

Concepts of Physics (PHYS 100) Syllabus

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1 How to Find Me

The best way to reach me is **e-mail**, edis@truman.edu. My office phone is 785-4583, but I don't check messages often.

My office is MG 3004, and I will have office hours on Tuesdays and Thursdays: 13:30–14:50, Wednesdays: 16:30–18:00. If you want to see me then, come knock on my office door, which I will keep closed. Don't worry, you won't interrupt anything important. Then go and hang around the blackboard immediately outside my office door. I will put my mask on and come out, and talk with you outside my office, using the blackboard.

On Tuesdays and Thursdays, from 11:00 to 13:20, I will have remote office hours. I will be at home, in front of my computer, and you can reach me by Zoom or by email. Again, don't worry about interrupting anything; I will drop everything and attend to you. My Zoom meeting ID is 711 943 0930. If I'm already talking to someone else, don't hesitate to join the meeting. Chances are we're talking about something relevant to the course anyway.

If none of these times work for you, don't worry. I'm available at a lot of other times as well. Check my **calendar** (edis.sites.truman.edu/schedule/)—any time in which I am not actually teaching or have another meeting scheduled, I might be able to talk to you as well. Emailing me ahead of time is best: that way, we can set up a time that is good for both of us, and I'll put it on my calendar so that others can see that it's not available.

When campus shuts down and everything becomes remote due to the virus getting out of hand, all my office hours will become remote office hours.

I will post course-related notices and documents on the [Concepts of Physics page](https://edis.sites.truman.edu/physics-100-concepts-of-physics/) (edis.sites.truman.edu/physics-100-concepts-of-physics/).

2 Course Description

This is a course for students who will not necessarily use a lot of physics in their future career, but who are curious about the nature of the universe we live in. Hence I emphasize modern physics, including some of its weirder aspects, but downplay the mathematical problem-solving typical of more advanced physics courses.

You will encounter physical concepts throughout your life, particularly if you live as an engaged, informed citizen. I certainly hope that you'll learn, for example, what terms like "energy" really mean. But my immediate goals are more liberal-artsy. I figure you have the best chance of appreciating physics if you encounter it in the context of science fiction and popular science. My goals are to have you learn enough physics that you'll be able to understand science fiction better, and to be able to enjoy popular science writing.

This course satisfies the *Physical Science Mode of Inquiry* requirement of Truman State University's *Liberal Studies Program*.

3 Schedule

Lectures: Tuesday and Thursday from 15:00 to 16:20 in MG 2001.

Labs: Wednesday 11:30 to 13:20 in MG 1002 and 1006.
Wednesday 13:30 to 15:20 in MG 1002 and 1006.

Final Exam: Thursday December 10, all day online.

This shouldn't need saying, but please observe all masking and social distancing requirements. If you don't, I will ask you to leave. If you forgot your mask, just go and fetch it. I don't care at what time you enter or leave the classroom, as long as you don't disturb others.

When campus shuts down and everything becomes remote, our class meetings will become Zoom meetings. Since I won't be able to use the classroom and blackboard as usual, I will switch to posting "pseudolectures" a few pages long every week before the class meetings. Your job will be to read and work through these, and also read the parts of the textbook I will list, ahead of our meeting. I will typically spend half an hour on Zoom reminding you of a few things and explaining a few points, but for the rest of the time, I will depend on you to ask questions.

4 Required course materials

- *Physics: Concepts and Connections* by Art Hobson, 5th Edition.
- *Astrophysics for People in a Hurry* by Neil deGrasse Tyson.
- *The Algebraist* by Iain M. Banks.

All three are vital to how this course will work, and you need to carefully *read* all of them. Looking at them just before an exam won't do; you need to regularly read them and be prepared to discuss them.

Physics is a standard textbook. It will walk you through the basic concepts and serve as a reference to consult when you come across something you don't understand in the other two books. It'll also be where you'll find, at the end of chapters, the various questions and problems you'll be regularly assigned. We'll be working through this book throughout the course.

Astrophysics for People in a Hurry is a popular science book consisting of essays related to physics and astrophysics. For the first 10 weeks of the course, we'll be reading and discussing readings from this together with the textbook. You don't need to study this book as hard; just enjoy it and try to follow it. If you get stuck, that's fine—I'm counting on you to ask questions! In fact, asking questions is exactly the point.

The Algebraist is a science fiction book. Banks writes exciting novels with interesting physics and intriguing twists on what physics may have in store in the future. This is, of course, a popular novel—and you should read it as such. Have fun! (This is a course requirement.) During the final weeks of the course we'll be discussing *The Algebraist*, and we will spend a good deal of time asking each other questions based on the book.

