

# General Physics 1–Honors (PHYS 101H): Fall 2022

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## Contact details

**Course Instructor** Prof. Chris Monahan. My pronouns are he/his/him. Email is the best way to contact me, although you are always welcome to drop by my office, Small Hall 326C.

**Contact email** [cjmonahan@wm.edu](mailto:cjmonahan@wm.edu).

**Course webpage** is [cjmonahan.net/phys101h\\_2022](http://cjmonahan.net/phys101h_2022) and on Blackboard.

**Be aware** This syllabus is subject to change during the semester. I will announce changes in class, but you are responsible for keeping up to date with the latest version on the course webpage and on Blackboard.

## Course overview

### College dates

- Add/Drop deadline: 11:59 pm on Monday September 12
- Midterm grading period: Monday October 10 to Sunday October 30
- Withdrawal deadline: 11:59 pm on Monday October 31.

University holidays (no classes!)

- Monday September 5 (Labor Day)
- Thursday October 13 and Friday October 14 (Fall break)
- Wednesday November 23, Thursday November 24 and Friday November 25 (Thanksgiving)

In addition, there are no classes on

- Thursday September 22 and Friday September 23
- Monday October 17

Class on Monday November 21 will be via Zoom.

**Class schedule** This course will be delivered in person in Small Hall 111 at **11:00 to 11:50 am** on Mondays, Wednesdays and Fridays, and in Small Hall 111 at **3:30 to 4:20 pm** on Thursdays.

**Prerequisites** Prior exposure to calculus will be assumed. This means you should be comfortable with the definition of derivatives, Taylor series, and one-dimensional integrals (including the mathematical sense of “anti-derivatives”). You should be able to calculate derivatives, Taylor series and integrals of simple functions of one variable, including basic trigonometric functions. Co-registration in the laboratory PHYS 101L is not required, but strongly encouraged.

**Office hours** (preliminary) In person on Monday at 10–10:30 am and 1–2 pm, and Friday 3–3:30 pm. Office hours take place in 326C Small Hall (my office).

**Laboratory** The laboratory (PHYS 101L) is a separate one-credit course. It is possible to take PHYS 101H without taking the lab, although I recommend you take both in the same semester. PHYS 101L is required for physics majors and minors. The lab cannot be taken without either being enrolled in the lecture class or having previously passed PHYS 101 or PHYS 101H.

**Assessments** There will be weekly Problem Set assignments, two midterm exams, and a final exam. The grades will be calculated based on one of two options:

- |                       |           |                       |
|-----------------------|-----------|-----------------------|
| • Problem Sets : 40%  | <b>or</b> | • Problem Sets : 40%  |
| • Midterm Exams : 30% |           | • Midterm Exams : 10% |
| • Final Exam : 30%    |           | • Final Exam : 50%    |

For each student, the final grade will be calculated using both methods, and the result with the larger numerical grade will be the one used to determine the letter grade.

This procedure allows those students that had difficulty with one or more of the midterm exams to have the chance to make up for it with a good performance on the final exam; after all—what is relevant is how much physics you have learned at the end of the course!

**Problem sets** Problem Sets will be posted on **Blackboard** on **Wednesday before class** and are due by the start of class the following Wednesday (that is, by 10:59 am). **I will drop the lowest grade on your weekly Problem Set.**

**Midterm exams** There will be two midterm exams. The dates are to be finalised, but will most likely take place on **Monday October 3** and **Wednesday November 9** during class time. These dates are unlikely to change.

**Final exam** The final exam will take place from **9 am to 12 midday** on **Tuesday December 13**. The final exam dates are centrally scheduled and will not change.

If you know you will miss an exam due to an university sanctioned event, please notify me by email prior to the exam. If you are ill on the day of the exam, please contact me as soon as possible to make other arrangements. A make-up exam may be administered.

**Required materials** We will use the (free) *Open Stax University Physics* textbook by Ling, Sanny, and Moebs. This text is accessible online here. You will also need an **Expert TA online subscription** for homework submission. To register for the course on Expert TA, you need this link: <http://goeta.link/USA48VA-007792-2VY>. The cost is approximately \$33 per course, per semester.

If you would like another reference textbook, which may be useful in future semesters if you plan to major in physics, then I would recommend either *Physics for Scientists and Engineers with Modern Physics*, by Serway and Jewett (Cengage Learning) or the super-classic *Fundamentals of Physics* by Halliday, Resnick and Walker (Wiley). Both of these textbooks have many many

editions, and I believe the latest versions are the 10<sup>th</sup> and 12<sup>th</sup> editions, respectively. Printed copies of the latest versions can be very expensive, however. If you do wish to buy a printed copy for future reference, I would not recommend buying the latest versions, slightly older editions can be purchased secondhand much more cheaply.

### **Course description**

This course is an introduction to topics in classical mechanics, including Newton’s Laws, conservation of energy and momentum, angular motion, gravitation, and wave motion. This course is for students who intend to major in physics or physical sciences and offers a more in-depth treatment of topics covered in PHYS 101, with more sophisticated examples. Prior exposure to calculus will be assumed. This means you should be comfortable with the definition of derivatives, Taylor series, and one-dimensional integrals (including the mathematical sense of “anti-derivatives”). You should be able to calculate derivatives, Taylor series and integrals of simple functions of one variable, including basic trigonometric functions.

We will cover:

1. Motion in one, two, and three dimensions.
2. Forces and Newton’s laws of motion.
3. Work, energy, and power.
4. Momentum and elastic and inelastic collisions.
5. Aspects of special relativity.
6. Angular motion, angular momentum, and moments of inertia.
7. Gravity, Newton’s laws of gravitation, and Kepler’s laws.
8. Fluid mechanics, Pascal’s law, and Bernoulli’s equation.
9. Simple harmonic motion, circular motion, and damped oscillators.
10. Waves, wave equation, and standing waves.
11. Sound waves and the Doppler effect.

