

Physics 131-01
General Physics with Calculus I

- Class: MWF 8:20 - 10:20 am, D115
- Professor: Dr. Jerry Gilfoyle; Office: Gottwald Science Center, D110; Phone:289-8255; electronic mail: ggilfoyl@richmond.edu; Office hours: MWF 10:20-11:20 am, T 10:00-11:00 am, T 3:30-4:30 pm. Other times by appointment or availability.
- Objective: To gain an understanding of the ideas of physics and to develop problem solving skills. Physics 131 satisfies the Natural Science Field of Study requirement.
- Textbooks: **Physics for Scientists and Engineers**, 4/e by Knight (recommended) and **Physics For Doing** by Belk et al. (required).
- Prerequisites: Calculus I (Math 211). May be taken concurrently.
- Course work: The course is taught in a ‘workshop’ format and will consist of lecture, lab, demonstration, 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 have a negative effect on your grades.
- 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%

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. 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 consist of short-answer questions and problems based on readings, homework, lectures, and lab. Each test is 50 minutes. The final exam is three hours.
- Homework: Homework assignments will consist of readings and problem sets listed on the course webpage. 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 should be handed in within 1-2 meetings after completion. 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.

Physics 131-01
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.

Physics 131-01 Schedule

Fall 2023

Date	Topic (Chapter)	Date	Topic (Chapter)
Aug 28	1-D Motion (1-2)	Oct 23	Test 2, Momentum (9)
30	1-D Motion (2)	25	Momentum (9)
Sep 1	1-D Motion (2)	27	Collisions (9)
4	Class Day	30	Collisions (9)
6	1-D Motion (2)	Nov 1	Collisions (9)
8	1-D Motion (2)	3	Rotation (12)
11	2-D Motion (2)	6	Rotation (12)
13	2-D Motion (3-4)	8	Angular Momentum (12)
15	2-D Motion (3-4)	10	Angular Momentum (12)
18	2-D Motion (4)	13	Angular Momentum (12)
20	Test 1, Force (4)	15	Harmonic Motion (14)
22	Force (4-5)	17	Harmonic Motion (14)
25	Force (5)	20	Harmonic Motion (14)
27	Applications of Force (5-6)	22	Thanksgiving Break
29	Gravity (6,13)	24	Thanksgiving Break
Oct 2	Gravity (6,13)	27	Harmonic Motion (14)
4	Centripetal Force (8,13)	29	Test 3, Relativity (36)
6	Centripetal Force (8,13)	Dec 1	Relativity (36)
9	Work and Energy (10-11)	4	Relativity (36)
11	Work and Energy (10-11)	6	Relativity (36)
13	Work and Energy (10-11)	8	Relativity (36)
16	Fall Break		
18	Work and Energy (10-11)		
20	Momentum (9)		

Final Exam: Monday, Dec 11, 9 am - 12 noon.

The Workshop Physics Approach

Introductory Physics with Calculus is taught in a ‘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 Investigative Physics 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. It is important for your success in this course that your entries reflect a sound understanding of the phenomena to observe and analyze. Make-up units will not be permitted and you are responsible for any material that you missed.

The Natural Science Field of Study Requirement

The field of natural science is concerned with the physical universe from subatomic to cosmic levels of organization, including inanimate as well as living systems, their structure, diversity, interaction, and evolution. Based upon the generation and testing of hypotheses, scientific inquiry is restricted to the study of repeatable, measurable, and verifiable phenomena. Within this field, knowledge may be gained either by controlled experiment or diligent observation, depending upon the phenomena being studied. Similarly, some of the field’s methodologies rely upon quantitative analysis, while others are primarily qualitative.

The natural science requirement is designed to enhance students’ appreciation of the beauty of science as well as their understanding of the challenges of doing science. Students gain experience in the formulation and testing of hypotheses and are introduced to scientific methodology. The natural science requirement consists of a single laboratory course selected from the three areas of science represented at the University of Richmond, namely, chemistry, physics, and the biological sciences.

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 131-01 Homework Assignments

Fall 2023

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>

Electronic copies of the problems are linked to the homework assignment page. Solutions for those assigned problems can also be found on the course website at the appropriate time usually the week after they are assigned. The problems and solutions are password-protected and are solely for the use of students in Physics 131-01 and are not be shared with people outside this class. The solutions, in particular, are not be downloaded, printed, or archived in any way. Sharing, saving, or archiving these solutions are Honor code violations.