5 Class Discussions

In lectures I will go over basic concepts, and I encourage you to join in with questions and observations. My idea of a successful time in class is not so much when I cover some material, but when a student asks an interesting question and we get sidetracked into looking at some fascinating science. An even more successful meeting is when students start discussing physics with *each other* and I can fade into the background.

So be sure to ask questions! 10% of your final grade will be based upon my in-class impression of what you contributed. And don't hesitate when asking. They don't even have to be directly physics questions. If we drift into discussing the artistic merit of some science fiction, or movie special effects techniques, or philosophical issues, that's perfectly fine with me.

Still, since sometimes students find it hard to leap in, I will also set aside time to more formally devote to discussion. About once a week during the semester, we will have some time when we start by discussing the assigned reading in *Astrophysics for People in a Hurry*. Come with questions!

6 Quizzes

On discussion days, I will also give you quizzes which will take up the final 15 or 20 minutes of class time. At least one of the questions in the quiz will be taken from the assigned problems given the week before, and the others will also be typically closely related to the assignments. One question will come from the material from *Astrophysics for People in a Hurry* under discussion.

Before each quiz, I will assign a number of questions to you from chapter ends in your *Physics* textbook. It is up to you to prepare yourselves by solving these before you come to the quiz. I will not collect homework; the quizzes are all.

I don't mind giving out answers to assignments. If you get stuck, consult me, and I'll work through the assignment with you.

Once we are forced completely online, the quizzes will continue during our Zoom meetings. I will email the quizzes as PDFs to you, and you will work on them quickly. Instead of handing the quizzes into me, you will take pictures of the two pages of your completed quiz and email them. I'll tell you more when the time comes.

For quiz dates, see the [Course Calendar](#).

7 EXAMS

#	Chapter (sections)	Conceptual Exercises	Problems	<i>Astro Hurry</i>
1.	3 4 (1–5)	1, 2, 7, 22 4, 10, 29, 31	2, 7 10, 13	1
2.	6 (1–6) 8 (1–5) 9 (1–3)	5, 20, 27 2, 9, 19 4, 10, 15	10,16 2 <i>none</i>	2
3.	10 (2–8) 12 (2–6)	18, 27, 39, 49 10, 17, 29	4, 8, 9 <i>none</i>	3
4.	5 (1–4, 6) 11	8, 10, 20, 37 8, 16, 20, 31	5 <i>none</i>	4
5.	13	2, 8, 13, 22, 28, 30, 33	1, 4	5, 6
6.	14	2, 13, 15, 21, 30, 34	1, 8	7, 8
7.	15 (1–7)	1, 6, 11, 13, 17, 20	5	9, 10
8.	17	4, 7, 9, 10, 11, 14	1, 2, 3	11, 12

Quizzes 9 and 10 will be based on *The Algebraist* alone.

7 Exams

You will have two midterm exams, and a final. The questions will be similar to those you will encounter in your assignments and in your quizzes. You will be allowed to use books and notes. You will need a calculator with you in exams, as well as most quizzes.

My exams are unusual. On the date of each exam, I will email you the PDFs of the exam just past midnight. You will have all the time you need during the next 24 hours to complete the exam, take pictures of all the pages with your answers, and email them back to me. I don't expect you will need more than one or two hours, but if you do, that's perfectly fine.

Moreover, I expect you to email me and ask questions during the exam. You may, for example, email me what you have done so far on a question and have me look it over. I will then tell you if you're on the right track, point out any mistakes, and so forth. My exams are not just an occasion to test you. I design them to force you to enter into a conversation with me

and learn something in the process. When you first look at a question, you may feel completely lost. That's not a problem: you're then supposed to sit down and type an email to me, asking some questions. **If you do not email me and ask questions during an exam, you're probably doing something wrong!** I'm not bothered by lots of questions. Never get the idea that you have to stop after a while, that it annoys me, or anything like that. As I say, I design my exams to force you ask questions.

You can email me throughout the day. But I will also be on Zoom at our regular class meeting time so you can ask questions verbally rather than having to type them in. I don't care if others in the meeting hear your question, and my answers will also be appropriate for all to hear.

Nothing about the exams will change once we go completely online.

For exam dates, see the [Course Calendar](#).

8 Labs

You will have seven labs throughout the course. Check the [Course Calendar](#). You will come into the lab on alternate weeks, so I am able to have one student per lab table. I will email you about whether you will be among the students who will always come in during the first week of a given lab or the second week.

