

# Introduction to Physics I

## Physics 001, Fall 2017

*Wherein a comically short period of time is spent understanding what it took the world's greatest scientific minds the entire 17th century to figure out.*

Revised August, 26th, 2017.

The most current version of the syllabus is at:

<http://physics.stmarys-ca.edu/courses/Phys001/17F>

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### INSTRUCTIONAL TEAM

- Professor: [Brian Hill](#) (follow link for contact info and office hours)
  - Teaching Assistants: TBA
  - Laboratory Professors (Physics 002): Professors [Edward Boyda](#) and [Anna Karelina](#)
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## COURSE MATERIALS

The campus bookstore has a discounted package price on the textbook, workbook and the online homework system.

- Textbook: [Physics for Scientists and Engineers: A Strategic Approach, Vol. 1 \(Chs 1-21\), 4th Edition](#)
- Workbook: [Student Workbook for Physics for Scientists and Engineers: A Strategic Approach with Modern Physics, 4th Edition](#)
- Online Homework System: [Registration Instructions for Pearson Mastering Physics](#)

The discounted price for all three items is \$232.70. This is a lot, but it is at least 30% less than the individual cost. There is no practical way to do the course without the materials. Please support the campus bookstore and buy the materials as soon as you are sure you are committed to the course, but at the latest, by Friday, Sept. 1st.

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## FLIPPED CLASSROOM

Conventional lecture presentation is not working well for the majority of students. It is incumbent on faculty to keep searching for classroom methodologies that help a larger fraction of the class succeed. The author of our textbook, Randall Knight, is a leading proponent of the "flipped classroom." In this methodology, class time is spent doing problems, using peer instruction and answering questions. Listening to lectures prepared by the professor is done by students on their own before class! These lectures will be short and will only highlight the textbook sections you need to study. The flipped classroom lectures will be [posted here](#) as we cover the material.

Although students have demonstrably higher success rates with the flipped methodology, many of them continue to desire the old lecture format because it is familiar, and it is at least a system in which they are "getting by." Unfortunately, "getting by" is not remotely sufficient to create a foundation of knowledge for an up-and-coming generation of scientists and engineers.

We will be implementing as many of Knight's and others' flipped classroom ideas as we can collectively handle. Please bear with me, and if you are finding the flipped classroom disorienting, perhaps you could be encouraged by a look into the literature on its effectiveness: for example, [a study involving 6,000 students](#) who were studying the same material as you will be studying this semester, and which demonstrated that flipped classroom resulted in more than twice — yes, more than twice! — the performance on standardized tests as conventional instruction.

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## **SCHEDULE**

We need to cover Chapters 1-17 of your textbook. That's a lot! It might appear that there are 14 weeks in the semester. However, with Monday off for Labor Day, Wednesday through Friday October 18-20 off for midterms, and Wednesday through Friday November 22-24 off for Thanksgiving, we actually have less than 13 weeks (14 \* 4 - 7 = 49 classes).

Out of the 49 classes subtract three classes for midterm exams. (Yes, that's a lot of midterms, but please believe me, it is better to have multiple, because it helps keep everyone caught up and having some idea where they stand.) Therefore, we have 46 classes to cover 17 Chapters! To put it another way, 13 of the chapters we can spend three days on but 4 of the chapters will have to be covered in only two days. If the pace seems fast it is because it is. I wish we could spread it out over more weeks, but that's all we have.

This is the schedule for the midterms and the final:

- Midterm 1: Monday September 18; Chapters 1-4 (approximately).
- Midterm 2: Monday October 16; Chapters 5-9 (approximately).
- Midterm 3: Monday November 13; Chapters 10-13 (approximately).
- Final: Monday, December 4th; cumulative plus Chapters 14-17.

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## ASSESSMENT AND EXPECTATIONS

15% for the homework, 20% on each of three midterms (totaling 60%), and 25% final. You can throw out your lowest midterm and replace its percentage with your final percentage. However, keep in mind that relying on this means you have 45% of your grade (yikes!) riding on the final. Unless otherwise specified, on-line problem sets must be submitted to the on-line homework system at midnight on the day they are due. If there are handed-in problem sets, they will be due at the beginning of class.

