

Professor: Dr. Ben Sugerman

Class: MWF 10:20 11:20 AM

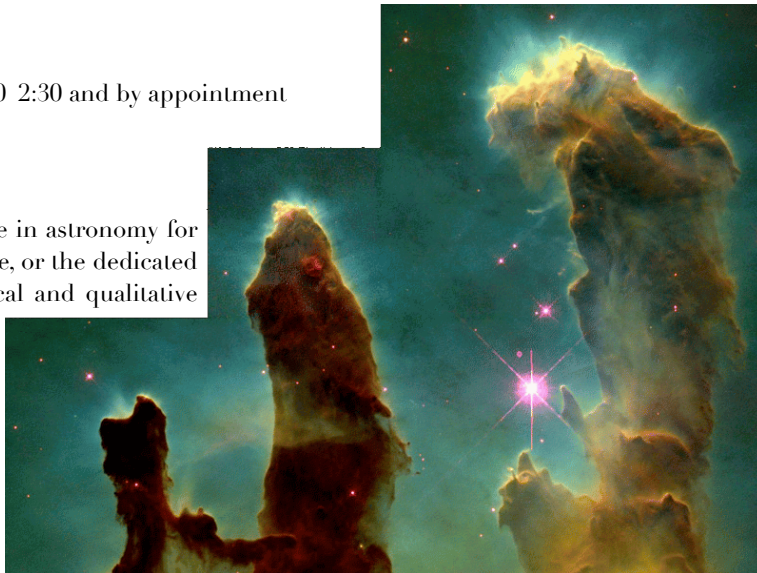
Website: *Intermediate Astronomy* on Blackboard

Office Hrs: HS G19, M 11:30 12:30, T/W 1 2, Th 1:30 2:30 and by appointment

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Course Objectives: An intermediate-level course in astronomy for physics students seeking a rigorous astronomy course, or the dedicated enthusiast seeking to continue Ast 110. An analytical and qualitative analysis of selected astronomical phenomena will allow students to learn basic principles and their application to real-world problems in astronomy, astrophysics and cosmology. Topics include telescope optics (including photographic and photoelectric attachments), planetary orbits, stellar structure, galaxy formation and evolution, the cosmological distance ladder, and the history of the Universe.



Why *Intermediate Astronomy*?

Try teach the whole of the universe, from the sky above you and the air around you to the very beginning of time, in one semester. A lot of fascinating material has to be glossed over, or skipped altogether. For that reason alone, a continuation of Ast 110 is needed, focusing on star clusters, galaxies and cosmology. For anyone interested, that isn't the study of make-up.

There is however a more subtle and fundamental reason to teach an intermediate-level course. Astronomy is the perfect merging of observation and theory: a person observes a phenomenon with some device, and then is left to explain why it happens using the laws of physics. In other words, the "scientific method" in action. One typically calls the quantitative physics and theory "astrophysics" and the observation, phenomenology and qualitative explanation "astronomy." While in Ast 110, we deal mostly with the phenomena, and in a forthcoming Ast 310 course we will tackle the detailed physics, there is an important and oft-overlooked void which I hope to fill in this course: learning to transition from qualitative to quantitative. How does one build a theory from observation? How do you test a theory with observation? How do you deduce a complete physical picture of a complicated system using only a limited range of observations? Remember, astronomy is a detective game: we can't visit, touch or sample most everything we wish to study, so all we are left with is what we can see.

I anticipate this course will mostly consist of discussion-motivated lectures, as we work to build a physical perspective of an observed (although generally poorly) universe.

Attendance

Attendance in lecture will not be taken. If you know you are going to miss a class, I will be much more receptive to meeting with you to go over what you missed if you notify me ahead of time.

Homework

Homework will be assigned roughly once every two weeks on Blackboard. Homework is your chance to master your material. You have a lot of time to work on them and a lot of opportunity to consult with me or your peers for help. There is really no reason why you can't have an almost perfect grade on all your homeworks, provided you put in the appropriate time and effort. Poor performance on homework will effect your understanding of new material, and will likely lower your performance on tests as well. In short, it is in your interest to take them seriously. Due dates will be posted with the assignment. Homework will be accepted late without penalty if you request approval at least 1 day in advance. Unexcused late assignments will be assessed a penalty of 15% per day, up to 5 days, after which a zero will be recorded.