Each lab is described in a pre-lab on the [Concepts of Physics web site](#). Read the appropriate pre-lab before you show up for a lab. You may also want to print it out. Don't waste time by having to read up on the lab during lab time. Due to social distancing, I won't be able to have you gather around and look at a setup all at once; reading the pre-labs so you have some idea about how to set up and do the experiment will be important.

I will keep things informal; I will not, for example, require a special lab notebook or demand a set format for lab reports. Typically, you will write down what you are doing in the lab on loose sheets of paper. This will include observations, calculations, and graphs. You will turn this in at the end of a lab session. Your pre-labs will provide a list of what exactly you need to turn in at the end. You do not have to collect your material and organize and prettify it for a formal report. Do not write down a description of the experiment, the procedure, and so forth.

You will work alone, not in groups. I will distribute you through both introductory lab rooms: MG 1002 and 1006. Please observe 6-foot distancing

at all times. I will be going around giving you hints and seeing if anything is going wrong.

If you do a competent but unimaginative lab, so that you turn in all the requirements but don't show any evidence of thinking much about what you were doing, you will receive about a 16 or 17 out of 20 points for that lab. Errors and omissions will reduce that grade. Getting closer to 20 requires that you go beyond fulfilling requirements set out in the pre-lab. For example, if you invent some interesting procedure for a measurement, make a relevant observation and speculate on what might have caused it, or show awareness of the possible sources of error and uncertainty in your measurements, write all these down. These impress me.

It's very difficult to organize lab make-ups, so I do not intend to have make-ups. *Do not miss any labs!*

When we are forced to go all remote, I will have suitable replacements for the labs—we will not try to do the labs we miss. I will tell you what you need to do when the time comes.

9 Grades

You should consider an overall percentage below 60% unsatisfactory, an F. 75% is satisfactory work, a C. 85%, a B, means you have done all that was asked for and appear to understand it. 95% is an A; you have mastered the material. There may be minor changes in how I determine final letter grades, but if you want to see how you are doing, you should first calculate your percentage as follows.

	Number of:	Points per:	Max points	% of Total
Discussion	1	100	100	10
Quizzes	10	20	200	20
Midterms	2	150	300	30
Final	1	200	200	20
Labs	10	20	200	20
		Total	1000	100

Then, you can find the number of points you've earned, and the maximum you could have earned. Your final percentage will be:

$$\text{percentage} = (\text{number of points earned}/\text{maximum possible}) \times 100\%$$

Round your result to the nearest tenth of a percent. You can then figure your approximate letter grade from your percentage using the chart below:

Percentage Range	Letter Grade
89.5%–100.0%	A
79.5%–89.4%	B
69.5%–79.4%	C
59.5%–69.4%	D
0.0%–59.4%	F

I may shift the borderline between certain letter grades by a small amount so that the line lands in the middle of a naturally occurring gap. Thus, it is possible you may get 88% and end up with an A, or you may get 92% and end up with a B.

You will also have an opportunity to earn up to 40 points of extra credit, on top of the points you acquire normally. For extra credit, you can write a one or two page paper presenting your thoughts about some physics you've encountered outside of class—in the news, in science fiction, or in other coursework. You will have two opportunities to try for 20 extra points each; these will be due the first class meeting after each midterm exam. Email your extra credits to me; don't give me hard copies.

10 Attendance Policy

You will need to be present in the classroom to do well in this course. But it's *your* responsibility to make sure you do well. I will not spend time keeping track of your attendance, and if you're not there, I will assume you have good reason to be absent. For example, if you are sick, please stay home! You don't need to tell me when you expect not to be present.

I cannot guarantee opportunities to make up labs or exams that you might miss. If you let me know ahead of time, I will try and accommodate you as best as I can, and I will make decisions on appropriate make-ups on a case-by-case basis. But again, I cannot guarantee that we can work something out—your best course of action is not to miss anything.

11 Academic Integrity

I care about maintaining academic integrity, and I will apply all Truman policies concerning **academic dishonesty**. I expect you to be familiar with the **Student Conduct Code**.

Do not present something that is not your own work as your own, whether you get it from another student or online. You will have plenty of opportunity and time to consult me about anything you're not sure about, including during exams. I'm much more concerned with you learning how to think about physics than showing an ability to spit out correct answers on demand.

In any case, I do not expect academic dishonesty, nor will I go out of my way to look for it. I run my classes on a kind of honor system: I leave you alone during exams, and while it is fine to consult textbooks or look things up online, I expect you will present me with your own work in the end.

