

GENERAL PHYSICS
Spring 2020
(Dual Credit with Ball State PHYC100)
General Information

INSTRUCTOR: Hasan Fakhruddin

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OFFICE HOURS: M: 12 - 3 PM
W: 12 - 3 PM
Th: 12 - 2 PM
F: 12 -3 PM
And by appointment

TEXT: Conceptual Physics – Digital Textbook

General Physics Course (Dual Credit with Ball State)

*[Dual Credit with Ball State;
4 Cr. Hours in PHYC 100;
Enrollment in Spring 2018]*

This is the second part of the two-semester General Physics course. The General Physics is a survey course with greater emphasis on understanding concepts. The first semester covers topics in Mechanics, Fluids Static and Dynamic and this semester we will discuss the topics of Electricity & Magnetism, Waves and Sound, Heat and Thermodynamics, Optics, and Modern Physics. Laboratory work will be covered as an integral part of this course

EVALUATION:

Homework assignments: You will be assigned homework periodically at the end of various topics covered in class.

Tests: You will have three tests as indicated in Course Outline below. For each test you will be emailed a copy of equations sheet; that would be for your knowledge as to what equations you will be given and that the rest of the equations should be memorized. Please do not bring a copy of this equations sheet for the test as an exact copy of this sheet would be attached to your test that you can use.

Labs: You will have a 2-hour lab on most Thursdays. Your lab report will be graded on your participation in the actual experiment and the written report. You must save all the graded lab reports until the semester grades have been awarded.

MIDTERM GRADE: The midterm grade will be based on

Homework	50%
Tests	50%

Labs will not count toward mid-term grade; they will for the semester grade.

FINAL GRADE: The final grade will be determined from the combination of the following scores.

Homework	30%
Tests	40%
Lab	30%

GRADING SCALE (May be curved depending on the class performance):

92%	-	100%	=	A
88%	-	91%	=	A-
84%	-	87%	=	B+
82%	-	83%	=	B
78%	-	81%	=	B-
74%	-	77%	=	C+
72%	-	73%	=	C
70%	-	71%	=	C-
0%	-	69%	=	D*

POLICY FOR MAKE-UP WORK:

Make-up work will be allowed only for the excused absences. You must make arrangements for the make-up work before or immediately after the excused absence. You must make every effort to make contact with your instructor in this regard personally or by a written note, p-mail, or phone.

LATEWORK POLICY:

Late homework assignments may be accepted up to one week after the due date with a penalty of 20% of the maximum points on that assignment. However, if the delay is due to an excused absence or with valid reasons, the instructor may reduce or forego the penalty.

ACADEMIC PROGRESS REPORTS:

Your performance will be evaluated periodically throughout the semester. If any problems is encountered an academic progress report will be sent out as per the Academy policy.

TARDY AND UNEXCUSED-ABSENCE POLICIES:

A student late to class/lab up to 5 minutes will be marked 'tardy'.

A student late to class/lab for more than 5 minutes will be marked 'absent'.

ACADEMIC DISHONESTY POLICY:

Academic dishonesty may be detrimental to a student's grade for the course.

Academy dishonesty includes but is not limited to:

- Plagiarism
- Manipulating lab data to obtain expected results
- Copying lab report from another student
- Copying in the tests and exams

For details, please refer to the Academic Dishonesty Policy in the Student's Handbook

USE OF LAPTOP COMPUTERS IN CLASSROOM

1. You may use the laptop in the lecture. You have option of writing notes on your laptop or in traditional notebook.
2. Unless told otherwise, please boot up your computer as soon as you arrive in class so that you will be ready to go to work as soon as class starts.
3. You are responsible for maintaining the power of your computer.
4. Keep your laptop on until the class ends for the day.
5. The volume on your laptop should be turned all the way down during class. Your laptops should be silent except for the clicking of the keyboard.
6. You may not read or send e-mail, play music or games, "IM", participate in chat rooms, or download any files during class. If this becomes a chronic problem, you will be asked to leave the classroom, with an unexcused absence for that day.
7. You may take class notes using your laptop, but you also need to be prepared to use pen and paper when asked.
8. You are responsible for maintaining your computer. Please make sure your computer is working before coming to class. If your computer is not working or is not able to connect to the wireless server, you should follow the help instructions in your laptop management document.
9. Print assignments before coming to class.
10. Remember to save your work frequently. Loss of a file by accident is not an acceptable excuse.
11. Close your lid/screen half way during discussions or class presentations or when otherwise requested by the instructor.
12. Do not hide toolbars (the dock). Keep all items you are working on visible on the screen and available for teacher inspection.
13. Do not bring you laptop to an exam.

Ball State University's Statement on the Importance of Diversity and Inclusion

Ball State University aspires to be a university that attracts and retains a diverse faculty, staff, and student body. Ball State is committed to ensuring that all members of the campus community are welcome through our practice of valuing the varied experiences and worldviews of those we serve. We promote a culture of respect and civil discourse as evident in our [*Beneficence Pledge*](#).

