

Physics 132-1
General Physics with Calculus

- Class: MWF 11:00 - 1:00 pm, D116
- Professor: Dr. Gerard P. Gilfoyle; Office: Gottwald Science Center, D110; electronic mail: ggilfoyl@richmond.edu; Office hours: MWF 3-4 pm, T 10-11 am, T 3-4 pm. Other times by appointment or availability.
- Objective: To gain an understanding of the ideas of physics and to develop problem solving skills. Physics 132 satisfies the Natural Science Field of Study requirement.
- Textbooks: **Physics for Scientists and Engineers**, 5/e by Knight (recommended) and **Physics For Doing - Part 2** by Belk *et al.* (required).
- Prerequisites: Math 212 (may be taken concurrently), Physics 127/131, or instructor's permission.
- Course work: The course will be taught in a 'workshop' format and will consist of lecture, laboratory work, demonstration, writing, and problem solving. Attendance at class and lab for the entire period is required. This is University policy. No make up work is permitted for unexcused absences. Excessive unexcused absences will be penalized and reduce your final grade for the course.
- Grading: Grades will be computed on the following basis:

Tests	45%(15% for each of 3 tests)
Quizzes	10%
Lab Notebooks	10%
Lab Summaries	5%
Final exam	30% (Apr 30, 9 am - 12 noon)

Make-up tests and laboratories will not be administered. If a test is missed for an excused absence the next test will count more to make up the loss. Unexcused absences will result in a grade of zero. An excused absence is given by the instructor for sufficient reason provided there is adequate warning in a timely fashion. The student is responsible for all missed work. Disability accommodations must be arranged with the instructor at least one week in advance.

- Tests: Tests will consist of short-answer questions and problems based on readings, lectures, and laboratory. Each test will last for 50 minutes. The final exam is three hours long.
- Homework: Homework assignments will consist of readings and problem sets and will be listed on the course webpage (see below). Homework will not be collected, but it is the basis for quizzes and tests so it is utter madness to neglect them. See below for details.
- Laboratory: Lab work includes documenting your work in the 'activity' spaces. The entries consist of observations, measurements, calculations, graphs, and answers to questions. You may use the same data and graphs as your partner and discuss concepts with your classmates, but all entries should reflect your own understanding. Each entry should be written in your own words. Lab Summaries (see below) should be handed in within two meetings after completing the classroom portion of the lab for credit. Periodically your lab notebook will be handed in and graded for completeness and quality of results.
- Supplies: Pencils and a calculator are required for each meeting.

The Workshop Physics Approach

Introductory Physics with Calculus is taught in ‘workshop’ format that emphasizes active learning rather than the passive approach of strictly lecture courses. In a given class meeting, there can be a combination of activities including laboratory work, lecture, discussion, problem solving, and demonstration. During class you will document your activities by filling in entries in the ‘activity’ space provided in the laboratory units that make up the *Physics for Doing! - Part 2* Student Guide. The entries consist of observations, predictions, derivations, calculations, and answers to questions. You may use the same data and graphs as your partners and, of course, discuss concepts with your classmates and the instructor. However, your entries in the activity units must reflect your own understanding of the concepts and the meaning of the data and graphs you present. Each entry should be written in your own words. The laboratory units will be collected periodically and evaluated for completeness. It is important for your success in this course that your entries reflect a sound understanding of the phenomena you observe and analyze. Some of the quizzes and test questions may be closely related to the laboratory activities. Make-up units will not be permitted and you are responsible for any material that you missed.

The Natural Science Field of Study Requirement

Natural Science is concerned with the physical universe, from subatomic to cosmic levels of organization. It covers everything from inanimate forces to living systems. Through the generation and testing of hypotheses regarding repeatable, measurable, and verifiable phenomenon, natural scientific inquiry is one of our major means of understanding the world in which we live. For this reason and because of the generally low state of scientific literacy that is reflected in the reluctance of many students to take elective courses in the natural sciences, the faculty has decided to require Richmond students to take a 4-credit, laboratory-based course in one of the three areas of natural science represented at the University, namely biology, chemistry, and physics. Besides adding to students’ knowledge of the world and their understanding of the methods and challenges of doing science, the faculty hopes that these courses will enhance their appreciation of the beauty of science.

