

# **Physics 12A, Elementary Physics (4 credits)**

UVM Physics Department – Spring 2023

## **Class schedule:**

Lecture: MWF 1:10-2:00 AND T 1:15-2:30 in Innovation E330

Three evening exams: Wednesdays: Feb. 15, Mar. 22, Apr. 12, Billings LH, 6:40 - 8:10 pm

Final exam (comprehensive): Tuesday: May 9, Votey 105, 10:30 am – 1:15 pm

*Note, this class meets four days a week. There is a separate one credit lab, Physics 22.*

*If you need lab credit, please enroll in a section of Physics 22 as well.)*

**Mastering Physics ID: donforth62116** [click link to enroll.](#)

**Instructor:** Dr. Luke Donforth (he/him)

Office Hours: M & W 10-11 or by appointment

Office: Innovation E227

Email: [luke.donforth@uvm.edu](mailto:luke.donforth@uvm.edu) (I will respond, but not on evenings or weekends.)

Phone: 802-656-0052 (landline, no text)

*Please utilize office hours for help and/or to discuss interesting aspects of the physics we're studying. Answering questions about material is easiest in person. If you have questions about grading, please email so that we both have a record of the conversation.*

**TAs:** there are multiple TAs for the course and the different sections, and you can go to any TA office hours. Please check the course Blackboard page for information about TA office hours.

**Pre-requisites:** Algebra and Trigonometry

**Education requirements satisfied:** N1, QR

## **Course Description:**

Physics, at its heart, is a set of tools to help you analyze and understand the universe around you, from subatomic particles to galactic structures. Physics 12 is the second small step on that path, finishing an introductory algebra based college physics course. Students will be presented with the topics of electric and magnetic fields, circuits, optics, circuits, and be introduced to relativity and quantum mechanics. The course goals are for students to develop both a qualitative (conceptual) and quantitative (algebra based problem-solving) understanding of each of these topics.

This course will meet for three 50-minute classes per week on Mondays, Wednesdays, Fridays and one 75-minute meeting on Tuesdays. This course is run as a student and group-centered active learning format where students will be expected to prepare for each class period by reading assigned sections from the textbook and other pre-class activities. During class, students will work individually and in groups doing a variety of activities including practice problems, tutorials, and other hands-on exercises with guidance and assistance from the instructor and teaching assistants.

Students are expected to attend all classes and participate in Learning Catalytics online exercises during class. There will be regular homework quizzes and pre-lecture activities, to be completed online via MasteringPhysics. Students should expect to spend at least eight hours per week outside of class to keep up with the reading, homework problems, and other online assignments.

### **Course Learning Objectives**

Successfully completing this course means that you can

- Apply first semester physics frameworks like energy and forces to new topics like electric and magnetic fields.
- Measure outcomes of hands-on activities, such as optical configurations of lenses, and justify physical laws based on experimental evidence.
- Calculate properties such as potential, current, field strength, forces on charges, focal length, and relativistic corrections.
- Utilize principles (such as the laws of physics being frame independent) to understand interactions and determine outcomes.

### **Land Acknowledgement:**

UVM is located on the lands and waters which has long served as a site of meeting and exchange among indigenous peoples for thousands of years and is home of the Western Abenaki People. UVM honors, recognizes, and respects these peoples, especially the Abenaki, as the traditional stewards of the lands and waters on which we gather today. In that spirit, we begin by acknowledging we are guests in this land, and we need to respect and help protect the land and water within our use. In offering this land acknowledgement, UVM affirms Indigenous People's sovereignty, history, and experiences. We note that a land acknowledgement is only a beginning in a larger process of naming injustices and relationship building.

## Required Course Materials:

### Textbook:

Modified Mastering Physics for College Physics: A Strategic Approach 4th Edition

Author(s): Knight, Jones, Field

You may procure a hardcopy (bound or looseleaf) and/or ebook option of the textbook. You will ALSO need to make sure you have **online access to Mastering**, as we'll use Mastering Physics for all of the homework pre-lecture assignments, and in-class assignments.