At Ball State, diversity is an integral part of our identity. Our success depends on our efforts to cultivate inclusivity within our pedagogical, scholarly, and creative pursuits. Community is an inherent and crucial aspect of such efforts at local, national and international levels. As we recruit and retain a diverse administration, faculty/staff and student body, we strive to ensure that our students are prepared to engage and succeed in increasingly diverse environments. Our recruitment efforts will continue to include historically underrepresented populations to create the cultural milieu that promotes participation by all.

We are committed to the pursuit of excellence by being inclusive of individuals without regard to race, religion, color, sex (except where sex is a bona fide qualification), sexual orientation, gender identity/gender expression, physical or mental disability, national origin, ancestry, or age. Ball State will be a place recognized for its positive climate—one where all stakeholders know that their contributions to the mission of the university are essential to our success.

Ball State University is committed to:

- creating innovative [courses](#), [programs](#), and practices that attract, retain, and nurture a diverse university community
- fostering a university environment that enables all who contribute to excel in a culture that is growing ever more diverse

Whereas other initiatives focus on particular aspects of diversity, our equal opportunity and affirmative action policies use a broad definition of diversity referring to race, religion, color, gender, sexual orientation, physical or mental disability, national origin, ancestry, age, and citizenship.

The Office of Institutional Diversity is not only committed to diversity programming for students; it also support several faculty development programs as well. The [Diversity Associates Program](#), the Developing Pedagogies to Enhance Excellence Seminar, and the [Diversity Seminars](#) are three programs that encourage faculty to explore the relevance of diversity in all classes.

Instructor: Mr. Hasan Fakhruddin

January 6 – February 28 Electricity and Magnetism

- Electrostatics
- Coulomb's Law
- Electric Field
- Motion of Charged Particle in Electric Field
- Electric Potential Energy and Electric Potential
- Capacitors
- Electric Current, Resistance, and EMF
- Electrical Resistivity, Power, and Energy
- Resistors in Series and Parallel
- Magnetic Fields
- Magnetic Force on Electric Current
- Magnetic Field due to I
- Magnetic Flux
- Electromagnetic Induction

Thursday - February 27 – TEST01**March 9 – 16 Wave Motion and Sound**

- Traveling Waves
- Properties of Sound
- Standing Wave and Beats
- Doppler Effect

March 18 – 27 Heat and Thermodynamics

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- Ideal Gas Laws and PV diagrams
- Reversible Thermodynamic Processes
- Heat Engines and Carnot Cycle
- Second Law of Thermodynamics
- Entropy

Thursday - March 26 – TEST02**March 29 – April 21 Optics**

- Reflection: Law of Reflection
- Refraction
 - Snell's Law
 - Total Internal Reflection
- Image Formation by Plane and Spherical Mirrors
- Image Formation by Lenses
- Interference
 - Superposition Principle
 - Double-Slit Interference

- Diffraction
 - Single Slit
 - Diffraction grating
- Polarization: (Qualitative)
- Electromagnetic Spectrum
- Inverse Square Law for Intensity of light

Thursday April 23 – TEST03

April 24 – May 1

Modern Physics

- Photoelectric Effect
- Energy of Photon
- Nuclear Symbols: Mass Number and Atomic Number
- Nuclear Reactions
- α , β , and γ decay
- Nuclear Fission and Chain Reaction
- $E = mc^2$ and applications to Nuclear Reactions

Labs: About 8 of the following labs will be done in Spring 2019

1. Electrostatics

This lab involves

Construction of Electroscope

Determination of the nature of electric charges on two (non-conducting) objects rubbed together

Ordering the objects according to their electronegativity

2. Electric Field Mapping

This lab involves

Constructing Equipotential lines using carbon-soaked papers, electrodes, power supply and voltmeter

Constructing Electric Field Lines orthogonal to equipotential lines and going from positive to negative charges.

4. Ohm's Law

This lab involves

Assembling a circuit with resistor, voltage supply, switch, ammeter, and voltmeter

Collection of V vs I data

Verification of Ohm's Law from graphical analysis

Determination of the resistance from the graph

5. Series-Parallel Resistive Circuits

This lab involves

Designing various series-parallel combination circuits

Theoretical prediction of the resistance of each circuit

Experimental verification of the resistance of each circuit

1. Standing Waves on a String

This lab involves

Adjusting frequency, tension, and/or string length to produce standing waves on the stretched string

Verifying the equation for speed of the wave on the string by graphical analysis.

2. Standing Waves of sound in a Pipe

This lab involves

Adjusting the length of a tube closed at one end to generate standing sound waves for each of the given tuning forks

Graphical analysis of the data to determine the speed of sound in air.

6. Dependence of Cooling Rate on Surface/Volume Ratio

This lab involves

Calculation and comparison of surface-to-volume ratios of two objects of same shape and different size

Study of dependence of the cooling rate on the surface/volume ratio

7. Verification of the Laws of Reflection and Refraction

This lab involves

Using laser, a glass slab, and measurement of angles to

Verify the law of reflection

Verify the law of refraction

8. Image formation by Spherical Mirrors and Lenses

This lab involves

Determine the focal length of converging mirrors and lenses by obtaining real image of an object on a screen

9. Young's Double Slit Experiment

This lab involves

Determination of wavelength of a given laser light using two slits cut in a slide

10. Single Slit Diffraction and Diameter of Hair

This lab involves

Determination of diameter of a piece of hair using diffraction of a laser beam