Field-of-Study Rationale

The introductory, general physics courses (Phy 131-132) cover the full range of the physical universe from the subatomic regime to cosmic scales. The central ideas of physics (forces, energy, conservation laws, *etc.*) are introduced as hypotheses and repeated observations are then made in the laboratory to support or reject their validity. The students learn not only the ideas of physics, but also reasons for their validity. This theoretical framework is used repeatedly to explain natural phenomena that we see around us and observe in the laboratory.

Physics 132-1 Schedule
Spring, 2025

Date	Topic (Chapter)	Date	Topic (Chapter)
Jan 13	Temperature (18,19)	Mar 10	Spring Break
15	Heat and Energy (19)	12	"
17	Heat and Energy (19)	14	"
20	MLK Day	17	Magnetic Fields (29)
22	Ideal Gases (18)	19	Magnetic Force (29)
24	Collisions and Gases (11,20)	21	Magnetic Force (29)
27	Kinetic Theory (20)	24	Magnetic Force (29)
29	Specific Heats of Gases (20)	26	Magnetic Force (29)
31	Specific Heats of Gases (20)	28	Test 2, Radioactive Decay (42)
Feb 3	Einstein Solid (L9)	31	Induction (30)
5	Einstein Solid (L9)	Apr 2	Electromagnetic Waves (31)
7	Entropy and Temperature (L10)	4	Interference (33)
10	Entropy and Temperature (L10)	7	Interference (33)
12	Entropy and Temperature (L10)	9	Interference (33)
14	Test 1, Electrostatics (22)	11	Diffraction (33)
17	Coulomb's Law (22)	14	Diffraction (33)
19	Electric Fields (23)	16	Diffraction (33)
21	Electric Potential (25)	18	Test 3, Hydrogen Atom (38)
24	Electric Potential (25)	21	Hydrogen Atom (38)
26	Electric Current (27)	23	Quantum Physics (40)
28	Circuits (28)	25	Quantum Physics (40)
Mar 3	Magnetic Fields (29)		
5	Magnetic Fields (29)		
7	Magnetic Fields (29)		

Final Exam: Wednesday, Apr 30, 9-12 pm.

Attendance Policy

Students should attend all classes for the full period. Those who are sick should not attend class and should inform the instructor in a timely fashion. Excessive, unexcused absences will be penalized. An excused absence is given by the instructor for sufficient reason provided there is adequate warning in a timely fashion.

- Make-up tests, quizzes, and labs will not be administered. If an activity is missed due to an excused absence the next activity will count extra to make up the loss. Unexcused absences will result in a grade of zero. The student is responsible for all missed work.
- Students must:
 - Notify instructors in advance of the absence if possible.
 - Contact the Student Health Center if sick.
 - Keep up with classwork if they are able to do so.
 - Submit assignments on time whenever possible.
 - Work with their instructors to try to reschedule any missed assignments.
 - Stay in close communication with their instructors.
- This attendance policy puts everyone on their honor. Falsely reporting a reason for an absence is an honor code violation.

Homework Assignments

A VERY effective way to study physics is to do the homework as the material is covered in class and then do additional problems when you study for an exam. See the course website below for the latest updates on assigned homework problems.

<https://facultystaff.richmond.edu/~ggilfoyl/genphys.html>

Solutions for the assigned problems can be found on the course website on the Monday after they are assigned. These solutions are password-protected and are solely for the use of students in Physics 132-02 and are not be shared with people outside this class. The solutions are not be downloaded, printed, or archived in any way. Sharing, saving, or archiving these solutions are Honor code violations.

The chapters on the website refer to **Physics for Scientists and Engineers**, 5th ed. by Knight.

