

Advanced Topics: Cosmology (PHYS 518)

Syllabus

Taner Edis

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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 my office hours are: Tuesdays and Thursdays: 10:30-11:50 and 13:30-15:20; Wednesdays: 13:30-14:20. 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.

I'm available remotely 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 on Zoom 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. My Zoom meeting ID is **taneredis**.

I will be using the web to post course-related notices and documents. Bookmark the course page: edis.sites.truman.edu/cosmology/.

2 Course Description

To understand the large-scale structure and history of our universe, cosmology brings together ideas from many different areas of physics: astrophysics,

general relativity, nuclear and particle physics, and thermodynamics, just to start. While some basic knowledge in such areas will be helpful, I won't assume that you have taken any courses beyond the prerequisites.

3 Schedule

Class: Tuesday and Thursday 12:00–13:20, MG 3000.
Wednesday 12:30–13:20, MG 3000.

4 Course materials

The textbook is Barbara Ryden, *Introduction to Cosmology* (2nd edition).

This course will be different than the other upper-level physics courses I teach. I'm not a cosmologist, and astrophysics is not at all my specialty. I've published a few minor pieces involving philosophical questions concerning cosmology, but these can be summarized as “back off, it's just physics.” In fact, one of my main motivations when I first taught this course was so I could learn a bit more of cosmology beyond what is common knowledge to any practicing physicist.

All this means is that I will keep my lectures closer than usual to the text—to some extent, I will be presenting you the highlights of my understanding on a close reading, and occasionally bringing in connections I can make to other questions in physics. I expect you to keep up by reading the textbook carefully as well. In some respects, I hope to model for you what a physicist has to do while learning a new subject on their own, reading an appropriate book and solving associated problems.

5 Homework and Recitations

Your homework assignments will determine 30% of your final grade. This is because, again, I intend for our coursework to model what we have to do when learning something new, largely on our own. Therefore the process of working through end-of-chapter questions is critical.

I will announce when each is due in class—normally about a week after we are done with each particular chapter.

I do not mind you discussing the homework with one another as well as with me. I will give hints if you come by my office and ask. However, I

expect you to turn in the results of your own efforts—not group solutions, and certainly not solutions directly taken from someone else. If I find results too similar to each other, especially if they make the same mistakes, you will have some explaining to do.

Before each homework set is due, we will also solve the recitation problems in class. I won't grade you on the recitations, though I will ask you to come up and solve them before the class. You don't have to get them right, and getting stuck is fine—I'll be there to help. The idea is to have me see you how you approach these things and help set you on the right path.

Chapter	Recitation	Homework
2	2, 5	3, 4, 6
3	1, 2	3, 4, 5
4	1, 3	2, 5
5	2, 3	5, 6, 8
6	2, 7	5, 6, 8
7	3, 5	4, 6
8, 9	8.1, 9.1	8.4, 9.2, 9.3
10, 11, 12	11.2, 12.3	10.3, 11.1, 12.4

We will most likely do the last two homework sets and recitations as planned, but there is a chance I may have to change course. It will depend on our pace and other considerations.

6 Exams

The default option is two take-home exams with somewhat lengthy questions, each determining 25% of your final grade. If you prefer another arrangement, ask in class.

I expect you to work on all exams strictly alone, without *any* discussion with others inside and outside of class. I also expect you not to use online resources such as web sites and discussion groups to give you hints or solutions.

7 Presentation

The remaining 20% of your grade will come from a ten-minute presentation (plus five minutes for questions) during the final two weeks of the semester.

For this, I would like you to pick a current cosmology-related topic which is not covered in the textbook, and put together a brief presentation with slides and so forth. I'd like you to explain the basics of this topic as best as you can, and make connections to what we have learned about cosmology during the semester.

8 Final grades

As with every other aspect of the course, I intend to be flexible. If you get less than 50% in your overall grade, you will certainly fail, and 90% or better will certainly be an A, but otherwise, I don't want to declare rigid boundaries such as "65%–77% is a C" and so forth. This is a small class and I will get to know how you do physics fairly well. What will matter most for your grade is my professional judgement about how well you come to understand the fundamentals of cosmology.

If you want to know how you are doing, or what sort of performance on the final you would need for an A, or have similar grade-related concerns, just email me or stop by my office and ask. I should be able to give you a fair estimate of where you stand.

9 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.

It is very hard to arrange for make-ups for exams or homework in a course like this. So I expect you will do everything possible to turn your work in on time, and so avoid later hassle for both me and yourself. I post solutions on the course web site; once they are up, it's too late to hand that work in.

Nevertheless, you may find you have missed something because of a legitimate excuse like being badly sick or a death in your family. In this case, come and speak with me, and I will decide, on a case-by-case basis, how to make up what you have missed. I will typically assign you some appropriate extra work, have you take a make-up exam in my office, or something similar.

10 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.

11 Lawyer Avoidance

Some of the required small print.

Truman policy and federal regulations require that students demonstrate that they are academically engaged in the courses they take. You must meet this requirement within the first calendar week of the semester, beginning at 12:00 am on Monday, August 23 and ending 11:59 pm Saturday August 28. Failure to do so, or to provide an explanation of an extenuating circumstance by that date and time will result in your removal from the course. Under certain circumstances, removal could impact your scholarship eligibility or financial aid. For the purposes of this class, establishing academic engagement requires, at a minimum, showing up at a lecture or lab.

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.

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.

Education records are protected by 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.

As part of the asinine nonsense that is required for a syllabus, I’m supposed to provide learning outcomes. Your learning outcome for this course: learning basic cosmology, evidenced by a passing grade.