
Physics 175x

Introduction to Astronomy 4 Credits

Instructor – Dr. Mark Conde



Breaking news in Astronomy: One of 2018's major discoveries in astronomy is from Chandra x-ray observations suggesting that tens of thousands of stellar mass black holes orbit near the center of our Milky Way galaxy. (These are in addition to the long-known supermassive black hole right at the center, which has roughly four million times the mass of our Sun.) Although this vast and previously unseen "swarm" of black holes had been predicted theoretically, obtaining observational evidence for its existence shows that even our home galaxy is exotic and dangerous at its core. The picture here shows an artist's impression of one of these black holes "shredding" an unfortunate star that strayed too close.

Overview

Description

This will be a standard 100-level undergraduate introduction to astronomy for non-science majors. It covers the science of astronomy and its societal consequences, with an emphasis on the interrelationships between astronomy and other sciences. As listed in the UAF Catalog, the topics to be covered are:

- Astronomical concepts and tools
- The solar system
- Stellar astronomy
- Cosmology.

There is an associated lab component, in which we will undertake some practical hands-on investigation of the tools and techniques used by astronomers to observe and understand the universe around us. When the weather permits, we offer additional evening opportunities to use telescopes on the roof of the Reichardt building to observe some interesting sky objects. This part of the course is included for your interest and enjoyment, so participation in the sky observing sessions is voluntary.

This course can be used by students to meet the University of Alaska's General Education Requirement (GER) in Natural Sciences, subject to the following stipulations:

- Credit may be counted toward GER or a degree major requirement, but not both.
- The minimum grade for GER classes is "C-", unless the major you are in requires a higher minimum grade for GER.

The University of Alaska has transitioned to the General Education Requirement, which replaces the older Core Curriculum. Requirements for courses to meet the GER in Natural Sciences remain as before, and can be found [here](#). The Natural Science component of the GER aims to "prepare students for lifelong learning in the natural sciences." More specifically, our study of the astronomy is required to include:

- A substantial emphasis on major concepts in natural science
- Consideration of the scientific method, as it applies to astronomy
- An experimental/laboratory component
- Consideration of the societal relevance of astronomy, and how it interacts with public policy

Major concepts and the scientific method will be discussed in lectures during the first few weeks, and you will apply these ideas in practice during the labs. The societal importance of astronomy will also be discussed in lectures, and a number of homework questions ask you to discuss issues of societal relevance.

GER Natural Science courses are required to undergo Student Learning Outcomes Assessment once every five years. One of the consequences of this is that the University may request additional feedback from you regarding your assessment of the conduct and value of this course.

The course will be closely linked to the assigned textbook (*Universe*, 10th Edition) although at times we may cover the topics in a slightly different order.

Course goals and student learning outcomes

Upon completion of this course students will:

- Understand the tools and techniques of scientific study, and how these have been used to establish our current knowledge of the universe.
- Be familiar with the hierarchy of objects that make up the universe, how they are distributed through space, and how Earth is placed in this universe.
- Understand the basic nature of these objects – how they formed, how they behave, and what their ultimate fates are likely to be.
- Be familiar in particular with the solar-system objects that are our near neighbors in space and may one day provide additional options for human habitation and resource extraction.
- Appreciate the societal relevance of astronomy and its connection to other fields of science.

My goal as an instructor is to provide every student with maximum possible opportunity for success. This means that I try to be as flexible as possible with the course requirements, to avoid creating needless hurdles. Nevertheless, some penalties for missed or late work are necessary; my policies in this regard are outlined below.

Instructor information

Instructor:	Dr. Mark Conde	
	Email:	mgconde@alaska.edu
	Office locations:	Reichardt room 110 and Elvey room 706F.
	Office Phone:	474-7741
	Office hours:	9:15 AM – 11:15 AM Tuesday and Thursday, or immediately after class on these days. I will be in Room 110 of the Reichardt building at these times.
Teaching Assistant:	Geneva Mottet:	Email: gjmottet@alaska.edu Office hours TBD in REIC room 128
Lab Manager:	Beth Roberts:	Email: earoberts8@alaska.edu Office: REIC room 114.) Phone: 474-7857
Office Manager:	Ellen Craig:	Email: eacraig@alaska.edu Office: Reichardt room 102.) Phone: 474-7339