Help With Physics Homework

If you have trouble with homework help is available from me during my office hours (see page 1 of this syllabus) and at other times when I'm available. Please feel free to stop by. The Physics Department is also arranging tutoring sessions. More on that as the schedule develops. The Academic Skills Center (<http://asc.richmond.edu>, 289-8626 or 289-8956) provides several services including tutoring. A summary of the services at the Academic Skills Center is on the last page of this syllabus.

Laboratory Notebooks

Your lab notebooks will be collected periodically and graded. You will be evaluated primarily on the completeness of your work. All laboratory activities should be performed as guided by your instructor. This includes responses to the questions in the lab and including plots, data sets, and any other items required in the laboratory or by the instructor.

Laboratory Summaries

At the end of each laboratory from *Physics for Doing! - Part 2* you should submit a laboratory summary sheet obtained from your instructor. The questions on it are designed for you to summarize the major ideas and results of the laboratory and to ask questions. Since a large portion of the tests are based on the labs, this is a useful study tool. You will receive credit for making a reasonable effort to fill in the summary. Summaries submitted more than five days after we complete a lab will not be accepted and a grade of zero assigned. A grade of zero will be assigned for unexcused absences.

Quizzes

Throughout the semester quizzes will be administered based on the homework problems from the previous full week. During the quiz you can use only your handwritten class notes and your handwritten solutions to the assigned homework problems. No other materials are allowed including anything printed from the web, *i.e.*, any online solutions, my slides, *etc.* If your notes and solutions are on a tablet, then print them out on paper before class. A grade of zero will be assigned for unexcused absences.

Solutions for the assigned problems can be found on the course website usually on the Monday after they are assigned. These solutions are password-protected and are solely for the use of students in Physics 132-02 and are not be shared with people outside this class. The solutions are not be downloaded, printed, or archived in any way. Sharing, saving, or archiving these solutions are Honor code violations.

Physics 132-1 Tentative Laboratory Schedule, Spring, 2025

In each meeting there will be laboratory work. You will document your activities by filling in entries in the activity space provided in the laboratory units in **Physics For Doing - Part 2**. The entries consist of observations, predictions, derivations, calculations, and answers to questions. You may use the same data and graphs as your partners and, of course, discuss concepts with your classmates and the instructor. However, your entries in the activity units must reflect your own understanding of the concepts and the meaning of the data and graphs you present. Each entry should be written in your own words. Below is a tentative schedule of labs for the semester. For the latest information on upcoming labs consult the course webpage.

Date	Laboratory (Unit)	Date	Laboratory (Unit)
Jan 13	Heat, Temperature, and Energy (1)	Mar 10	Spring Break
15	Heat of Vaporization of Nitrogen (2)	12	"
17	Calorimetry (3)	14	"
20	MLK Day	17	Magnetic Fields from Currents (23)
22	Boyle's Law (4), P-T Law (5)	19	Biot-Savart and a Straight Wire (24)
24	Kinetic Theory of Ideal Gases (6)	21	Biot-Savart and Current Loops (25)
27	Kinetic Theory of Ideal Gases (6)	24	Weighing an Electron (26)
29	Applying the Kinetic Theory (7)	26	Weighing an Electron (26)
31	Applying the Kinetic Theory (7)	28	Test 2, Radioactive Decay (34)
Feb 3	Einstein Solid (8)	31	Radioactive Decay (34)
5	Einstein Solid (8)	Apr 2	Electromagnetic Induction (27)
7	Entropy and Temperature (9)	4	Visualizing EM Plane Waves (28)
10	Entropy and Temperature (9)	7	The Interference of Light (29)
12	Entropy and Temperature (9)	9	The Interference of Light (29)
14	Test 1, Electric Charge and Electroscope (10)	11	The Diffraction of Light (30)
17	Introduction to the Electric Potential (12)	14	The Diffraction of Light (30)
19	Charges, Fields, and Potentials of a Point Charge (13)	16	The Diffraction of Light (30)
21	Equipotential Lines and Electric Fields (14)	18	Test 3, Optical Spectrum of Hydrogen (31)
24	Charges, Fields, and Potentials of a Dipole (15)	21	Optical Spectrum of Hydrogen (31)
26	Potential for Continuous Distributions (16)	23	Orbits and the Effective Potential (32)
28	Introduction to Circuits (18)	25	A Theory for the Hydrogen Atom (33)
Mar 3	Ohm's Law and Equivalent Resistance (19)		
5	Fields of Permanent Magnets (21)		
7	Magnetic Forces on Charged Particles (22)		

