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

Instructor: Sazzad Nasir; Office: Elliott Hall B027A; Email: smnasir@bsu.edu

Office hours (virtual): M&W: 9-10:45 AM; 1 - 2: PM
Tu&Th: 11:30 - 1:45 PM
F: 9 - 10:45 AM
& by appointment

Learning outcomes

This is the first semester of a two-semester introductory course in general physics. The goal of the course is to understand the core-principles that govern motion of objects in the physical world. This course in particular explores key concepts in classical mechanics that attempt to understand, for example, the motion of heavenly bodies or the stopping of a car when brake is applied, among others. Such seemingly disparate questions can in fact be examined by introducing such key concepts as force and inertia along with wonderful application of mathematics.

We will begin by laying the foundation of the basics of classical mechanics: rules of kinematics in defining motion, principles of dynamics as envisioned in Newton's laws that completely describe motion of classical objects, and laws of gravitation. We will then learn about energy and momenta and associated conservation principles and finish the course by examining oscillatory motions.

At the conclusion of the course, students will be able to:

1. Use kinematical principles in depicting object's motion in space
2. Understand physical quantities and their units, various measurement techniques and errors
3. Apply vectors to study motions in higher dimensions
4. Understand the concepts of force and inertia and apply Newton's laws to a variety of problems
5. Examine the role of gravitational force in the movement of celestial bodies
6. Apply the concepts of energy and momenta as an alternate way to study dynamics
7. Appreciate the richness of rotatory and oscillatory movement

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 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. 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 (data, analysis, and results) are due at the beginning of the next lab.

Tests: **Three tests in total** (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. Virtual students can opt for take-home tests.

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 1% of your total course grade. Write a well thought-out 2-3-page commentary on outlining 3-4 limitations of classical physics.

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 10% 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.

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.

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.

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	Scientific process; Physics as a scientific discipline; Classical mechanics No lab	Ch. 1
2&3	Physical quantities; units; precision Lab: Unit conversions and significant figures (instruction)	Ch. 1
4	Kinematics: Scalars and vectors. Displacement No lab	Ch. 2
5	Kinematics: Velocity, speed and acceleration Lab: Measurement techniques; Indirect measurement of heights and distances	Ch. 2
6	One dimensional kinematics: Constant acceleration; falling objects Lab: Kinematic graphs with motion detectors **TEST 1**	Ch. 2
7	Two dimensional kinematics: Vector addition Lab: Measuring acceleration due to gravity	Ch. 3
8	Two dimensional kinematics: Projectile motion Lab: Projectile motion	Ch. 3
9	Dynamics: Concept of force; Newton's laws of motion No lab	Ch. 4
10	Newton's laws of motion Lab: Newton's laws (instruction)	Ch. 4
11	Application of Newton's laws: Friction & Elasticity Lab: Coefficient of friction **TEST 2**	Ch. 5
12	Circular motion: Kinematics; centripetal force Lab: Spring-mass system & Centripetal force	Ch. 6

Week	Topic	Texts (CP)
13	Gravitation and motion of heavenly objects Lab: Work and energy (instruction)	Ch. 6
14	Work and energy; potential and kinetic energy; conservation of energy Lab: Spring-mass system; force sensor; energy conservation	Ch. 7
15	Linear momentum; types off collisions; conservation of momenta Lab: Collision and conservation of momenta	Ch. 8
16	Rotational motion; Oscillatory motion: simple harmonic motion Lab: Photogate and simple pendulum. Measuring acceleration due to gravity **TEST 3**	Ch. 10 & 16
17	Classical mechanics and its limitations	

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.

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.