

Modern Physics

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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 a fourth quarter course on modern physics co-taught by three instructors Mr Fakhruddin, Mr Schuh and myself. As outlined below, one of the goals of the course is to provide a brief, but complete, exposition of the special theory of relativity.

The course will guide students to appreciate the limitations of Galilean relativistic principles and how Einstein's theory of relativity put space and time on equal footing from which interesting phenomena of length contraction and time dilation could be understood. There will be a derivation of the famous equation relating mass and energy: $E=mc^2$.

Texts & materials

Modern Physics by Randy Harris (**RH**)
Scientific calculator; Laptop (optional); Lab notebook

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.**

Tests: **A comprehensive exam** (please see below), which may be comprised of a variety of question types, including fill-in, multiple choice, short answer, and problem solving.

Weighting: Homework 75%; Final exam 25%.

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

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

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.

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 policies 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

Lecture	Topic
1	Newtonian framework & Galilean transformation
2	Principles of relativity; relativity of simultaneity
3	Lorentz transformations; length contraction & time dilation
4	Relativistic mechanics
5	TEST

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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.