General Physics II
PHYCS 100 Ball State University (Dual credit)
SCI03101A/SCI03101LA (Sec# 1-3)
Lectures on MWF & Labs on T

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Office hours: MW: 8 - 9AM; 11AM - 12PM; 1-2PM
Tu: 12 - 1PM
Th: 1 - 2PM
F: 8 - 9AM; 11AM - 12PM & by appointment

Learning outcomes
This is the second semester of a two-semester introductory course in general physics. The goal of the course is to understand the core-principles of electromagnetism that dominate our everyday experiences. These include the basic rules of optics underlying the physic of light, which is a type of electromagnetic wave. Electrical energy and its usage form the very foundation of our modern society; it's presence is pervasive ranging from household appliances to the lighting of our homes. The electromagnetic force, one of the four fundamental forces of nature, plays a central role in holding the stellar masses together, by providing a stabilizing force that offsets the crushing attractive force due to gravity. Such seemingly disparate topics can in fact be understood by developing a unifying framework for studying classical electromagnetism.

Our goal in this course is to cover the basics of electromagnetism: concepts of electricity, electrical charges, forces, fields, energy and electronic circuits. Since electromagnetic energy propagates in waves, we will also study wave motion and its applications. In addition, elements of atomic/nuclear structure will also be covered. This will give us an appreciation about the structure and colorful properties of matter and also about the various forces that hold atoms together. Finally, we will explore the laws of thermodynamics with everyday applications.

At the conclusion of the course, students will be able to:
1. Use electrical and magnetic field lines and their energy in understanding electromagnetic phenomena
2. Understand the basics of electrical circuits
3. Examine the wave motion as a mode of energy transfer
4. Apply the rules of optics in describing how images are formed
5. Appreciate the richness of the atomic world
6. Apply the laws of thermodynamics to real life problems

Texts & materials
Open Stax: College Physics (2012)
Scientific calculator; Laptop (optional); Lab notebook

Internet resources
https://www.nsf.gov/news/classroom/physics.jsp

Virtual classes
On days when there is no in-person class or for students who opted for virtual classes only, reading materials will be posted on the Canvas. Please note that Canvas will be the main repository for class materials and will be used for posting of assignments and making announcements and etc. When possible, recorded materials will be posted explaining accompanying reading materials and students will have the opportunity to participate in discussions going over the topics covered in the class.

Class attendance, preparation and expectations
Successful learning of physics entails becoming familiar to definitions and core concepts and their applications. It is very important to study and learn the material as covered in class as successive classes will build on concepts covered previously.

Evaluation
Homework: Homework assignments based on class presentations will be provided periodically. **They are due within a week after their receipt.**

Labs: The various concepts learnt during instructions will be illustrated in the lab periods. **Lab activities will be performed in groups of 3-4 students.** Successful completion of each week's lab will entail performing the experiment carefully, recording pertinent data and observations completely, and turning in a complete and correct write-up of data analysis and results. Some lab days are reserved for instructions (please see below).

Lab reports from each group (data, analysis, and results) are due at the beginning of the next lab.

Tests: **Three in-class tests** (please see below). Tests may be comprised of a variety of question types, including fill-in, multiple choice, short answer, and problem solving. The tests are not cumulative (but note that each topic builds on previous topics). Test topics would be announced at least a week prior to the test date.

Weighting: Lab 30%; Homework 25%; Each test carries 15% of the total weight.

Grading: Grades will be rounded to the nearest integer. Specific letter grade will be assigned according to the following scheme:

- 90% or higher =A; 86% - 89% =A-
- 85% - 88% = B+; 81% - 84% = B; 77% - 80% = B-
- 73% - 76% = C+; 70% - 75% = C; 64% - 69% = C-
- 63% or below = D*

You have **1 business day** from when the graded test is returned to you to dispute your grade. To do so, you will need to make an appointment with the instructor.

Extra credit
You can earn up to 2% of your total course grade. Write a well thought-out 2-3-page commentary on a topic of your choice in modern physics. [**Must be emailed before the final week**]

Make-up work
Make-up work will be allowed only for the excused absences. Arrangements must be made for the make-up work before or immediately after the excused absence.