### **Accommodations and Student Accessibility Services**

William and Mary accommodates students with disabilities in accordance with federal laws and university policy. Any student who feels they may need an accommodation based on the impact of a learning, psychiatric, physical, or chronic health diagnosis should contact Student Accessibility Services staff at 757-221-2512 or at [sas@wm.edu](mailto:sas@wm.edu) to determine if accommodations are warranted and to obtain an official letter of accommodation. For more information, please see the Student Accommodation Services [website](#).

### **Course policies**

The following policies are founded on two tenets:

1. You are responsible for your own learning.
2. You have agreed to abide by the Honor Code.

Some aspects or details of these policies are open for revision during the semester, if we, as a

class, feel that they are not working. These two tenets, however, are not.

### **Honor Code**

As students at William and Mary you have agreed to abide by the [Honor Code](#). You are responsible for your behaviour in class and are expected to uphold the Honor Code.

### **Responsibility for learning**

You are responsible for your own understanding of the course material. We may all learn in different ways, and I aim to foster an environment that allows us all to learn effectively. Taking responsibility for your own learning guides the following policies.

**Working together** You are encouraged to work together for problem sets, but you must provide your own solutions. Collaboration helps develop and cement understanding of the material, and is an important skill for your future careers, whether in physics or not. Your problem set submissions, however, should represent your own understanding and we must strike a balance between working collaboratively and copying someone else's work. I cannot emphasise this enough: **Copying solutions will not help you understand this course**. Moreover, copying is cheating and a form of plagiarism. An example of appropriate collaboration is working together to sketch out the main steps in a derivation or in the solution to a problem, then going away to write up your solutions in detail separately. An example of cheating is taking someone else's solutions the night before the deadline and copying them line by line.

**Attendance** Attendance does not form part of the grade for this class. After all, you are responsible for your own understanding of the course material. Attending class will, however, significantly improve your enjoyment of the course and is *highly* likely to improve your satisfaction with both your own understanding and your grade. In practice, it is extremely hard to obtain a good grade in this course without attending class.

I appreciate it if you are able to let me know if you will be absent from class, either because of other commitments or for health-related reasons, but this is **not required**. All course materials, including the slides, will be available on the course webpage and on Blackboard after class. Office hours are the best place to come with questions about material from classes that you missed. If you would like to make arrangements to catch up on missed classes outside of office hours, or if you will have an extended absence, please let me know and we can try to make appropriate arrangements.

**Late work, extensions, and make-up exams** I can make occasional accommodations for late homework if you inform me in advance. Reasons are appreciated, but not necessary, because sometimes you may not wish to share your reasons with me, for, you know, personal reasons. As with all these policies, I expect you to treat this responsibly. Sudden emergencies and unexpected life events will obviously be accommodated appropriately.

If you know you will miss an exam due to an university sanctioned event, please notify me by email prior to the exam. If you are ill on the day of the exam, please contact me as soon as possible to make other arrangements. A make-up exam may be administered.

**Laptops and mobile devices** You are welcome to bring laptops and mobile devices to class and are responsible for their appropriate use. Please note, however, that there is significant evidence (see, for example, [here](#), [here](#), and [here](#)) that using your device for tasks that are not related to in-class activities will (significantly) impinge on your understanding of the course material and perhaps even your grade. Distracting other students is not appropriate use.

**Typewriters** Typewriters are not permitted in the classroom.

### **Student organisations**

There are a number of organisations, societies, and other opportunities to have some physics fun. I encourage you to check some of these out:

1. Society of Physics Students. Join as a member via tribe link page: [here](#).
2. Women in Physics group. Contact Prof. Novikova using [inovikova@physics.wm.edu](mailto:inovikova@physics.wm.edu).
3. Mentoring for Careers in Physics (MCP). Professional mentoring for women interested in STEM careers. Contact me or Prof. Yang using [rxyan2@wm.edu](mailto:rxyan2@wm.edu).

### **Student resources**

I recognise that, as college students, you juggle different responsibilities and can face challenges that make learning difficult. There are many University resources available to help you navigate emotional, psychological, physical, medical, material and accessibility concerns. Asking for help is a sign of courage and strength. If you or someone you know is experiencing any of these challenges, I really encourage you to reach out to the following offices:

- For psychological/emotional stress, please consider reaching out to the [W&M Counseling Center](#); or (757) 221-3620, 240 Gooch Drive, 2nd floor. Services are free and confidential.
- For physical/medical concerns, please consider reaching out to the [W&M Health Center](#); or (757) 221-4386, 240 Gooch Drive.
- For additional support or resources, please contact the Dean of Students by submitting a Care Report; or by calling 757-221-2510, or by emailing [deanofstudents@wm.edu](mailto:deanofstudents@wm.edu).

Please reach out to me if you are facing challenges inside or outside the classroom; I can help guide you to appropriate resources on campus, some of which are listed below (links in online PDF):

- [The Dean of Students and the Student Success office](#).
- [Student Accessibility Services](#)
- [Writing Resource Center](#)
- [Equity program](#)
- [LGBTQ resources](#)
- [Neurodiversity Initiative](#)
- [Health and Wellness](#), mental health resources and the [Counseling Center](#)
- [The Haven](#)
- [Lifeline](#)
- [Options for reporting Discrimination, Harassment, Retaliation and Sexual Misconduct](#).

For quick access, you can also use the QR code in the figure below



The full policy of the College on Discrimination, Harassment and Retaliation is [here](#).