A hard-copy of the text is on reserve at Howe Library.

### Calculator:

You should have a scientific or graphing calculator that does not connect to the internet.

### Additional Accounts:

You will need a Gradescope account (free), which is where your exams will be returned to you. More information on Gradescope will be posted after the first midterm.

Learning Catalytics is embedded inside of Mastering Physics.

### Equipment:

You will need a portable computer (see [CEMS Laptop Recommendations](#)) to access the in-class assignments, course Blackboard page ([bb.uvm.edu](http://bb.uvm.edu)), as well as the course Gradescope page.

*Students struggling to pay for or obtain course materials or CEMS-approved laptops are encouraged to contact KC Williams, Assistant Dean of Equity, Belonging, and Student Engagement ([kc.williams@uvm.edu](mailto:kc.williams@uvm.edu)) and/or [UVM Student Financial Services](#).*

## Technical support for students

Students, please read this technology check list to make sure you are ready for classes.

<https://www.uvm.edu/it/kb/student-technology-resources/>

Students should contact the Helpline (802-656-2604) for support with technical issues.

## Grading Criteria & Policies:

Each student will receive a total grade based on the grades of the exams, homework, pre-lecture, and in-class assignments. The individual components will be scaled and converted to letter grades according to:

**Mid-terms 33%** (11% each). See schedule on syllabus first page.

**Pre-lectures: 9%**. See schedule on Mastering Physics.

**In-class: 26%**. Daily. Run via Learning Catalytics.

**Homework 16%**. See schedule on Mastering Physics.

**Final: 16%**. See schedule on syllabus first page.

A = 90 - 100%

B = 80 - 89.9%

C = 70 - 79.9%

D = 60 - 69.9%

F = 59.9% or below

All grades will be posted electronically to ensure privacy. It is each student's responsibility to verify the accuracy of the postings. Please report any discrepancies promptly.

**Missing Hourly Exams:** Missing a midterm exam will result in a score of zero unless the student has a valid excuse (and accompanying note from physician, dean, etc.). A student with a valid excuse may be given a make-up exam at a time that is mutually convenient for the student and the instructor.

**Missing the Final:** Missing the final examination will result in a final course grade of F unless the student has arranged with the instructor through the appropriate academic dean for an "Incomplete."

**Extra Credit:** Extra credit work will not be assigned for the course.

## **Homework:**

Part of the course objectives is for you to understand physics concepts and also be able to apply them numerically. We will work on that in class, and you will have more opportunities to practice and demonstrate your mastery via homework problems. Please keep up with the Mastering Physics page for homework assignments. Not that there are problems that are due and graded (labeled Homework Quizzes in Mastering Physics). There are also un-graded Practice homework sets of similar problems. Homework is not accepted late, but the practice problems can be done at any time. (Practice problems have due dates before the pertinent chapter homework, but just to help organize the calendar.)

It is allowed and even encouraged for you to work on the homework problems together. However, after discussing it with other students, instructors, and/or TAs, you should do the work yourself. Please do not utilize online repositories such as Chegg; that is a violation of UVM's code of Academic Integrity, as well as cheating yourself of the educational opportunity.

