

**Ball State University**  
**Course Syllabus for Modern Physics Laboratory (PHYC 262)**  
**Spring 2026**

**Class:** Thursday 12:00 PM – 1:50 PM, Cooper Science Building 301/411

**Instructor:** Dr. Michael J. Skoby  
mjskoby@bsu.edu  
Office: CS 430B

**Office Hours (subject to change):**

Tuesday 2:30 PM – 3:30 PM  
Thursday 10:00 AM – 11:00 AM  
Friday 1:00 PM – 2:00 PM  
Or by appointment

**Catalog Description:**

Classic experiments such as the Cavendish measurement of  $G$ , determination of Planck's Constant, Rutherford Scattering, Millikan Oil Drop Experiment, Franck-Hertz Experiment, and the Hall Effect will be performed. Use of computer software for report generation will be stressed.

\*The description includes some example experiments in modern physics. We will do some the experiments listed and others that are not listed.

**Required Materials:**

*Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements*, 3rd Ed., John Taylor, University Science Books, 2022

Laptop with Excel (Ball State students can download it for free from the university website. The browser version will not have all the necessary capabilities.)

**Course Objectives:**

- Discover more about physical phenomena in the world through experimentation, specifically those topics related to modern physics.
- Gain an understanding of various experimental methods and techniques through “hands-on” experience, with data taken from various instruments.
- Learn an overview of experimental data and analysis, such as measurements, random and systematic uncertainties, and error propagation.

- Strengthen computer skills through calculation and analysis of experimental data, which include graphs, regression, and data manipulation in spreadsheets.
- Strengthen communication skills by presenting experimental results in written laboratory reports and through oral and poster presentations.

### Course Grading:

Your final grade will be weighted as follows:

7 Labs (10% each):	70%
In-class Exercises:	10%
Exam:	10%
Slide Presentation:	5%
Poster Presentation:	5%

Below is the grading scale. The letter grade thresholds may be lowered at the instructor's discretion, but the thresholds will not be raised. For example, if you get at least 90% you will be guaranteed to receive an A- or possibly better.

A	93-100%
A-	90-92%
B+	87-89%
B	83-86%
B-	80-82%
C+	77-79%
C	73-76%
C-	70-72%
D+	67-69%
D	63-66%
D-	60-62%
F	Below 60%

### Classroom Conduct:

\*Due to safety concerns and the challenging logistics of this course, percentage points may be deducted from your total grade for violation of the following rules of conduct.

- **SAFETY** is the number one priority in the laboratory. There are multiple ways you could potentially hurt yourself or others including but not limited to electrical shock, burns, cuts, falls, etc. Follow all safety warnings and precautions.
- Handle all equipment with care. The instrumentation and apparatuses are delicate and can easily be damaged if you're not careful. We only have one of everything because it's all very expensive.
- For the safety of people and equipment, absolutely NO FOOD or DRINK is allowed in the laboratory (not even water).

- Show up. Only verifiable circumstances beyond the student's control, for which supporting documentation is provided, will be excused. Unexcused absences will result in an automatic zero for that day's assignments. See the "Attendance" section below for more details.
- Be on time. It's not fair to your lab partner if you're late and they've already started working on the experiment. It's also important not to miss any announcements and safety warnings given at the start of class. Your lab report grade may be lowered if you're late. If you're more than 10 minutes late, you will receive a zero for that day's lab.
- Do not leave until you're dismissed. Performing experiments carefully and correctly takes time and patience. Do not try to rush through the procedures to leave early. You will always have something to work on, so there is never a reason to leave class early without permission from the instructor.
- Return the experimental setup to the state in which you found it, clean up the work area, and push in your chairs before you leave.
- Use of cell phones at any time is not allowed. You may use a laptop for the purposes of performing the experiments or taking notes. We only meet for less than 2 hours per week, so it's important that your focus be completely on the day's activities.
- All lab partners are expected to make equal contributions in conducting the experiments. You may share the data collected, but you must make your own tables and write your own lab report. Everyone is expected to do all calculations on their own.
- Treat everyone with respect.

### **Labs:**

Experiments will be conducted in groups of 2, where each group member must make an equal contribution to completing the experiment. Each group member will prepare and submit a lab report for each experiment that is their own work. You may not share any sections in the lab report. *Use of artificial intelligence is not allowed for any reason.* Lab report guidelines will be made available before we begin conducting experiments. Lab reports are generally due a week after the experiment was carried out. Late lab reports will not be accepted.

### **In-class Exercises:**

We will use some of the lecture time to work through exercises and perform other activities. Please bring a calculator, paper, and pencil to class to show your work for in-class exercises and be prepared to hand it in at the end of class.

### **Exam:**

There will be one exam early in the semester that covers error analysis. The details of this exam will be given in class.

**Slide Presentation:**

An oral slide presentation will be made by each student on a topic related to modern physics near the end of the semester. The slide presentation will be made via PowerPoint or similar presentation software in a 10-minute oral report. Details will be presented in class.

**Poster Presentation:**

Towards the end of the semester, one of the experiments completed during the semester will be presented as a poster, in a format similar to those presented at formal physics society meetings, by each student. The details of the project requirements will be given at a later date.

**Attendance:**

Students are expected to be present for every lecture and lab. Only exceptional cases (e.g., illness) will be considered excused, and students are still responsible for all material covered in class. You must contact the instructor *before* missing class for an excused absence and you may be required to provide supporting documentation.

**University Statement:**

We are committed to ensuring that all members of the community are welcome, through valuing the various experiences and worldviews represented at Ball State and among those we serve. We promote a culture of respect and civil discourse.

**Disability Statement:**

If you need course adaptations or accommodations because of a disability, please contact the instructor of record as soon as possible. Ball State's Disability Services Office coordinates services for students with disabilities; documentation of a disability needs to be on file in that office before any accommodations can be provided. Disability Services can be contacted at 765-285-5293 or [dsd@bsu.edu](mailto:dsd@bsu.edu).

**Academic Dishonesty:**

“To maintain its credibility and reputation, and to equitably assign evaluations of scholastic and creative performance, Ball State University is committed to maintaining a climate that upholds and values the highest standards of academic integrity.” Refer to the following BSU web site for more information:

<https://www.bsu.edu/about/administrativeoffices/vice-provost/student-services/academic-integrity>

## Tentative Class Schedule

Week	Date	Class
1	Jan 8	Error Analysis
2	Jan 15	Error Analysis
3	Jan 22	Error Analysis
4	Jan 29	Error Analysis and <b>Exam</b>
5	Feb 5	Lecture: Lab 1, 2, 3, 4
6	Feb 12	Lab 1, 2, 3, 4
7	Feb 19	Lab 1, 2, 3, 4
8	Feb 26	Lab 1, 2, 3, 4
9	Mar 5	<b>No Class (Spring Break)</b>
10	Mar 12	Lab 1, 2, 3, 4
11	Mar 19	Lecture: Lab 5, 6, 7
12	Mar 26	Lab 5, 6, 7
13	Apr 2	Lab 5, 6, 7
14	Apr 9	Lab 5, 6, 7
15	Apr 16	<b>Slide Presentations</b>
16	Apr 23	<b>Poster Presentations</b>

**Disclaimer:** This syllabus is subject to change.