Some students are under the assumption that there are three or so absences excusable per class per semester (perhaps because some classes that are graded on participation allow that). There is no such assumption for this class. The material builds very rapidly, and it is unavoidably cumulative. You should ask a fellow student for details on what was covered in any classes you are forced to miss.

There are 51 of you launching on this journey. As you will see, I will be putting in a lot of time to help you be successful. I don't have unlimited time though. Things that are not very constructive uses of anybody's time — and which I won't be very accomodating of — are:

- Requests for alternative ways to make-up poor scores or missed material. The material is extremely carefully chosen by many physicists working over multiple decades to figure out what is most important for you to know. There isn't a body of alternate material that can substitute for what we are covering.
- Requests for intermediate grades to be computed other than those that are submitted at midterms. That said, I will often provide histograms for exam scores, and you can at least see roughly where you stand in the class. I don't make the final curve until after the final exam is graded and its score is folded in.
- Guidance for what will and won't be on the exams. I will sometimes say that out of necessity we must skip certain sections of the book. Other than that, you are responsible for Chapters 1-17 and that is pretty much the whole story.

I will be tirelessly accomodating for requests for help with the concepts.

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## ADVICE

If you are a STEM (Science, Technology, Engineering and Mathematics) major, introductory physics is your single most important class. This is because physics is at the foundation of almost every other science and engineering discipline. Even the mathematics you will use this semester was originally developed by physicists (especially Isaac Newton) to solve physics problems.

Therefore, if you are a STEM major, you should plan to spend more time on this class than any other. As a rule of thumb, you will spend around three hours outside of class for every hour in class. If getting behind and then trying to catch up before each exam is a strategy that has worked for you in the past, please be forewarned that there is too much rigorous material covered in college-level physics for that strategy to work out.

A misconception: physics professors often hear from some students that "I understand the material but I can't do the problems." *Physics is about being able to solve a wide variety of problems starting from a small number of principles.* Therefore, "understanding the material but not being able to do the problems" is an oxymoron. Above all else, keep doing problems, and do them mostly if not entirely on your own. This is what will make you good at physics.

Of course if you are flat-out stuck, ask a classmate for a pointer, come to my office hours, or visit the STEM Center (see below), but do not fall into the trap of just "following along" with other people's solutions. Virtually all understanding that you feel you are gaining in that way is illusory.

Finally, I will be doing everything I can to make the material intelligible, but the biggest variable is how much you embrace the subject matter and how much of a wellspring of focus and self-discipline you can find within yourself. Hoping to just "get by" or not finding the hours to do the work on your own is probably the main reason students get behind and eventually abandon STEM majors for something else that has different demands.

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## **STEM CENTER TUTORING**

Saint Mary's has a center for students taking STEM classes in Assumption Hall, Room 200. The STEM Center provides several services, including free tutoring in math, chemistry, physics, and biology. Please be very respectful of the Assumption Hall residents.

## **ACADEMIC HONOR CODE**

The Saint Mary's Academic Honor Code (AHC) is applicable to this (and all) Saint Mary's courses. You are responsible for familiarizing yourself with it: [AHC Website](#).

## **STUDENT DISABILITY SERVICES**

Accommodations that take into account the context of the course and its essential elements for individuals with qualifying disabilities are extended through the office of Student Disability Services (SDS). Information regarding the services available may be found on the [SDS Office Website](#).

## **MISSION**

John Baptist de La Salle dedicated himself to serving students who could not afford the private tutoring that was the primary form of education in his day. Saint Mary's is an heir to that mission and its faculty and staff are entrusted with carrying it out.

It is my goal to make each of you feel and know that you are valued and belong, regardless of your background or demographic. Please let me know if I am falling short in that. We all have blinders. I am constantly re-examining and trying to correct my own.

A syllabus is not the place to enumerate all of the ways the physics faculty go out of their way to make everyone successful. We are in the business of teaching and doing physics and almost all of the time you will hear us talking about physics. Please be assured that we take the Saint Mary's mission very seriously even when we aren't talking about it.