## **Pre-lecture:**

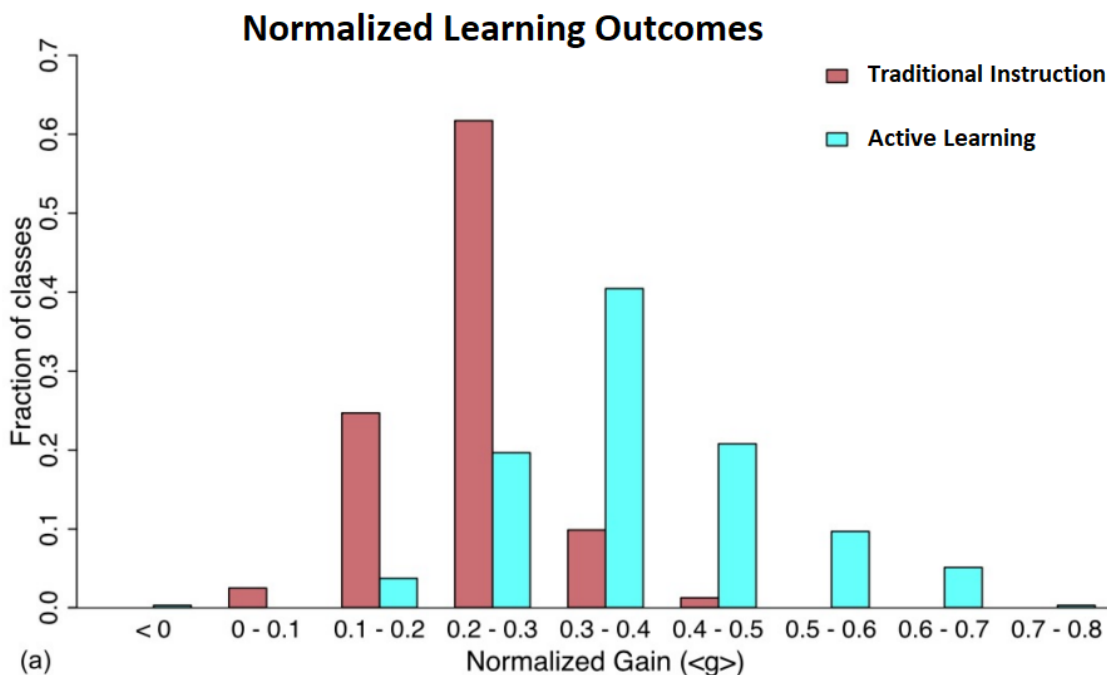
We expect you to come to class having performed an initial review of the material in the textbook. To facilitate that, we've assigned pre-lecture assignments for the different chapters, so that you are ready to participate in the in-class activities with your group. The pre-lecture assignments are graded for credit. No credit is given for late pre-lectures.

For those of you who like seeing things visually laid out, there are optional videos for almost all of the chapters that you can watch. Those are flagged as optional video lectures. The video lectures have due dates to help you know when they'll be most pertinent, but they can be watched at any time.

## **Pedagogy:**

This class utilizes a constructivist framework for education based around an active-learning modality, incorporating aspects of flipped-classrooms, peer teaching, hands-on activities, and problem solving while the instructors and assistants are available. There is very little time spent in class lecturing. We do this for the students. It would be easier to lecture, but it is not as efficient. See the figure below (adapted from Von Korff, et al, *American Journal of Physics* **84**, 969 (2016)), which compares what students learned after a semester of introductory physics (normalized to what they knew when they started). This study includes over 30,000 students in the data set, and we feel is strong evidence that to not teach with active learning methods would be a disservice to you.

If you find the modality challenging or frustrating, please come and talk to me. I'd be happy to discuss resources and techniques that will hopefully make the experience more fruitful for you.



During the daily sessions, we'll cover material in discussion, group problem-solving, conceptual analysis, and lecture. A portion of your final grade is contingent on your participation in these sessions. You should read the pertinent sections of the textbook before coming to class, to be well prepared to participate in the discussions and problem solving. We will work together to develop a learning community that is inclusive and respectful; and that encourages and appreciates expressions of different ideas, opinions, and beliefs in the spirit of Our Common Ground. Meaningful and constructive dialogue is encouraged in this class. This requires mutual respect, willingness to listen, and open-mindedness to opposing points of view. Respect for individual differences and alternative viewpoints will be maintained at all times in this class. Conduct that substantially or repeatedly disrupts the ability of faculty and instructors to teach and the ability of students to engage may result in my asking a student to temporarily leave the classroom. [See Undergraduate Catalogue - Classroom Code of Conduct \(p. 443-444\).](#)

The UVM attendance policy can be found [here](#).