Target schedule

Week	Dates	Topics (from the textbook <i>Universe</i>)	Labs
1	Aug 27 - Aug 31	Class introduction, Chapter 1	Math Review
2	Sep 03 - Sep 07	Chapters 2-3	None
3	Sep 10 - Sep 14	Chapters 4-5, Quiz 1	1
4	Sep 17 - Sep 21	Chapters 6-7	2
5	Sep 24 - Sep 28	Chapters 8-9, Quiz 2	3
6	Oct 01 - Oct 05	Chapters 10-11	4
7	Oct 08 - Oct 12	Chapters 12-13, Quiz 3	5
8	Oct 15 - Oct 19	Chapters 14-15	6
9	Oct 22 - Oct 26	Chapters 16-17, Quiz 4	7
10	Oct 29 - Nov 02	Chapters 18-19	8
11	Nov 05 - Nov 09	Chapters 20-21, Quiz 5	9
12	Nov 12 - Nov 16	Chapters 22-23	10
13	Nov 19 - Nov 23	Thanksgiving week, Chapter 24	Make up
14	Nov 26 - Nov 30	Chapters 25-26, Quiz 6	11
15	Dec 03 - Dec 07	Chapters 27-28	Telescope
16	Dec 10 - Dec 14	Finals week	None
17	Dec 17 - Dec 21	Grades posted by Dec 19	

Note that this is a rather ambitious schedule, requiring us to cover roughly one chapter from *Universe* per lecture. It is unlikely that we will make it all the way to the end of the book as shown here, but I at least want to complete up to Chapter 24.

Course components and instructional methods

Instructional materials

Material for this course will be prepared electronically and will be available *over the web* via the “Blackboard”¹ system at <https://classes.alaska.edu>. Material to be posted this way includes:

- Course syllabus (this document)
- Lecture notes (see comments below)
- Homework problem sets
- Lab notes
- Supplementary handouts
- Online student grades

Note that I will not be distributing homework or exam solutions to the web. These will instead be posted in the glass cabinets in the physics departmental area of the Reichardt building.

Lectures

I will be presenting lectures mostly using a computer, although I will supplement this with additional informal diagrams etc drawn on the blackboard. I intend to post printable

¹ All students should have access to Blackboard. Please let me know if you have difficulties with this.

versions of the electronic lecture notes online ahead of time, provided this does not appear to be adversely affecting lecture attendance.

Lectures will be held on Tuesdays and Thursdays from 11:30 am – 1:00 pm in room 203 of the Reichardt building. You should read the lecture notes and the relevant chapter from *Universe* beforehand. I strongly recommend bringing printed versions of the notes to class, and annotating them with your own supplemental notes during the lecture.

Labs

Generally, each student will be expected to complete one lab session per week. There are currently two sections allocated for this class, corresponding to labs on Tuesday and Wednesday. The labs meet in room 252 of the Reichardt building, and run from 2:15pm to 5:15pm on their respective days.

No regular lab sessions are scheduled during the week of Thanksgiving. We will instead use Thanksgiving week as a chance to do makeup labs. Labs in the final week of semester will be comprised of telescope observing sessions and/or recitations in preparation for the final exam.

There will be a total of 11 labs. Lab write ups should be completed during the lab, and turned in to the TA at the end of the session. Your worst lab score will be discarded; the remaining 10 scores for your lab participation and write up will contribute to your final grade. Complete lab policies are outlined in more detail in a separate document that will be available from the PHYS175 Blackboard site.

Laboratory sessions are a vital part of this course, and should not be missed. To pass this course, ***there is an absolute requirement that you must attend and write up at least 7 of the labs.*** Any student failing to reach this number will automatically fail.

Homework

Homework will be assigned each week during the Thursday lecture, and will be due by 5:00 pm on Thursday of the following week. ***All homework must be submitted via the box for this class that is located in the physics departmental office. Please do not put homework in my departmental mailbox,*** as this will delay getting it to the TA for grading. You may work with others, but you are prohibited from simply copying other's work. Homework will count significantly toward your final grade, as well as provide me with feedback regarding your understanding of the material.

Please realize that even if you submit a correct solution to a problem, your grader may not recognize it as correct if it's poorly presented. To maximize your chance of scoring well, your homework must:

- Be neatly laid out
- Be largely free from crossing out and over-writing
- Use grammatically correct English and be well enough written that the grader can understand what you're trying to say

Solution sets will be posted in the glass cabinet in the Physics Dept. hall. You are strongly encouraged make copies to help you understand how to approach these problems; it will likely help on tests.