12 Advice

- Expect to spend at least 7 hours per week outside of class on this course; even more if you find the course hard. Physics is notoriously difficult.
- Do not expect to read something once in your textbook and understand it; plan on going over much of the text more than once.
- I will not lecture directly out of the textbook, but I expect you to study it. If you are having difficulty understanding parts of the textbook which I have not addressed in class, it is your responsibility to ask about those parts.
- I encourage you to ask questions often, and I will ask you questions often. It is perfectly acceptable if you struggle with a question and get bogged down. You're not experts, and I don't expect you to pretend to be experts.
- In exams and labs, you must show how you arrived at your result, either by way of an explanation, or by clearly showing the steps in your calculation. If you did something correctly but I am unable to follow your reasoning as it is written, you may receive little or no credit. It is your job to make it easy for me to understand what you are doing.

13 Lawyer Avoidance

The minimum investment of time by the average Truman student necessary to achieve the learning goals in this course are not less than one hour (50 minutes) of classroom instruction and a minimum of two hours of out of class student work each week per credit hour awarded or at least the equivalent of three hours (2:50) of laboratory work, internships, practica, and other academic work each week per credit hour awarded. This average time per week for an average student may have weekly variations.

To obtain disability-related academic accommodations students with documented disabilities must contact the course instructor and the Office of Student Access and Disability Services (OSA) as soon as possible. Truman complies with ADA requirements. For additional information, refer to the [Office of Student Access and Disability Services website](#). You may also contact OSA by phone at (660) 785-4478 or email studentaccess@truman.edu.

In each classroom on campus, there is a [poster of emergency procedures](#) explaining best practices in the event of an active shooter/hostile intruder, fire, severe weather, bomb threat, power outage, and medical emergency. Students should be aware of the classroom environment and note the exits for the room and building. For more detailed information, please consult the [Emergency Guide for Academic Buildings](#). A [six-minute video](#) provides some basic information on how to react in the event there is an active shooter in your location.

Truman students, faculty, and staff can sign up for the TruAlert emergency text messaging service via TruView. TruAlert sends a text message to all enrolled cell phones in the event of an emergency at the University. To register, sign in to TruView and click on the “Truman” tab. Click on the registration link in the lower right of the page under the “Update and View My Personal Information” channel on the “Emergency Text Messaging” or “Update Emergency Text Messaging Information” link. During a campus emergency, information will also be posted on the [TruAlert website](#).

Truman State University and its faculty are committed to supporting our students and fostering an environment that is free from bias, discrimination, and harassment. If you have encountered any form of sexual misconduct (e.g., sexual assault, sexual harassment, stalking, domestic or dating violence), we encourage you report this to the University. If you speak with a faculty member about an incident of misconduct, that faculty member is a “mandated reporter” and must notify Truman State University’s Title IX Coordinator (Violette Hall 1308, 785-4354) and share the basic facts of your experience. The Title IX Coordinator will then be available to assist you in understanding all of your options and in connecting you with resources both on and off campus. If you would prefer to have a confidential conversation about an experience, the counselors at University Counseling Services are *not* mandated reporters and they can be reached at 660-785-4014. For after-hours crisis counseling, call 660-665-5621. For more information regarding Truman’s policies and procedures relating to any form of gender discrimination, please consult Truman’s [Non-discrimination Policy](#) and [Complaint Reporting and Resolution Procedure](#).

Consistent with guidance for higher education institutions from the Centers for Disease Control and to help us reduce the possible spread of COVID-19, when this class meets, or you attend office hours, you will be required to wear a face covering that completely covers your nose and mouth. You will be expected to keep the covering on at all times while we are meeting. In the event you arrive to class without a face covering, you will be asked leave until you are able to obtain one and return. Thank you for your help in containing this virus and helping to protect your peers.

Education records are subject to the Family Education Right to Privacy Act ([FERPA](#)). As a result, course grades, assignments, advising records, etc. cannot be released to third parties without your permission. There are, however, several exceptions about which you should be aware. For example, education records can be disclosed to employees or offices at Truman who have an “educational need to know.” These employees and offices may include your academic advisor, the Institutional Compliance Officer, the Registrar’s Office, or Student Affairs depending on the type of information.

Behavior that persistently or flagrantly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. Such behavior inhibits other students’ ability to learn and an instructor’s ability to teach. A student responsible for disruptive behavior may be asked to leave class pending discussion and resolution of the problem and may be reported to the Office of Student Conduct.