

POPULAR ASTRONOMY (IN HOLLYWOOD)

Tuesday & Thursday | MEZ 1.306 | 5:00-6:30 PM

Why this class?

These days, space doesn't just appear in films and shows that look like the classical idea of "science fiction". As Samuel L. Jackson recently put it, even Spiderman has been to space. If space and its myriad interesting phenomena are going to become just another setting (or sometimes effectively a character) in pop culture, then it'll deepen our appreciation for both the entertainment and the science if we understand the real stories behind what we see on screen. Sometimes Hollywood gets it right and sometimes they get it very very wrong, and I'll try to present a balanced mix of both while explaining the context.

What will I get out of this class?

By participating in this class, my goal is that you will acquire (or increase!) an appreciation for the astronomical phenomena and settings that are appearing throughout modern popular culture, you will learn the scientific principles behind what we see out in the universe (and on screen), and you will develop practical skills in terms of understanding quantitative astronomical data and why it tells us what it tells us. There is no prerequisite; having had a general Introductory Astronomy class (like AST 301) would presumably help, but I'll plan to keep this class self-contained and assume as little prior knowledge as possible. This is not a math course, but we will encounter uncomplicated algebra and possibly a little bit on trigonometry and logarithms. I'll explain anything we need about those if they come up.

Instructor

Prof. Adam Kraus
alk@astro.as.utexas.edu
 PMA (RLM) 15.316B
 Office hours:
 Thu 4-5 (Outside MEZ)
 Mon 2-3 (on Zoom)

Teaching Assistant

Malvika Badrinarayanan
malvika.badri@utexas.edu
 Office Location TBD
 Office Hours: TBD

Course Learning Objectives:

This course has five primary goals, each with one or more learning objectives:

Course Goal 1: Intuition for how astronomical phenomena should behave, when you see them on screen.

Course Goal 2: Recognition of the common "failure modes" in Hollywood's depiction of space, and why they shouldn't work.

Course Goal 3: Understanding of the basic physical principles that drive that behavior, in terms of a manageable toolkit of "how things work".

Course Goal 4: Interpretation of quantitative displays (i.e., plots) of astronomical data, extracting the punchline they're meant to convey.

Course Goal 5: Vision of where humanity might be going in the future, quite believably within your lifetime. Ask me for some examples from my own life, but yesterday's "fantastic fiction" can turn into today's "pedestrian reality" shockingly quickly!



Image credit: <https://www.flickr.com/photos/35188692@N00/2282306375>

Required Materials:

Our textbook is The Cosmic Perspective (9th ed.), and all homework will be completed and turned in via the Mastering Astronomy online system. I'll be showing clips from a wide variety of streaming services; you don't need to subscribe, necessarily, but you may want to arrange for access to them so you can see those clips in context later.

Course Websites:

Canvas: <https://utexas.instructure.com/courses/1340284>

Mastering Astronomy: Go to Canvas -> My Textbooks -> Launch Courseware

Where can I find... ?

Canvas will have the following:

1. Lecture slides
2. Links to recorded lectures
3. Reading Assignments
4. Gradebook
5. Important Announcements

I suggest that you monitor Canvas daily, and ideally set up for notifications of new posts/ events.

Mastering Astronomy will have (approximately weekly) homework assignments.

What is expected of me in this class?

- Attend class and participate! We'll be taking regular breaks in class to discuss a question in small groups, then use the "Instapoll" system in Canvas to poll the entire class. (This is also how we track attendance.)
- Complete all assigned homework on time, including assigned readings. Make sure to take the time to think about the reading!
- Take advantage of class resources. We are here to help you!
- Have fun! You'll only get so many opportunities to watch Netflix in the pursuit of your degree, but luckily for all of us, this is one of them!

What happens in class?

Each week will have a general theme. If the marine biologists get Shark Week, then we deserve some Weeks of our own! Gravity Week! Black Hole Week! Alien Week!