Exams and Quizzes

There will be six 20-minute quizzes during the semester and one two-hour final exam. The preliminary dates for these are

- Quizzes: Sep 13, Sep 27, Oct 11, Oct 25, Nov 8, and Nov 29.
- Final: 10:15 a.m.-12:15 p.m., Thursday, December 13

No textbooks or printed material will be allowed in the final exam, but you may bring in any amount of your own original (not photocopied) handwritten notes. The final exam will be held in the same room as our weekly lectures.

No notes of any sort may be used during the quizzes. Only your best 5 quiz scores will contribute to your final grade. Your lowest quiz score will be discarded and will make no contribution. Quizzes will be held at the end of the Thursday lecture, during the last 20 minutes of our regularly scheduled class time.

Course policies

Grading

The course grade will consist of the following components

- Homework: 24% (2% each for 12 assignments)
- Best 10 out of 11 labs: 30% (3% each for 10 labs)
- Best 5 out of 6 quizzes: 25% (5% each for 5 quizzes)
- One two-hour final exam: 21% (Makes up 100%)

I will post all grades online, using the UAF's "Blackboard" system (<http://classes.alaska.edu>). All registered students have access to this system for checking their grades. Please do *check that we have posted all your grades correctly*, and let me know if you think there is an error. Also, please retain all work that we return after grading, in case an error does appear. Returned graded work is proof of your scores.

Final grades will be returned as letter grades with plus/minus modifiers. These will be derived from your overall percentage grade. The approximate conversions for each letter grade will be as follows. A: ≥90%; B: 75% to 90%; C: 60% to 75%; D: 50% to 60%; F: <50%. Plus/minus modifiers will subdivide each main grade into three equally spaced sub-levels.

Attendance

UAF policy² states that "you are expected to adhere to the class attendance policies set by your instructors." In general, I expect at least 90% attendance from all students. If attendance becomes a concern I may need to respond, for example by introducing unannounced "pop quizzes" to allow me to reward those who do attend regularly. Extra credit will be given for points scored on any such quizzes.

²See <http://catalog.uaf.edu/academics-regulations/attendance/>

Class participation

There is no requirement for you to participate actively in class by asking questions or joining discussions, and there is no grade component based on this. Nevertheless, you are of course free to ask questions at any time during the lectures. Because we have a large amount of material to cover, I may defer answering lengthy or numerous questions until after class.

Consequences of Low Grades

It is important to understand the implications of receiving a letter grade of “C” or below for this course. The following table³ describes UAF regulations with regard to grades of ‘C’ and below:

Grade / Grade Points	Definition and academic implications
C+ (2.3) C (2.0) C- (1.7)	<p>“C” (including C+ and C-) indicates a satisfactory level of acquired knowledge and performance in completion of course requirements.</p> <p>C- (1.7) is the <u>minimum</u> acceptable grade that undergraduate students may receive for courses to count toward the major or minor degree requirements, or as a prerequisite for another course. A minimum grade of C (2.0), however, MAY be required by specific programs for prerequisite and / or major / minor courses. Please consult specific program listings in the UAF Catalog.</p> <p>C- (1.7) is the <u>minimum</u> acceptable grade required for all Core (X) Courses.</p>
D+ (1.3) D (1.0) D- (.7)	<p>“D” (including D+ and D-) indicates a minimal level of acquired knowledge and minimal performance in completion of course requirements. This grade does not satisfy requirements for courses in the major, minor, Core, or graduate programs.</p>

Table updated 5/21/2013

Needless to say, a grade of “F” represents a failure. Zero grade points will be awarded, and the course must be re-taken to receive credit.

Missed or late work

A make-up quiz will be offered if a student misses a quiz due to illness, clash with another UAF commitment, or a genuine emergency. Determination of whether circumstances justify this make-up will be at the discretion of the instructor. An unexcused absence will lead to 0 points earned on that quiz.

As noted, we will schedule make-up labs during Thanksgiving week. Students will be allowed to make up at least one missed lab this way. Making up more than one missed lab will be at the discretion of the lab teaching assistant – whether this is possible will depend on availability of equipment and TA time, both of which are in turn dependent on the level of demand for make-ups.