Late-work
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.

The content of this syllabus is subject to change. Changes will be announced in class or electronically.

Tardiness and unexcused absences
A student late to class/lab up between 5-7 minutes will be marked 'tardy'. A student late to class/lab for more than 7 minutes will be marked 'absent'. Students who sleep, read or work on materials not related to the class activities will be counted absent. Please refer to the student handbook for polices related to attendance, tardiness, excused and unexcused absences.

Use of computers in classroom
Laptop can be used in the class only for class works such a taking notes and reading class notes. Laptop may not be used for e-mail, playing music or games, messaging, web browsing or downloading any files during the class period. If this becomes a chronic problem, an unexcused absence for that day would be assigned. A student should be prepared to use pen and paper when asked. All items being worked on should remain visible on the screen and be available for inspection. A laptop can't be used during an exam.

Academic progress report
An academic progress report will be sent out as per the Academy policy for unsatisfactory performance in the course.

Changes to the syllabus
The content of this syllabus is subject to change. Changes will be announced in class or via online communications.

Tentative course outline

Week	Topic	Texts (CP)
1	Wave definitions and wave motion Wave propagation, refraction, diffraction, interference, dispersion	Ch. 16
2	Sound wave: Phenomenon, interference (beats), standing waves and resonance Doppler effect, pitch and tone Lab: Standing wave on a string	Ch. 17
3	Electrostatics: Theory and observations Coulomb's law Lab: Standing wave of sound	Ch. 18
4	Electric fields and electric potentials (and voltage) Lab: Electroscope	Ch. 19
5	Electrical currents; Ohm's law **TEST 1**	Ch. 20
6	Electrical circuits: Applications Lab: Mapping of electric field	Ch. 21
7	Electromagnetism: Concepts Lab: Ohm's law	Ch. 22

Week	Topic	Texts (CP)
8	Electromagnetic (EM) radiation; EM wave definition and spectrum Lab: Series and parallel circuits	Ch. 23
9	Light: Refraction and reflection; ray optics Lab: Reflection and refraction	Ch. 25
10	Light: Interference and diffraction **TEST 2**	Ch. 26
11	Heat and temperature; ideal gas laws Lab: Spherical mirror and lenses	Ch.13 & 14
12	The laws of thermodynamics and their applications Lab: Double slit experiment	Ch. 15
13	Frame of reference and special theory of relativity Lab: Diffraction and diameter of hair	Ch.28
14	Wave mechanics and postulates of quantum mechanics Lab: Cooling rate	Ch. 30
15	Applications of quantum mechanics **TEST 3**	Ch. 29
16	Special topic: General relativity	Ch. 28

Academic Honesty
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

Statement on Diversity & 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 world views 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.

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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.

Indiana Academy Mask Policy

Requirement

The Indiana Academy will follow Ball State University's mask policy. Effective July 1, 2020, all people on campus—including faculty, staff, students, vendors, contractors, suppliers, and visitors—should wear face masks (covering nose and mouth) while inside campus buildings. Face masks are specifically required in the following situations:

i. When in the presence of others (indoors or outdoors) and physical distancing is difficult to maintain, such as in hallways, elevators, stairs, public spaces, and common areas;
ii. When in a classroom or laboratory;
iii. When using campus transportation (such as a shuttle bus);
iv. When multiple individuals are in a University vehicle.

Students, faculty, and staff are encouraged to bring their own mask. Masks will be provided to anyone who is unable to bring a mask or their mask is damaged.

Non-compliance

If a student declines to wear a face mask as required, the student will be referred to the Director of Academic Affairs or the Director of Residential Affairs. If the situation occurs in a classroom or other academic setting, it is considered a classroom management issue, and the teacher will remind the student of the requirement and give the student a chance to comply with it prior to referring the matter to the Director of Academic Affairs or the Director of Residential Affairs. Wearing masks is crucial to preventing the spread of COVID-19 to others.