Each class, we'll then tackle a few topics under that week's theme. The topics will be broken down into a typical structure:

1. I'll show you a movie or television (or other?) clip that references something about that week's theme.
2. I'll use Instapoll to poll the class about some aspect of it, giving you some time to talk to each other first. This will test our initial assumptions and intuitions.
3. I'll talk through the story about what's actually happening (or should be happening) and why.
4. Sometimes I might repeat steps 2 and 3, depending on how much we want to mine that specific topic.

How is my performance in this class assessed?

What is the grading scale?*

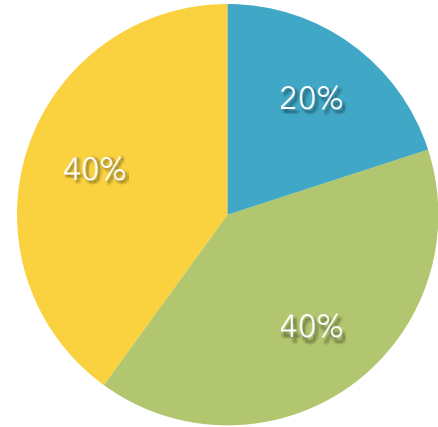
93.0 - 100	A
90.0 - 92.99	A-
87.0 - 89.99	B+
83.0 - 86.99	B
80.0 - 82.99	B-
77.0 - 79.99	C+
73.0 - 76.99	C
70.0 - 72.99	C-
67.0 - 69.99	D+
63.0 - 66.99	D
60.0 - 62.99	D-
< 59.9	F

*no rounding

Your final course grade will be determined as follows:

- 40% - Weekly-ish homework, dropping the lowest 2 scores
- 40% - Four exams, dropping the lowest score
- 20% - In-class participation, dropping lowest quarter of Instapoll answers

● Participation ● Exams
● Homework



Participation: It is expected that students will attend class regularly and be engaged. This will be assessed by completion of Instapoll questions during class (and note, you must be in class for these to count - please do not relay the questions to your friend who stayed at home!). At least the start, these will not be graded; simply answering is enough. The lowest 1/4 will be dropped, in order to allow for some absences. After the last two years, everyone recognizes that sometimes life events come up unexpected.

Homework: We'll have homework assignments roughly every week, which you will complete through the Mastering Astronomy online homework system. **Make sure you set up your account and can access Mastering Astronomy ASAP!**

Homeworks will be a mix of conceptual questions, questions where I pose Hollywood-style scenarios and ask you what should happen, questions where I show you astronomical plots and ask you to interpret them, and some very light mathematical questions. I'll plan to drop the lowest two grades, because again, things happen.

If we stick to the schedule, the homework will be due on Tuesdays at the beginning of class. This might change if we change the schedule, though. Note! Each homework will have a few questions about the readings for the upcoming week. This is intended to incentivize you to do the readings ahead of time.

Exams : We will have four exams, including one that is scheduled during the final exam window (but is intended to have similar structure and length to the others). These will largely be multiple choice, resembling the homework assignments that lead up to each one. I'll drop the lowest exam grade (so if you're happy with your first three, you can treat the last exam as optional).

The intent for all of these is to give you some flexibility over the course of the semester. People get sick, people have other life events, etc. By allowing some drops in each category, you won't need to worry about how those affect your grade. (If you have official university obligations or encounter a more substantial life event, we can work out how to handle them - the former by coordinating with the sponsor of those obligations, the latter if you go through Student Services.)

Communications with us

Your first point of contact for communication is your TA, Malvika Badrinarayanan. The next point of contact is then Prof. Kraus. Please use Canvas or email to send a message to Malvika and/or Prof. Kraus with questions, concerns, etc. We will aim to respond during normal working hours (M-F, 9-5pm) within 24 hours.

Classroom Safety and COVID-19

This is a science classroom and I strongly recommend that everyone look to the science and follow the guidance of local public health officials and the CDC. Wearing a mask indoors is encouraged, especially in a densely crowded environment like a large classroom, and I plan to start out teaching in mask while we see what happens with the giant wave of folks coming back to campus. Note that the attendance policy is extremely generous, effectively allowing a quarter of all classes to be skipped. As such, **if you're experiencing any symptoms of COVID-19 (or any other contagious disease), do not come to class in person.** Not only does it keep others from catching it, but it also will help you get better sooner if you don't push things. Classes will be recorded and available afterward, and if this causes you to miss enough classes that it becomes a problem, we can work with SES to make sure we settle all the paperwork to keep that from happening.

