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# Physics 175

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## Introduction to Astronomy 4 Credits

Instructor – Dr. Mark Conde



**Breaking news in Astronomy:** On 24-August-2016, the European Southern Observatory announced<sup>1</sup> the discovery of an Earth-like and possibly habitable planet orbiting the very nearest star beyond our solar system! At “just” 4.2 light years distance, Proxima b is a place that human spacecraft (and possibly even humans themselves) could one day visit. It is difficult to over-state the implications of this discovery. This picture is an artist's impression of how a scene from the surface of Proxima b might appear. Of course, we currently have no idea of what it's really like.

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<sup>1</sup> <http://www.eso.org/public/news/eso1629/>

## 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 will devote a portion of our lab sessions to using 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.

The course is included in the UAF Core Curriculum, whose Natural Sciences component aims to “prepare students for lifelong learning in the natural sciences.” This means that our study of the topics above must 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

These mandatory components come from UAF’s requirements for Core Natural Science courses. 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.

Core 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*, 10<sup>th</sup> 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: [mark.conde@gi.alaska.edu](mailto:mark.conde@gi.alaska.edu)  
Office locations: Reichardt room 110 and Elvey room 706F.  
Office Phone: 474-7741  
Office hours: TBD, but likely 9:00 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: TBD : Email: [TBD](#)  
Office hours in REIC room 128  
TBD : Email: [TBD](#)  
Office hours in REIC room 126

Lab Manager: Jean Talbot: Email: [j.talbot@alaska.edu](mailto:j.talbot@alaska.edu),  
Office: REIC room 114.)  
Phone: 474-7857

Office Manager: Ellen Craig: Email: [eacraig@alaska.edu](mailto:eacraig@alaska.edu)  
Office: Reichardt room 102.)  
Phone: 474-7339

## Target schedule

Week	Dates	Topics (from the textbook <i>Universe</i> )	Labs
1	Aug 29 - Sep 02	Class introduction, Chapter 1	None
2	Sep 05 - Sep 09	Chapters 2-3	Math Review
3	Sep 12 - Sep 16	Chapters 4-5, Quiz 1	1
4	Sep 19 - Sep 23	Chapters 6-7	2
5	Sep 26 - Sep 30	Chapters 8-9, Quiz 2	3
6	Oct 03 - Oct 07	Chapters 10-11	4
7	Oct 10 - Oct 14	Chapters 12-13, Quiz 3	5
8	Oct 17 - Oct 21	Chapters 14-15	6
9	Oct 24 - Oct 28	Chapters 16-17, Quiz 4	7
10	Oct 31 - Nov 04	Chapters 18-19	8
11	Nov 07 - Nov 11	Chapters 20-21, Quiz 5	9
12	Nov 14 - Nov 18	Chapters 22-23	10
13	Nov 21 - Nov 25	Thanksgiving week, Chapter 24	Make up
14	Nov 28 - Dec 02	Chapters 25-26, Quiz 6	11
15	Dec 05 - Dec 09	Chapters 27-28	Telescope
16	Dec 12 - Dec 16	Finals week	None
17	Dec 19 - Dec 23	Grades posted by Dec 21	

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"<sup>2</sup> system at <http://classes.uaf.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

<sup>2</sup> 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 201B 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 three sections allocated for this class, corresponding to labs on Tuesday, Wednesday, and Thursday evenings. The labs meet in room 252 of the Reichardt building, and run from 7:00 until 10:00 pm on their respective days.

No regular lab sessions are scheduled on or after the week of Thanksgiving. We will instead use Thanksgiving and the following week as a chance to do makeup labs. Lab sessions in the final week of semester will be used as 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 PHYS213 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 Friday 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 15, Sep 29, Oct 13, Oct 27, Nov 10, and Dec 1
- Final: 10:15 a.m.-12:15 p.m., Tuesday, 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.

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.uaf.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:  $\geq 90\%$ ; 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 policy<sup>3</sup> 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.

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<sup>3</sup>See <http://www.uaf.edu/catalog/current/academics/regs2.html#Attendance>, which states that: "You are expected to regularly attend classes; unexcused absences may result in a failing grade. You are responsible for conferring with your instructor concerning absences and the possibility of arranging to make up missed work."

## 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 table<sup>4</sup> describes UAF regulations with regard to grades of ‘C’ and below:

Grade	Definition and academic implications	Grade Points
C+	Satisfactory to Fair: satisfactory level of performance, with some mastery of material	2.3
C	Average: satisfactory level of performance and level of competency in the subject. <b>A minimum grade of C (2.0) is required for all prerequisite and major courses.</b>	2.0
C-	Barely satisfactory: <b>Minimum grade required for all Core (X) Courses. A grade of C- (1.7) in a class which is a prerequisite for another class or in a class required for a student’s major will result in the student being required to retake the class.</b>	1.7
D+, D, D-	Below Average: Fair to poor level of competency in the subject matter. <b>A grade of D+, D or D- in a Core (X) class will automatically require the student to re-take the class to receive core credit, starting Fall 2011.</b>	1.3, 1.0, 0.7

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.

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.

<sup>4</sup> Taken from <http://www.uaf.edu/files/uafgov/Table-C-grades-policy.doc>

## 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.

## Course requirements and materials

### Prerequisites

Placement in ENGL F111X or higher; placement DEVM F105 or higher, 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.

### 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 Friday evening. This was chosen so that you can (and should) speak to your lab TA during your lab class (either on Tuesday, Wednesday, or Thursday) 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 5<sup>th</sup> 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/>