Our intention is for CEMS to be a place where you will be treated with respect and kindness. We welcome individuals of all ages, backgrounds, beliefs, interests, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. All members of the College are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the community. If you ever feel that you have been unfairly treated or judged by an instructor, a mentor, another student, or another member of the CEMS community, please let someone know. Your instructors and advisors in the [CEMS Office of Student Services](#) are available to discuss any concerns or you can report an incident of bias through the [Campus Bias Response Program](#).

## **Attendance and illness:**

If a student will not be able to attend in-person classes for qualifying health reasons, Student Health Services (SHS) will send a notification to the appropriate student services office or designated staff member informing them of this along with the dates the student is unable to attend. The SHS notification will specify whether the request for flexibility is only around in-person class attendance or includes additional flexibility for assignments and tests because the student is too ill to participate. Students are responsible for working with their faculty to make up class content and work they miss due to a documented illness.

## **Lived Name and Pronoun Information**

The UVM Directory includes fields for indicating your lived name and your pronouns. Lived names (preferred names, names in use) are names that an individual wants to be known by in the University community. Entering your pronouns is strongly encouraged to help create a more inclusive and respectful campus community. To update your information, login to the UVM Directory. A preview box will allow you to see how this information will appear in other systems used on campus such as Microsoft Teams and Blackboard.

More information about how to make changes to your lived name and pronouns is available in the [Knowledge Base](#).

To read more about official UVM policies, events, and initiatives regarding diversity, equity, and inclusion: <https://www.uvm.edu/diversity>

## **Sexual Assault, Relationship Violence, Harassment, & Discrimination Disclosure:**

All course instructors (including graduate and undergraduate students hired for the course) are “Responsible Employees” or mandatory reporters, meaning we are responsible for reporting to the Title IX Coordinator instances of sexual assault, intimate partner violence, harassment, and discrimination disclosed to any of us, including the names of the person that disclose the information, for institutional review. If you would like to speak confidentially with someone (i.e. someone not required to make a report for institutional review) you may contact the following resources directly for support:

[Campus Victim’s Advocacy](#)

[HOPE Works](#)

[UVM Counseling & Psychiatry Services](#)

[Student Health Center](#)

[UVM’s Affirmative Action and Equal Opportunity Office](#)

## Course Evaluation:

All students are expected to complete a **mid-term** evaluation and final evaluation of each course they are enrolled in. Indicate that the evaluations will be anonymous and confidential, and that the information gained, including constructive criticisms, will be used to improve the course.

[Click here for instructions on how to access Blue course evaluations.](#)

## Student Learning Accommodations:

In keeping with University policy, any student with a documented disability interested in utilizing ADA accommodations should contact Student Accessibility Services (SAS), the office of Disability Services on campus for students. SAS works with students and faculty in an interactive process to explore reasonable and appropriate accommodations, which are communicated to faculty in an accommodation letter. All students are strongly recommended to discuss with their faculty the accommodations they plan to use in each course. Faculty who receive Letters of Accommodation with Disability Related Flexible accommodations will need to fill out the Disability Related Flexibility Agreement. Any questions from faculty or students on the agreement should be directed to the SAS specialist who is indicated on the letter.

### Contact SAS:

A170 Living/Learning Center;

802-656-7753

[access@uvm.edu](mailto:access@uvm.edu)

[www.uvm.edu/access](http://www.uvm.edu/access)

## Research and Citation Help

For help selecting research topics, finding information, citing sources, and more, ask a librarian. The UVM Libraries are eager to help. You may ask questions by phone, e-mail, chat, or text, or make an appointment for an individual consultation with a librarian.

