

# Astronomy 3: The Nature of the Universe

## Lecture Section 1

Fall 2017

**Lectures:** Tuesday, Thursday, 10:30 am – 11:45 am, Kinsey Pavilion 1220B

**Homepage:** <http://www.astro.ucla.edu/~aes/AST3>

**CCLE Homepage:** <https://ccl.e.ucla.edu/course/view/17F-ASTR3-1>

### Personnel:

**Professor:** Alice Shapley  
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Office Hours: Tuesday, 2:00-4:00 pm

**Head TA:** Tze Yeung (Mathew) Yu  
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Office: 3-540 PAB  
Office Hours: Monday, 1:00-3:00 pm

**TA:** Helen Kim  
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Office Hours: Monday, 10:00-11:00 am; Wednesday, 1:00-2:00 pm

**TA:** Kevin Hayakawa  
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Office: 3-540 PAB  
Office Hours: Tuesday, 2:00-3:00 pm; Thursday, 1:00-2:30 pm; Location: 3-735 PAB

**Discussion Sections** (i.e. “Labs”):

All discussion sections take place in Knudsen 1116.

**Discussion Section 1A:** Monday 8:00 - 9:50 am, Helen Kim

**Discussion Section 1B:** Monday 12:00 - 1:50 pm, Helen Kim

**Discussion Section 1C:** Tuesday 8:30 - 10:20 am, Helen Kim

**Discussion Section 1D:** Monday 4:00 - 5:50 pm, Mathew Yu

**Discussion Section 1E:** Tuesday 3:00 - 4:50 pm, Mathew Yu

**Discussion Section 1F:** Wednesday 6:00 - 7:50 pm, Kevin Hayakawa

**Text: The Essential Cosmic Perspective, 7th Edition (2014)**, by Bennett, Donahue, Schneider, & Voit (required). The textbook may be purchased new, used, or in digital form. Mastering astronomy on-line resources are free with purchase at the bookstore, or can be purchased separately – but they are NOT required.

**Astro 3 Lab Manual:** Package of Lab exercises for discussion sections (required).

**Calculators:** A simple one is **highly** recommended, though not required.

## 1 Introduction

This course provides a broad introduction to astronomy and our place in the universe. We will start by discussing the mind-bogglingly vast range in physical scales spanned by astronomy, and then learn how we can perform astronomical observations in our everyday lives. We will then follow the history of astronomy as a science, reviewing the fundamental physical concepts of motion, energy, gravity, and light on which it is based, along with the tools used to make astronomical measurements. After these preliminaries, we will delve into the nature of planets, stars, galaxies, and the Universe as a whole. At the end of this course, students should appreciate the beauty and power of the scientific method as it applies to astronomy.

## 2 Prerequisites

We will review all the basic physical concepts required for understanding the material in the course. However, we expect a knowledge of entry-level UC mathematics (algebra, geometry, and basic trigonometry).

### 3 Grading: Labs, Homework and Exams, etc.

Final grades will be based on lab assignments (a total of 8 to be completed during the quarter); homework assignments (a total of 8 on-line quizzes given during the quarter); two midterm exams; and the final exam. These factors will be combined in the following percentages to determine your class grade:

- 20% Lab assignments
- 10% Homework assignments
- 20% First midterm exam (in class)
- 20% Second midterm exam (in class)
- 30% Final exam

Final marks for the course will be graded on a curve.

**Lab assignments** are *required*. You must attend lab starting week 1 of the quarter. Labs for the course will be performed in the lab classroom (Knudsen 1116) during the 2-hour discussion section, and are to be handed in at the conclusion of the discussion section. Attendance is required for labs. If you miss a lab for a valid reason, you should try to attend another section that same week (not later in the quarter). To attend another section, you must contact lead TA Mathew Yu (tzeyu@astro.ucla.edu) as early as possible, and he will help you resolve the situation. If for whatever reason this is not possible then contact your TA within 7 days after the missed lab to discuss an alternate assignment for make-up credit. **Only one make-up will be allowed per quarter.** Other missed labs will earn you a zero score. You must complete at least 5 labs or else you will receive an “Incomplete” in Astro 3. **DON'T LET THIS HAPPEN.** Exams may draw from topics covered during lab sessions.

**Homework** will be assigned roughly every week (starting during week 1) and will consist of on-line quizzes based on lectures and reading (~ 10 – 15 questions per week), in addition to the reading assignments from the textbook. Quizzes will be due at 10 pm on each Monday, unless otherwise announced. **No late homework will be accepted.** At least 5 homework assignments must be turned in to pass the course.

**Exams** will consist of two midterms (**in class**), each worth 20%, and a final exam worth 30%. The first midterm will take place on Tuesday, October 24th, and the second one on Tuesday, November 14th. The final exam will be on Friday, December 15th, from 11:30 am - 2:30 pm. The exams will be (almost) exclusively based on **multiple choice** questions.

**Extra Credit** opportunities will be announced during the quarter.

## Schedule of Lectures

Week	Date	Title	Chapter
0	Sep. 28	General course intro. Our place in the universe.	1
1	Oct.	3 Discovering astronomy for yourself.	2
		5 Science and History of Astronomy. <i>Lab: Quantitative Skills</i>	3
2		10 Motion, Force, Energy.	4
		12 Light and Telescopes. <i>Lab: Naked-Eye Astronomy</i>	5
3		17 The Solar System.	6
		19 The Terrestrial Planets. <i>Lab: Light and Telescopes</i>	7
4		24 <b>Midterm Exam 1, in class</b>	
		26 The Jovian Planets. <i>Lab: Light: Color and Spectra</i>	8
5	Nov.	31 Pluto; Extrasolar Planets.	9, 10
		2 The Sun. <i>Lab: Gravity and Extrasolar Planets</i>	11
6		7 Measurements of Stars.	12
		9 Stellar life cycles. <i>Lab: No lab.</i>	13
7		14 <b>Midterm Exam 2, in class</b>	
		16 Stellar remnants, black holes. <i>Lab: Spectra, Stars, and the H-R Diagram</i>	14
8		21 The Milky Way.	15
		23 <b>Thanksgiving, no class.</b> <i>Lab: No lab.</i>	
9		28 Galaxies.	16
		30 Galaxy Evolution. <i>Lab: Structure and Motion of Spiral Galaxies</i>	16
10	Dec.	5 Cosmology.	18
		7 The Big Bang. <i>Lab: Expansion of the Universe</i>	17
11		15 <b>Final Exam</b>	