SYLLABUS INSERT REGARDING ACADEMIC AND PERSONAL SUPPORT SERVICES

Hope N. Walton, Director Academic Skills

Below is a boxed statement that describes the services available from the Weinstein Learning Center and other resources. We recommend that you consider including this boxed statement in your course syllabus, on Blackboard, or perhaps on a separate handout. Of course, other support services that relate specifically to your course can also be added.

Staff members from the resources below are available for consultations about concerns related to students as well as issues related to services.

Weinstein Learning Center

Academic Skills Center (asc.richmond.edu): Academic coaches assist students in assessing and developing their academic and life-skills (e.g., critical reading and thinking, information conceptualization, concentration, test preparation, time management, stress management, etc.). Peer tutors offer assistance in specific subject areas (e.g., calculus, chemistry, accounting, etc.) and will be available for appointments in-person and virtually. Peer tutors are listed on the ASC website. **Email Roger Mancastroppa** (rmancast@richmond.edu) and **Hope Walton** (hwalton@richmond.edu) **for coaching appointments in academic and life skills.**

English Language Learning assists multi-lingual and international students in honing their language, academic, and/or intercultural skills. Among other available services for students are one-on-one tutoring, group workshops, and semester-long classes on writing and U.S. culture. **Please contact Dr. Bohon, Director of English Language Learning, at Leslie.Bohon@Richmond.edu for more information and appointments.**

Quantitative Resource Center: (qrc.richmond.edu): Provides services related to quantitative and computational learning across the curriculum through tutoring, consultation and training.

Speech Center: (speech.richmond.edu): Assists with preparation and practice in the pursuit of excellence in public expression. Recording, playback, coaching and critique sessions are offered by teams of trained student consultants. During scheduled [appointments](#), consultants assist in developing ideas, arranging key points for more effective organization, improving style and delivery, and handling multimedia aids for individual and group presentations. We look forward to meeting your public speaking needs.

Technology Learning Center: (tlc.richmond.edu): The TLC is a staffed public lab dedicated to supporting digital media projects. Services include camera checkout, video/audio recording assistance, virtual reality, poster printing, 3D printing and modeling. The TLC is located on the second floor of Boatwright Library.

Writing Center (writing.richmond.edu): Assists writers at all levels of experience, across all majors. Students can attend [walk-in hours](#) at Boatwright Library (room 171A) with trained writing consultants who offer friendly critiques of written work.

Other Campus Services

Boatwright Library Research Librarians: (library.richmond.edu/help/ask/ or 289-8876): Research librarians help students with all steps of their research, from identifying or narrowing a topic, to locating, accessing, evaluating, and citing information resources. Librarians support students in their classes across the curriculum and provide individual appointments, class library instruction, tutorials, and [research guides](#) (libguides.richmond.edu). Students can [contact an individual librarian](#) (library.richmond.edu/help/liaison-librarians.html) or ASK a librarian for help via email (library@richmond.edu), text (804-277-9ASK), or [chat](#) (library.richmond.edu/chat.html).

Career Services: (careerservices.richmond.edu or 289-8547): Can assist you in exploring your interests and abilities, choosing a major or course of study, connecting with internships and jobs, and investigating graduate and professional school options. We encourage you to update your profile in [Handshake](#) and schedule an appointment with a career advisor early in your time at UR.

Counseling and Psychological Services: (caps.richmond.edu or 289-8119): Assists currently enrolled, full-time, degree-seeking students in improving their mental health and well-being, and in handling challenges that may impede their growth and development. Services include brief consultations, short-term counseling, skills-building classes, therapy groups, crisis intervention, psychiatric consultation, and related services.