



PHY-212: Engineering Physics III

Course Title: Engineering Physics III Course Number: PHY-212 Credits: 4

Pre-requisite PHY-211

Meeting Times: _____

Meeting Room: _____

Instructor: ____

Office Hours: _____ Office Location: ____

E-mail: _____ Telephone: ____

Course Description: This is the third course of a three-course sequence on introductory Engineering Physics. Topics covered include vibratory and wave motion in general, interference of mechanical waves and related standing wave patterns, resonance and phenomena of beats, Doppler shift of sound waves, geometrical optics, and applications to lens and mirror systems, diffraction, interference, and polarization of light. Also covered are special relativity, photoelectric effect, Bohr atom, continuous and discrete spectra, Compton Effect, De Broglie and wave practical duality of matter, wave mechanics mortification of classical mechanics, and the nuclear atom. Lab experiments are performed spanning the broad spectrum of topics discussed in the lecture.

Students' Learning Outcomes/ Objectives (SLO)

Upon successful course completion students will be able to:

1. Describe simple harmonic motion mathematically and identify all the relevant physical quantities (amplitude, period, frequency, wavelength, wave number, intensity) and distinguish between them.
2. Describe the phenomena of interference, resonance, beats, and Doppler shift in the case of sound or other mechanical waves.

3. Describe the phenomena associated with light, reflection, refraction, dispersion, diffraction, interference, and polarization.
4. State that Einstein postulates and analyzes the implications of the theory of special relativity and its impact on Newtonian mechanics.
5. Trace the development of the dual nature of light and the photon concept from the works of Planck, Einstein, and Bohr and from the molecular absorption and emission spectra in general.
6. Accurately perform laboratory experiments that illustrate the phenomena discussed in the lecture including simple harmonic motion, wave properties, geometric and physical optics, measurement of the spectral emission of gases, and the photo-electric effect. Use library skills to supplement the information obtained in the course and complete the assigned project.

Text: University Physics (15th edition) By Young and Freidman

Background readings and other materials:

1. Fundamental of Physics Extended Halliday, David and Resnick, Robert.
John Wiley and Sons.
2. Technical Physics, by Frederick Bueche
3. Feynman, Character of Physical Law. Random
4. Douglas Giancarlo Physics for Scientists and Engineers.

Course Outline:

(Exams & Labs schedules are based on material covered in class)

Week	Topics
1	Periodic Motion and Simple Harmonic Motion, The Physical Pendulum, Forced Oscillation, and Resonance
2	Mechanical Waves Periodic Waves, Mathematical description of MW. Energy in Wave Motion and Standing waves
3-4	Sound and Hearing Sound Waves and Speed of S.W. Sound Intensity & Standing Waves, Standing and Normal Modes Resonance and Sound, Beats, Doppler effect and Shock Waves
Exam#1	
5	Nature & Propagation Of light Nature of Light, Speed of light Reflection and Refraction, Dispersion, Polarization, Scattering of Light and Huygens's Principle
6	Geometrical Optics, Reflection & Refraction at a Plane Surface

Reflection at a Spherical Surface Refraction at a Spherical Surface

Exam#2

- 7-8 Special Theory Physical Laws & Relativity, Relativity and Time Intervals
Relativity of Length, The Lorentz transformations
The Doppler Effect, Relativistic Momentum, Work and Energy
- 9 Photo-Electric Effect X-Ray & Compton Scattering
Particle-Wave Duality for Matter, Uncertainty

Exam#3

- 10 Particles as waves Energy Levels and Bohr's Model of the atom
The Laser and Continuous Spectra
The uncertainty Principles
- 11-12 Quantum Mechanics Wave Functions and the three-Dimensional
Schrödinger equation
Potential Wells, Potential Barriers, and Tunneling
The Harmonic Oscillator
Comparing quantum mechanics and Newtonian Oscillators
- 13-14 NUCLEAR PHYSICS: Property of Nuclei
Nuclear Binding and Nuclear Structure
Nuclear Stability and Radioactivity & Half Lives

Final Exam

Lab Experiments

(Subject to change based on class schedule and material covered)

The Spiral Spring and Simple Harmonic Motion
Dynamics of Spring Motion (Damping)
Physics of the Pendulum
The velocity of Sound and Standing Waves
Index of Refraction
Reflection and Refraction in Lenses
Absorption of Light measurements
Photo-Electric Effect

Assessment

- | | |
|-------------------------------|-----------|
| 1. Three in-class exams | 20 % each |
| 3. A final comprehensive exam | 20% |
| 4. Lab work and Assignments | 20% |

FINAL AVERAGE	GRADE	FINAL AVERAGE	GRADE
92 – 100	A	75 – 77	C+
88 – 91	A–	70 – 74	C
85 – 87	B+	60 – 69	D
82 – 84	B	0 – 59	F
78 – 81	B–		

- ATTENDANCE POLICY:

Students may be dropped after 3 absences. Regular attendance is crucial to doing well in the course. All cell phones should be turned OFF. If a student expects an emergency call, clear it with me before class. If a cell phone rings during class, the student will be asked to leave for the remainder of the class. No food or drinks are to be used except bottled water. Students are expected to follow attendance guidelines as presented in the syllabus provided by the instructor. However, in case of an emergency or illness, students are advised to notify their instructor or counselor immediately. The instructor will determine the validity of the absence. The exceptions to instructor discretion exist when members of the armed forces are called for training or assignment or in any case where students are legally required to be elsewhere. Pending the submission of appropriate documentation reasonable accommodations for make-up work shall be provided, and in accordance with guidelines included in the syllabus.