³ Taken from http://www.uaf.edu/files/uafgov/Info-to-Publicize-C_Grading-Policy-UPDATED-May-2013.pdf

Problem sets will generally not be accepted after the due date, without evidence of illness or genuine emergency. Students having documented clashes with other UAF commitments may pre-arrange alternate homework submission deadlines with me. All decisions regarding late homework or alternate deadlines will be at the discretion of the instructor.

Student conduct and academic honesty

It is the responsibility of each student to be informed about the policies for student conduct and safety at the University of Alaska. You are encouraged to read these policies at <http://www.uaf.edu/usa/student-resources/conduct/#condu>. It should go without saying that students are expected to do their own original work for all assignments. Copying from other students or indeed from any source that is not your own work constitutes plagiarism. Failure to comply with UAF policies may be considered academic misconduct and may result in a failing grade (either for individual portions of work, or for the entire course, depending on severity.) Serious cases will be referred to university authorities for possible further disciplinary action.

Student responsibilities

It is the responsibility of all students to be aware of the various requirements of the class. This includes knowing what work is required, when the deadlines are, and how this work should be turned in. These requirements are clearly outlined in the syllabus, and multiple reminders will be given in class. Lack of awareness of a requirement will not be regarded as an acceptable rationale for failing to meet it.

The department takes great care to ensure that all submitted work is graded fairly and that the resulting scores are correctly credited to the students who submitted the work. Nevertheless, scores occasionally do get entered incorrectly or missed altogether. **It is the responsibility of students to check their scores in Blackboard frequently**, and to notify the instructor and/or TA immediately any discrepancy is noted. As discussed earlier, students are also responsible for keeping all graded work returned to them, as evidence of the grade received, should any disparity arise later.

Course requirements and materials

Prerequisites

Placement in WRTG F111X; placement DEVM F105, or permission of instructor.

Textbooks

Required:

- *Universe*, Tenth Edition by Freedman, Geller, & Kaufmann (W.H. Freeman & Co.)

Earlier editions of this text (8 and above) will also suffice.

Recommended additional reading: There are numerous excellent 100-level astronomy books available now. Any of the recent ones would likely be helpful for this course.

Note that online notes will be provided. However these will make frequent reference to the more extensive treatment of topics that appears in the book.

Calculators

You will need access to a calculator to complete some of the homework problems. Calculators will also be permitted during quizzes and the final exam, although I rarely pose problems on these tests that require one. You will not need anything elaborate; an easy-to-use scientific calculator is all that you will need. Remember that it is much more important to present the correct reasoning for solving a problem than it is to arrive at the correct numerical value. Please, explain your reasoning when presenting solutions to homework and exam problems. I will award partial points for correct reasoning, if presented, even if the final answer is incorrect or incomplete.

Support Services

Homework help

I have set the weekly homework deadline to be on Thursday evening. This was chosen so that you can (and should) speak to your lab TA during your lab class (either on Tuesday, or Wednesday) if you need additional homework help. The TA will have seen my solution to each problem, so they know what I am expecting. They can help you understand what is being asked, how to tackle the problem, and how to present your solution.

Complaints and concerns

You are always welcome to discuss your concerns with me. However, if you have a concern that you feel cannot be resolved by discussion with me, you may wish to contact the Physics Department chair, Dr. Wackerbauer. The University also has an Academic

Advising Center on the 5th floor of the Gruening building, open Monday to Friday, 8 am to 5 pm and contactable via phone at 907-474-6396. The advising center can help with all student matters, from study tips to help with understanding the University's formal mechanisms for academic appeals. (See also <http://www.uaf.edu/advising/>)

Student Health and Counseling Center

The University provides health and counseling services through its Student Health and Counseling Center, which is located at 612 N. Chandalar Drive, on the 2nd floor of the Whitaker Building (the same building as Fire and Police, across from the bus turn around.) Their web site is at <http://www.uaf.edu/chc/>. The center will see students on an appointment basis. The number to call for an appointment is 474-7043. It is best to do so at 8:00 AM in the morning, because they are scheduled daily on a first come first serve basis.

Disabled students

Disability services are provided free of charge, and are available to any student who qualifies as a person with a disability. Student seeking special accommodations for a disability must first discuss their needs with Disability Services. Call 474-5655 to schedule an appointment.

UAF Disability Services is located in the Whitaker Building, room 208. Extensive support is available, as described at <http://www.uaf.edu/disability/>