What are other policies on exams, assignments, and other course structure?

Course Webpage: The course webpage on the Canvas system will be updated with course announcements, homework and reading assignments, and deadlines. It is your responsibility to check these on a regular basis. Please come to class prepared, having read the required reading assignments. Also please be prepared to participate in in-class discussions and activities, this is for your benefit. Homework assignments will be completed on Mastering Astronomy, so you should also be checking that regularly.

Late work: Since all parts of your grade allow for dropping of a substantial fraction of the work, then late work will not otherwise be accepted. Please stay on top of deadlines! (If you have official university obligations or encounter a substantial life event, we can work out how to handle them - the former by coordinating with the sponsor of those obligations, the latter if you go through Student Services.) Note that being busy with other classes will not be considered as a valid excuse.

Expectations regarding mutual respect: Astronomy belongs to all people, independent of race, religion, gender, gender identity, gender expression, or sexual orientation. Incidents of discrimination, assault, harassment, threats, intimidation, profiling, or coercion based on membership or perceived membership will not be tolerated. Show each other the respect that colleagues deserve.

Course Conduct: Be respectful of others, especially during in-class peer discussion times, and even if you disagree with them. Please silence cell phones before you enter the classroom, no texting or using your devices during class except for use in specified classroom activities or taking notes. Also, please do not pack up or leave class early, as a consideration to us and your fellow students.

Instructor Travel: As part of their university duties, your instructor or TAs may be required to travel as part of their role as professional researchers. They will do their best to minimize the impact of this travel, and will endeavor to maintain Canvas communication at all times while out of Austin. When the instructor is out of town or otherwise unavailable, either lectures will be recorded and posted, or another UT faculty member will hold the class instead.

Plagiarism: As a research university, the University of Texas at Austin takes plagiarism very seriously. Do not risk getting involved in a plagiarism infraction - the consequences simply aren't worth it. Always do your own work. You may also read more about plagiarism at the Student Judicial Services website: <http://deanofstudents.utexas.edu/conduct/academicintegrity.php>

Sharing of Course Materials is Prohibited: No materials used in this class may be shared online or with anyone outside the class unless you have my express, written permission. This includes all class recordings. Unauthorized sharing of materials promotes cheating. It is a violation of the University's Student Honor Code and an act of academic dishonesty. I am well aware of the sites used for sharing materials, and any materials found online that are associated with you, or any suspected unauthorized sharing of materials, will be reported to Student Conduct and Academic Integrity of the Office of the Dean of Students. These reports can result in sections, including failure in the course.

Email: Email is recognized as an official mode of university correspondence; therefore you are responsible for reading your email for university and course-related information and announcements. Please check your email regularly and frequently.

University and Course Policies:

Academic integrity: The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community. Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties. Ethical conduct is expected at all times. For example, answering Voting Questions to receive credit when you are not in class is unethical. Incidences of academic dishonesty will be reported to Student Judicial Services. For more specific information go to: <http://deanofstudents.utexas.edu/conduct/academicintegrity.php>.

Academic accommodations (SSD): The University of Texas at Austin provides upon request appropriate adjustments for qualified students with disabilities. We are committed to making an inclusive, accessible and welcoming classroom environment for all students. For more information, contact

Services for Students with Disabilities at: 512-471-6259 (voice), 512-410-6644 (video phone), ssd@austin.utexas.edu (email) or online at: <http://diversity.utexas.edu/disability/>

Personal or Family Emergencies: If you experience a personal or family emergency (death in the family, protracted sickness, serious mental health issues) that prevents you from attending an exam or forces you to miss multiple days of class, you should contact Student Emergency Services in the Office of the Dean of Students <http://deanofstudents.utexas.edu/emergency/>. They will work with you to communicate with your professors and let them know of your situation.