Exams

There will be two cumulative exams given roughly halfway through the term and during finals. Exams will be closed book and closed notes. You may bring a single, 3x5 index card with any information you wish to use. You can also "exchange" points on a problem for hints. Calculators are allowed but use of programmable calculators with notes stored inside will be considered cheating.

Office Hours and Asking for Help

If you let your work slide until the last minute, you will quickly find yourself lost, upset and possibly failing. Take the time now to plan out a work schedule so you can review material as we go along, keep up or ahead with reading, start homework early, and leave yourself plenty of time to collaborate with friends and see me for help.

I hold office hours to augment the contact we have together, for those who need or want it. During these hours you may come by, unannounced, and for *any* reason. These are hours that I set aside for *you*; I hold them for your benefit, not mine. Outside of office hours, I maintain an “open-door” policy, i.e. if my door is open, you are free to talk to me, provided I’m not busy at that moment.

I will never hunt you down and force you to seek help. It is your decision and responsibility to monitor your learning, to make time to see me, and to do so in a *timely* manner. For example, do not come to me the day before your exam needing to learn everything in the course. Also, do not expect me to entertain questions about homework or tests an hour before they are due.

Grading

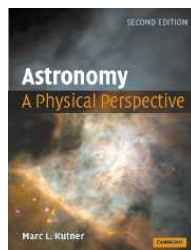
Your grade will be composed of: 60% homework, 20% mid-term and 20% final exam. I will drop the lowest non-zero homework grade. To help you monitor your progress, your grades will be posted on Blackboard. However, I keep the official grade-book, so remember Blackboard is only a guide (i.e. Blackboard’s grade-book can’t drop grades, so your actual grade may be higher than the percentage you see). Final grades will be based on your overall percentage, as follows:

A: 85 100%	B: 75 79%	C: 65 69%	D: 55 59%
A-: 82 85%	B-: 72 75%	C-: 62 65%	D-: 52 55%
B+: 79 82%	C+: 69 72%	D+: 59 62%	F: 0 52%

Cheating and the Honor Code

I advise you to form study groups for homework sets, studying for exams, and general discussion of this course. Blindly copying someone else’s homework just ensures that you haven’t taken advantage of that chance to learn, and though you may not be caught, you will probably suffer the consequences later on tests. Nonetheless, this violates the college honor code, and any obvious or suspected case of cheating, copying or other violation will reported to the Honor Board as outlined in the Campus Guidebook. If in doubt, *ask!!!*

Required Text



M. Kutner

Astronomy; A Physical Perspective, 2/e
Cambridge (2003)

Optional Texts

Hester et al., *21st Century Astronomy, 2/e*

Chaisson & McMillan, *Astronomy Today, 5/e or 6/e*

Bennett et al., *The Cosmic Perspective, 4/e or 5/e*

Carroll & Ostlie, *An Introduction to Modern Astrophysics, 2/e*

	Week	Topics/Readings
i. Physics	1*	Review of classical physics
	2	Light and Radiation (Ch 2, §5.2, §6.3.3)
	3	Energy and Matter. Gravity & Orbits (Ch 3, §6.2, 5)
	4	Gravity, Relativity (Ch 6, 7)
	5	Relativity, Telescopes (Ch 7, 4)
ii. Stars	6	Stellar structure and theory, variables (Ch. 9, §10.2)
	7	Compact objects, close binaries (Ch 11, 12)
	8	Clusters (Ch 13)
iii. Galaxies	9	ISM (Ch 14)
	10	Star formation, Milky Way (Ch 15, 16)
	11	Milky Way, Galaxies (Ch 16, 17)
	12*	Galaxies and AGN (Ch 17, 19)
iv. Cosmology	13	Clusters (Ch 18)
	14	Cosmology (Ch 20)
	15*	Big Bang (Ch 21)

*indicates a short week