- DISABILITY SUPPORT STATEMENT:

Students with disabilities who believe that they might need accommodations in this class are encouraged to contact Counselor/Coordinator, and Disability Support Services at (201) 360-4157, as soon as possible to better ensure that such accommodations are implemented in a timely fashion. All disabilities must be documented by a qualified professional such as a Physician, Licensed Learning Disabilities Teacher Consultant (LDTC), Psychiatrist, Psychologist, Psychiatric Nurse, Licensed Social Worker or Licensed Professional Counselor, who is qualified to assess the disability that the student claims to have and make recommendations on accommodations for the student. All information provided to the Disability Support Services Program will be confidential between the program, professors involved with the student, and individual students.

- **ACADEMIC INTEGRITY STATEMENT:**

Academic Integrity Standards

Academic integrity is central to the pursuit of education. For students at HCCC, this means maintaining the highest ethical standards in completing their academic work. In doing so, students earn college credits by their honest efforts. When they are awarded a certificate of degree, they have attained a goal representing genuine achievement and can reflect with pride on their accomplishment. This is what gives college education its essential value.

Violations of the principle of academic integrity include:

Cheating on exams

Reporting false research data or experimental results

Allowing other students to copy one's work to submit to instructors

Communicating the contents of an exam to other students who will be taking the same test

Submitting the same project in more than one course, without discussing this first with the instructor

Submitting plagiarized work. Plagiarism is the use of another writer's words or ideas without properly crediting that person. This unacknowledged use may be from published books or articles, the Internet, or another student's work

When students act dishonestly in meeting their course requirements, they lower the value of education for all students. Students who violate the college's policy on academic integrity are subject to failing grades on exams or projects, or for the entire course. In some cases, serious or repeated instances of academic integrity violations may warrant further disciplinary action.

Hudson County Community College Classroom Recording Policy

- Hudson County Community College prohibits the audio-visual recording, transmission, and distribution of classroom sessions. Classes may only be recorded with the advance written permission of the instructor. The Hudson County Community College classroom recording policy must be listed in all syllabi.
- All classroom recordings can only be used for academic purposes by students enrolled in that class. Recordings may not be shared, reproduced, or uploaded to public websites or other mediums, and these recordings may contain copyrighted material and are prohibited from any form of commercial use.
- All students and guests must be informed that the class may be recorded. Due to issues related to privacy and the possible inhibition of student participation, instructors should be mindful of the effects of permitting classroom recording.

- Instructors should retain electronic or paper copies of their written consent to grant classroom recordings.
- Students must destroy their recordings at the end of the semester.
- Students who are granted permission to record their class by the office of Disability Support Services should inform the instructor beforehand and are subject to the policies outlined in this document.
- Violation of this policy is subject to disciplinary action listed under the code of conduct as included in the Student Handbook. Instructor Classroom Recording Policy
- Instructors may record their classes as long as students are informed in writing in advance that recording will take place. Instructors may distribute their own lectures, but this must be limited to the lecture portion of the class. Recordings of student presentations or activities may be used in the class if the students are notified in advance of the recording. Recordings of student presentations or activities may not be distributed in any way without the advance written consent of the students. This should be included in all syllabi: Hudson County Community College prohibits the audio-visual recording, transmission, and distribution of classroom sessions. Classes may only be recorded with the advance written permission of the instructor. The complete classroom recording policy is listed in the student handbook.

Successful people access support from others when needed. Hudson County Community College has many supportive services available to help you meet your goals. You are encouraged to contact your instructors or other professionals on campus. Below are resources available to you.

IN AN EMERGENCY, PLEASE CONTACT SECURITY or 911.

	Journal Square Campus	North Hudson Campus
<u>Counseling Services</u> counseling@hccc.edu	201-360-4150 A Building, Floor 2 https://myhudson.hccc.edu/advisement	201-360-4150 Enrollment Center, Floor 1 https://myhudson.hccc.edu/advisement
The National Suicide Prevention Lifeline: 1-800-273-8255 Crisis Text Line: Text HELLO to 741-741		
<u>Advising Services</u> advising@live.hccc.edu	201-360-4150 A Building, Floor 2 https://myhudson.hccc.edu/advisement	201-360-4150 Enrollment Center, Floor 1 https://myhudson.hccc.edu/advisement
<u>Career Development</u> career@hccc.edu	201-360-4181 A Building, Floor 3 https://myhudson.hccc.edu/career-development	201-360-4181 Floor 2, Room 204 https://myhudson.hccc.edu/career-development
<u>Disability Support Services</u> dss@hccc.edu	201-360-4157/4163 A Building, Floor 2 https://myhudson.hccc.edu/dss	201-360-4157/4163 Enrollment Services, Floor 1 https://myhudson.hccc.edu/dss
<u>Library</u> Journal Square librarian@hccc.edu North Hudson librarynhc@hccc.edu	201-360-4360 L Building, Floor 1 http://www.hccclibrary.net/	201-360-4605 Floor 3 http://www.hccclibrary.net/
<u>Tutoring Center</u> tc@hccc.edu	201-360-4187 Lower Level of Library Building https://myhudson.hccc.edu/tutoring	201-360-4623 Floor 5, Room 511 https://myhudson.hccc.edu/tutoring
<u>Writing Center</u> wc@hccc.edu	201-360-4370 J Building, Room 204 https://myhudson.hccc.edu/tutoring	201-360-4779 Floor 7, Room 703A https://myhudson.hccc.edu/tutoring/