Astronomy 301 Syllabus

Winter Quarter 2020

Instructor – Dr. Chris Laws Office - Physics and Astronomy Building (Tower), C333 Office Hours – 930-1030a Tuesdays and Thursdays; also by appointment. Email - <u>wampaz@uw.edu</u> Phone and Voicemail - (206) 221-7949

Introduction

Welcome to Astronomy 301 - Introductory Astronomy for Scientists and Engineers. In this course, we will ambitiously attempt to describe in physical detail most of the major components of the entire observable universe – all within the brief period of 10 weeks! We'll examine spatial scales from the interiors of atoms to superclusters of galaxies, and time scales as brief as the first microseconds of the universe's existence to the multi-billion year lifetimes of stars. Along the way, we'll also pay close attention to the tools we use – both physical and theoretical – and carefully outline some of the major outstanding questions in our continuing exploration of the cosmos.

Course Objectives

The subject of astronomy is diverse and extensive, invoking chemistry, geology, atmospheric sciences, particle physics, optics, general relativity, and many other sciences. The cultural content is also broad, encompassing some of the great questions from human history – what is our true place in the universe? What are we made of and where did we come from?

In the next ten weeks we'll taken on this epic body of material, including but not limited to:

- Describing the physical and temporal scales of the universe and the key components within it: planets, stars, and galaxies, and the structures within which these are found.
- Constructing a detailed picture of the origin and evolution of our solar system, galaxy, and the universe itself what we know, how we know it, and the many things we're still confused about.
- Reviewing what we've learned about life in our own (and other) planetary system(s), and what that suggests about the distribution of life-bearing worlds in the universe.
- Exploring the basic techniques employed in astronomical science, from naked-eye observations and simple geometry to modern space-based detectors and high-performance computer simulations.

As I said, this is a lot of material – but by actively engaging yourself in the lectures and reading, I am confident that by the end of the course you will have earned a firm, college-level understanding of our modern view of the universe around us.

Textbook and Online Materials

The following Open Access textbook is required for the course:

Fraknoi, A et al. Astronomy - https://openstax.org/details/books/astronomy

Reading assignments from the textbook will be specifically outlined on a weekly basis, and you will be expected to have read all of the relevant material in advance of posted due dates. Copies of any slides that I use in class will be posted on the homepage for this course, along with readings, assignments, and other useful materials:

https://faculty.washington.edu/wampaz/classpages/a301/Home.html

If you have any problems accessing the homepage, please contact me by sending email to <u>wampaz@uw.edu</u>.

Lecture Session Format

In lecture sessions I will present ideas that augment and put into broader context topics covered by the current reading materials. However, we will also interrupt ourselves regularly for in-class discussions, and you will be expected to participate actively and be prepared each day to answer questions when called upon. I believe strongly that the best class is a dynamic, active environment where the students and instructor(s) interact closely – and I will certainly be implementing those beliefs in this class!

Quizzes

On Thursday of each week, we will have a short quiz over the recent lecture and reading material. These weekly quizzes are designed to encourage you to keep up with the information as you're going along, rather than letting material build up too much. Each quiz will feature at least one short answer/essay question, as well as a problem containing some significant mathematical content; the latter will consistently be adapted from the "Suggested Homework" for the week (see *Homework Sets* below).

Homework Sets

Each week I will post a set of 3-7 "Suggested Homework" problems on the class website. They will be drawn primarily from the textbook (or supplemental texts), but on some occasions I will alter those questions or write new ones altogether. These assignments will NOT be formally collected and graded, but at least one of the "Suggested Homework" questions (modestly adapted) *will appear* on each Thursday's quiz.

Exams

There will be no formal midterms, but I will have an optional Final Exam on Monday, March 16th from 1030a-1220p. Students may choose to not take the exam, in which case they will be assigned Final Exam grades equal to the average grade of their 10 weekly quizzes. Note: students who do take the exam but score lower than their quiz averages will not be penalized – they will be assigned Final Exam grades equal to their quiz averages.

Out-of-Class Activity

Each student will be required to attend at least one 'astronomy field trip activity' – for example, attending a public lecture on astronomy, or coming to one of the planetarium presentations that I will arrange for the class here on campus – and then prepare a 1-2 page written report/review of the event. This assignment is intended to be fun, and to encourage you to see astronomy in action outside of the classroom.

Grading Policy

The grades for the course will be determined as follows:

•	Weekly Quizzes (10 x 7% each)	70%
•	Optional Final Exam (1 x 25% each)	25%
•	Out-of-Class Activity (1 x 5% each)	5%

This of course yields a 'percentile' score, based on a perfect score of 100. I will translate that score to the 0.0-4.0 scale in the following general manner:

90-100	3.6-4.0
80-90	2.9-3.5
70-80	2.2-2.8
< 70	< 2.1

The average score in the course over the last three years has been around 86, and that score has earned an average grade of 3.4; the cutoff for 4.0 has been around 95. For more insight, I strongly suggest these discussions from the UW's guidelines on grading:

http://www.washington.edu/students/gencat/front/Grading Sys.html

http://depts.washington.edu/grading/practices/guidelines.html

Missed Activities and Assignments:

I will allow makeup opportunities for missed *in-class* quizzes, provided that you contact me regarding your absence no later than 24 hours after missing class. Any *out-of-class* quiz that is turned in late will be accepted but penalized at a 50% level, providing that I receive it within 24 hours of the specified due date. Out-of-class quizzes turned in more than 24 hours late will receive no credit.

Access and Accommodations:

Your success in this class is extremely important to me, and it is my goal to help you perform your best. It is also the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law. If you believe there are elements of the course design that may negatively impact your performance, please let me know as soon as possible so that we can work together to develop strategies to meet both your needs and course requirements. You should certainly contact me if you have emergency medical information to share, need to make arrangements in case the building must be evacuated, or experience emergent needs for accommodation as the quarter progresses.

If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course. If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions including but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924 or uwdrs@uw.edu or disability.uw.edu. DRS offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS.

Washington state law requires the accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW's policy, including more information about how to request an accommodation, is available at Religious Accommodations Policy. Accommodations must be requested within the first two weeks of this course using the Religious Accommodations Request Form

ASTR301 Calendar (subject to change)

Tue	Thu
1/7 The Big Picture Intro/Syllabus	1/9 Patterns in the Skies
	Quiz 1
1/14 The Motions of the Earth	1/16 The Copernican and Newtonian Revolutions
	Quiz 2
1/21 The Planets	1/23 Comets, Asteroids, and Dwarf Planets
	Quiz 3
1/28 Exoplanets and the Formation of Planetary Systems	1/30 Measuring and Interpreting Light I
	Quiz 4
2/4 Measuring and Interpreting Light II	2/6 The Sun Amongst Stars
	Quiz 5
2/11 Star Clusters and Stellar Ages	2/13 Dwarfs, Giants, and Gold
	Quiz 6
2/18 The Compact Corpses of Stars	2/20 Black Holes
	Quiz 7
2/25 The Structure of the Milky Way	2/27 Life in Our Galaxy
	Quiz 8
3/3 A Universe of Galaxies	3/6 Dark Matter and Large-Scale Structure Distribute Final Exam Essay Questions Quiz 9
3/10 The Hubble Flow and Expanding Space-Time.	3/12 The Deep History and Future of the Universe
	Quiz 10 (Take Home)