and laboratory work are integral parts of the course.

II. Course Objectives

1. To provide a foundation in physics necessary for further study in science, engineering and technology.

2. To provide an appreciation of the nature of physics, its methods and its goals.

3. To contribute to the development of the student's thinking process through the understanding of the theory and application of this knowledge to the solution of practical problems.

III. Course Outline

- Coulomb's Law (Ch. 21) Electric charge. Conductors and Insulators. Coulomb's Law. WileyPlus homework problem set Chapter 21
- 2. Electric Fields.- (Ch. 22)

The electric field. Electric field due to a point charge. Electric field lines. Electric field due to an electric dipole. Examples of calculations of electric fields. Point charge in a uniform electric field.

WileyPlus homework problem set Chapter 22.

3. Electrical potential.- (Ch. 24)

Electric potential energy, potential difference, examples of calculations. Equipotential surfaces. Electric potential energy of a system of point charges. WileyPlus homework problem set Chapter 24.

 4. Current, resistance and direct current circuits.- (Ch. 26-27)
Electric current. Current density. Resistivity and resistance. Ohm's Law. Power in circuits. Work energy and electromotive force. Series and parallel circuits. Kirchhoff's rules. Capacitance and capacitors. WileyPlus homework problem sets Chapter 26 & Chapter 27.

Test 1

(TBA)

5. Magnetic fields.- (Ch. 28)

Magnetic force on a charge. Magnetic field lines. Discovery of the electron. Motion of charged particles in magnetic fields. Magnetic force on a current-carrying wire. WileyPlus homework problem set Chapter 28.

6. Sources of Magnetic fields.- (Ch. 29)

Magnetic field due to a current. The Biot-Savart Law. Calculations of magnetic fields. Forces between parallel conductors. WileyPlus homework problem set Chapter 29.

7. Induction.- (Ch. 30)

Faraday's law of induction. Demonstration of Induction. Motional emf. Lenz's law.

8. Electromagnetic Waves.- (Ch. 33)

Maxwell's rainbow. Traveling electromagnetic waves. Sinusoidal waves. Energy carried by electromagnetic waves. Momentum and radiation pressure. Polarization. Reflection and refraction. Dispersion. Total internal reflection. WileyPlus homework problem set Chapter 33.

Test 2

(TBA)

9. Images.- (Ch. 34)

Types of images. Reflection by plane and spherical surfaces. Refraction by thin lenses. Graphical methods. Optical instruments. WileyPlus homework problem set Chapter 34.

10. Wave optics.- (Ch. 35-36)

Interference. Light as a wave. Diffraction. Young's interference experiment. Coherence. Interference from thin films. Michelson's interferometer. Diffraction from a single slit. Diffraction by a circular aperture. Diffraction gratings. X-ray diffraction. WileyPlus homework problem sets Chapter 35 & Chapter 36.

Final Exam

(TBA)

IV. Laboratory

- Lab 1. Coefficient of linear expansion. (1/25)
- Lab 2. Coulomb's Law. (2/1)
- Lab 3. Simulation on electric fields & forces (2/8)
- Lab 4. Equipotential lines (2/15)
- Lab 5. Peer instruction. Pre-test practice. (2/22)
- Lab 6. Capacitors. (2/29)
- Lab 7. Resistance: Ohmic and non-ohmic devices (3/7)
- Lab 8. Series and parallel circuits. (3/21)
- Lab 9. Peer instruction. Pre-test practice. (3/28)
- Lab 10. Magnetic Fields due to Coils. (4/4)
- Lab 11. Magnetic Force on a Current-Carrying Wire. (4/11)
- Lab 12. Standing Waves. (4/18)
- Lab 13. Reflection and Thin lenses. (4/25)

Lab 14. Interference and diffraction (5/2)

V. Assessment of Student Performance

- 1. Electronic homework (10% of course grade)
- 2. Tests (35% of course grade)
- 3. Final exam (35% of course grade)
- 4. Lab. grade (20% of course grade)

For lab grade student must complete in a satisfactory manner the laboratory exercises; the laboratory notebook and prepare 2 (two) formal reports. Students are expected to be in the lab on time, **points will be deducted for tardiness** (if a student is more than 20 minutes late he/she will receive an automatic zero grade for that lab).

Grading Scale	
Final Score	Letter Grade
92.5 - 100	А
89.5 - 92.4	A-
86.5 - 89.4	B+
82.5 - 86.4	В
79.5 - 82.4	В-
76.5 - 79.4	C+
72.5 - 76.4	С
69.5 - 72.4	C-
66.5 - 69.4	D+
59.5 - 66.4	D
0-59.4	F

Fourth Hour:

In this class, the deep learning outcomes associated with TCNJ's 4th hour are accomplished through laboratory experiments.

VI. Bibliography

Feynman, R., <u>The Feynman Lectures on Physics</u>, Vols. 1,2, & 3, Redwood City, California: Addison-Wesley, 1989.

Serway, R. A., and Jewett, J. W., <u>Principles of Physics</u>, 4th Ed., CA, Thomson- Brooks/Cole, 2006. Young and Freedman, <u>University Physics 12th ed.</u>, New York, Addison-Wesley, 2009.

VII. SELECTED TCNJ POLICIES

Final Examinations

The final exam is not scheduled until the middle of the semester. Therefore do not plan on any travel until after the last day of the exam period. TCNJ's final examination policy is available on

the web:

http://academicaffairs.pages.tcnj.edu/college-governance/policies/final-examevaluationreadingdays-policy/

Attendance

Every student is expected to participate in each of his/her courses through regular attendance at all class sessions. It is further expected that every student will be present, on time, and prepared to participate when scheduled class sessions begin. While attendance itself is not used as a criterion for academic evaluations, grading in this course is based on participation in quizzes to be given at the beginning of several classes. No make-ups or extensions will be given unless a student has a genuine emergency. If a student misses an exam or assignment deadline they must contact the instructor within 36 hours to explain the situation; otherwise the student will earn a zero for that exam or assignment.

Students who must miss classes due to participation in a field trip, athletic event, or other official college function or for a religious holiday should arrange with their instructors for such class absences well in advance. In every instance, however, the student has the responsibility to initiate arrangements for make-up work.

TCNJ's full attendance policy is available at:

http://policies.tcnj.edu/policies/digest.php?docId=9134

Academic Integrity Policy

Academic dishonesty is any attempt by the student to gain academic advantage through dishonest means, to submit, as his or her own, work which has not been done by him/her or to give improper aid to another student in the completion of an assignment. Such dishonesty would include, but is not limited to: submitting as his/her own a project, paper, problem set, report, test, or speech copied from, partially copied, or paraphrased from the work of another (whether the source is printed, under copyright, or in manuscript form). Credit must be given for words quoted or paraphrased. The rules apply to any academic dishonesty, whether the work is graded or ungraded, group or individual, written or oral. TCNJ's academic integrity policy is available at:

http://policies.tcnj.edu/policies/viewPolicy.php?docId=7642

Americans with Disabilities Act (ADA) Policy

Any student who has a documented disability and is in need of academic accommodations should notify the professor of this course and contact the Office of Differing Abilities Services (609-771-2571). Accommodations are individualized and in accordance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1992. TCNJ's Americans with Disabilities Act (ADA) policy is available at: http://affirm.pages.tcnj.edu/key-documents