The sections on the website refer to the text **Physics for Scientists and Engineers** (4th edition) by Knight. Items labeled with an 'L' refer to the laboratory manual **Physics For Doing** by Belk, Bunn, Fetea, Gilfoyle, Helms, Nebel, Rubin, Serej, Singal, Trawick, and Vineyard.

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. 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 list of their services is at the following address along with other information.

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

A summary of the services at the Academic Skills Center is on the last page of this syllabus.

Physics 131-01 Tentative Lab Schedule

Fall 2023

In each meeting there will be laboratory work. During the laboratory you will document your activities by filling in entries in the activity space provided in the laboratory units that make up **Physics For Doing**. 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	Topic (Lab)
Aug 28	Pretest, Position vs Time Graphs (1)
30	Velocity vs. Time Graphs (2), Relating Position and Velocity Graphs (3)
Sep 1	Changing Motion (4)
4	Slowing Down, Stopping, and Turning Around 1-D Motion (5)
6	Measurement, Uncertainty and Variation (6)
8	Projectile Motion (7)
11	Projectile Motion (7)
13	Uniform Circular Motion (8)
15	Uniform Circular Motion (8)
18	Uniform Circular Motion (8)
20	Test 1, Force and Motion I (10)
22	Force and Motion I (10), Lab notebooks due
25	Newton's Third Law, Tension, and Normal Forces (13)
27	Friction and Applying the Laws of Motion (14)
29	Gravitational and Electromagnetic Forces (15)
Oct 2	Gravitational and Electromagnetic Forces (15)
4	Centripetal Force (16)
6	Work and Power (17)
9	Work and Kinetic Energy (18)
11	Conservation of Mechanical Energy (19)
13	Conservation of Mechanical Energy (19)

Oct	16	Momentum and Momentum Change (21)
	18	Impulse, Momentum, and Interactions (22)
	20	Impulse, Momentum, and Interactions (22)
	23	Test 2, Newton's Laws and Momentum Conservation (23)
	25	Momentum Conservation and Center-of-Mass (24), Lab notebooks due
	27	Momentum Conservation and Center-of-Mass (24)
	30	Introduction to Rotation (25)
Nov	1	Introduction to Rotation (25)
	3	Newton's Second Law for Rotation (27)
	6	Newton's Second Law for Rotation (27)
	8	Conservation of Angular Momentum (29)
	10	Conservation of Angular Momentum (29)
	13	Hooke's Law (30)
	15	Periodic Motion (31)
	17	Derivatives of the Sine and Cosine (32)
	20	Periodic Motion (31)
	22	Thanksgiving Break
	24	Thanksgiving Break
	27	Periodic Motion (31)
	29	Test 3, Galilean Relativity (34)
Dec	1	Galilean Relativity (34), Lab notebooks due
	4	The Twins Paradox (35)
Dec	6	The Twins Paradox (35)
	8	The Twins Paradox (35)

Physics 131-01 Themes

Fall 2023

During this semester we will approach physics as a series of problems or themes. Each problem will be introduced and the physics principles needed to solve the problem will be gradually developed until we reach the answer. Some problems can be answered in a few sessions. Others may require longer. The motivation here is to enhance learning by developing the technical ideas in the context of an overall goal or solution.

Date	Theme	Date	Theme
Aug 28	Quest for Quarks	Oct 23	Dinosaur extinction
	"	25	Test 2, Dinosaur extinction
Sep 1	"	27	Dinosaur extinction
	"	30	Dinosaur extinction
4	"		
6	Amazing Basketball Shot	Nov 1	Making a Star
8	"	3	"
	"	6	"
11	"	8	"
13	"	10	"
15	Dark Matter		
	"	13	Biological Attack
18	"	15	"
20	Test 1, Saturn's Rings	17	"
22	Saturn's Rings		
	"	20	"
25	"	22	Twin's Paradox
27	"	24	Test 3, Twin's Paradox
29	"		
Oct 2	"	27	Thanksgiving Break
	"	29	"
4	"		
6	Bungee Jumping	Dec 1	"
	"	4	Twin's Paradox
9	"	6	"
11	"	8	"
13	"		
	"		
16	Dinosaur extinction		
18	"		
20	"		

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 \(rmancast@richmond.edu\)](mailto:Rmancast@richmond.edu) and [Hope Walton \(hwalton@richmond.edu\)](mailto: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.