Howe Library: <https://library.uvm.edu/askhowe>

Dana Medical Library: <https://dana.uvm.edu/help/ask>

Silver Special Collections Library: <https://specialcollections.uvm.edu/help/ask>



## Regarding potential changes during the semester:

<http://catalogue.uvm.edu/>

The University of Vermont reserves the right to make changes in the course offerings, mode of delivery, degree requirements, charges, regulations, and procedures contained herein as educational, financial, and health, safety, and welfare considerations require, or as necessary to be compliant with governmental, accreditation, or public health directives.

## Intellectual Property Statement/Prohibition on Sharing Academic Materials:

Students are prohibited from publicly sharing or selling academic materials that they did not author (for example: class syllabus, outlines or class presentations authored by the professor, practice questions, text from the textbook or other copyrighted class materials, etc.); and students are prohibited from sharing assessments (for example homework or a take-home examination). Violations will be handled under UVM's Intellectual Property policy and Code of Academic Integrity. **Please note that 'sharing assessments' includes course materials on study sites such as Chegg and Course Hero; and that uploading and downloading both count as unauthorized sharing.**

## Important UVM Policies

### Academic Integrity:

The policy addresses plagiarism, fabrication, collusion, and cheating.

<https://www.uvm.edu/policies/student/acadintegrity.pdf>

### Code of Student Conduct:

[UVM's Code of Student Conduct](#) outlines conduct expectations as well as students' rights and responsibilities.

### FERPA Rights Disclosure:

The purpose of UVM's [FERPA Rights Disclosure](#) is to communicate the rights of students regarding access to, and privacy of their student educational records as provided for in the Family Educational Rights and Privacy Act (FERPA) of 1974.

Final Exam Policy:

The University [final exam policy](#) outlines expectations during final exams and explains timing and process of examination period.

### **Grade Appeals:**

If you would like to contest a grade, please follow the procedures [outlined in this policy](#).

### **Grading:**

[This link](#) offers information on grading and GPA calculation.

### **Religious Holidays:**

Students have the right to practice the religion of their choice. If you need to miss class to observe a religious holiday, please submit the dates of your absence to me in writing by the end of the second full week of classes. You will be permitted to make up work within a mutually agreed-upon time. The complete policy is [here](#).

### **Promoting Health & Safety:**

The University of Vermont's number one priority is to support a healthy and safe community:

[Center for Health and Wellbeing](#)

[Counseling & Psychiatry Services \(CAPS\)](#) Direct Phone Line: (802) 656-3340

**C.A.R.E.** If you are concerned about a UVM community member or are concerned about a specific event, we encourage you to contact the Dean of Students Office (802-656-3380). If you would like to remain anonymous, you can report your concerns online by [visiting the C.A.R.E. Team website](#).

### **Food Insecurity:**

The UVM Center for Health & Wellbeing provides several on- and off-campus resources for students struggling with food insecurity: <https://www.uvm.edu/health/food-insecurity-uvm>

## Statement on Alcohol and Cannabis in the Academic Environment

As a faculty member, I want you to get the most you can out of this course. You play a crucial role in your education and in your readiness to learn and fully engage with the course material. It is important to note that alcohol and cannabis have no place in an academic environment. They can seriously impair your ability to learn and retain information not only in the moment you may be using, but up to 48 hours or more afterwards. In addition, alcohol and cannabis can:

- Cause issues with attention, memory and concentration
- Negatively impact the quality of how information is processed and ultimately stored
- Affect sleep patterns, which interferes with long-term memory formation

## Thank you

I appreciate that you're here taking physics with us. For many of you, this is a requirement for your major or future plans - experts in your field of study have decided that this information is important for what you want to do. We've worked with some of them to try to make this an informative and useful course for you.

It is my belief and experience that comprehension of physics concepts and principals allows you to more fully understand and engage with the universe. While you may not use physics every day, it is my hope that you succeed in the course and move on with tools to make meaning and sense of the world around you. I look forward to exploring physics with you.

Please come to my office hours or email me if you have questions or concerns, both from the course material or things outside of it. That invitation extends to after the semester as well, as you use or hone these tools in future steps along your life's path.