Religious Days: A student who is absent from a class or examination for the observance of a religious holy day will be permitted to make up the missed work, if notice is given at least fourteen days prior to such an absence.

Schedule of Topics / Due Dates (subject to some changes):

Date	Topic	Anticipated Readings in Cosmic Perspective	Reading "Stretch Goals"	Notes
Aug 23 - Aug 25	Space Week!	1.1 (The Scale of the Universe), 4.1 (Describing Motion in Daily Life), 4.2 (Newton's Laws of Motion), 4.3 (Conservation Laws in Astronomy)	I strongly encourage reading 3.4 (The Nature of Science) as a "philosophical primer" when you get a chance! Stretch goal reading is not necessary, but can make learning the rest easier.	
Aug 30 - Sep 1	Gravity Week!	3.3 (The Copernican Revolution), 4.4 (Universal Law of Gravitation), 4.5 (Orbits, Tides, And Acceleration of Gravity)	2.4 (The Ancient Mystery of the Planets)	
Sep 6 - Sep 8	Time Week!	S2 (Space and Time)	5.1 (Light in Everyday Life), 5.2 (Properties of Light)	
Sep 13 - Sep 15	Dangerous Stars Week!	14.2 (Nuclear Fusion in the Sun), 14.3 (The Sun-Earth Connection), 15.2 (Patterns Among Stars), 15.3 (Star Clusters)	18.1 (White Dwarfs), 18.2 (Neutron Stars)	
Sep 20 - Sep 22	More Dangerous Stars!			Exam 1 on Sep 22

Date	Topic	Anticipated Readings in Cosmic Perspective	Reading "Stretch Goals"	Notes
Sep 27 - Sep 29	Black Holes Week!	17.3 (Life as a High-Mass Star), 18.3 (Black Holes), S3 (Spacetime and Gravity)	19.4 (The Galactic Center), 21.3 (The Role of Supermassive Black Holes)	
Oct 4 - Oct 6	Weird Planets Week!	7.2 (Patterns in the Solar System), 8.1 (Search for Origins), 8.2 (Explaining Features of the Solar System), 13.2 (The Nature of Planets Around Other Stars), 13.3 (The Formation of Other Solar Systems)	13.1 (Detecting Planets Around Other Stars), 13.4 (The Future of Extrasolar Planetary Science)	
Oct 11 - Oct 13	Asteroids & Comets Week! (AKA Chase Scene Week and Dinosaur Killers Week)	11.3 (Rings), 12.1 (Classifying Small Bodies), 12.2 (Asteroids), 12.3 (Comets), 12.5 (Cosmic Collisions)	11.2 (Satellites of Ice and Rock) and 12.4 (Pluto & the Kuiper belt)	
Oct 18 - Oct 20	Big Bang Week!	22 (The Birth of the Universe)	20.3 (The Age of the Universe)	Exam 2 on Oct 20
Oct 25 - Oct 27	Dark Matter Week!	19.1 (The Milky Way Revealed), 23 (Dark Matter, Dark Energy, and the Fate of the Universe)	21.1 (Looking Back Through Time), 21.2 (The Lives of Galaxies)	
Nov 1 - Nov 3	Habitable Planets Week!	10 (Planetary Atmospheres) except 10.3 (skip Moon/Mercury)	7.1 (Studying the Solar System)	
Nov 8 - Nov 10	Aliens Week!	24 (Life in the Universe)	13.2 (The Nature of Planets Around Other Stars)	
Nov 15 - Nov 17	More Aliens!			Exam 3 on Nov 17
Nov 29 - Dec 1	Weird Aliens & Megastructures Week!		13.4 (The future of Extrasolar Planetary Science)	
Dec 8 - Dec 12				Final Exam, date TBD

The instructor reserves the right to change the course content or the assigned work as needed to match the pace of the class or to incorporate late-breaking astronomical discoveries or new shows dropping on Netflix. Topics will be given the time I think they deserve, rather than rushing just to stick with a notional calendar.