

$$L = 4\pi R^2 \sigma T_{\text{eff}}^4$$

“The most incomprehensible thing about the universe is that it is comprehensible.” (Albert Einstein)  
Astrophysics is a branch of physical science in which we are bold enough to trust the physical laws that we have discovered on Earth and use them to explain the “heaven”. In this one-semester course we will review and learn physical concepts and principles in various physics disciplines in the context of stars, and we will use these concepts and principles to understand how stars move, shine and evolve.

## General Information

- **Instructor:** Dr. Huaiyu “Mike” Duan, <duan@unm.edu>, P&A 1144, 505-277-1508.
- **Instructor’s office hour:** After class on Tuesday, P&A 1144. Other appointments can be made by email.
- **TA:** TBA.
- **Lecture hours:** 9:30 AM – 10:45 PM on Tuesday and Thursday, P&A 5.
- **Textbook:** *An Introduction to Modern Astrophysics* (2nd edition) by Bradley W. Carroll & Dale A. Ostlie (published by Pearson/Addison Wesley, ISBN 0-8053-0402-9).
- **Course homepage/repository:** UNM Learn <<https://learn.unm.edu>>.
- **Communication:** Class news and notices will be sent to your UNM email address, i.e. <[your\\_unm\\_net\\_id@unm.edu](mailto:your_unm_net_id@unm.edu)>. Please check your UNM mailbox regularly during the week.

## Prerequisites

- **Physics:** Modern Physics (PHYC330).
- **Math:** Total and partial differentiations, integrals, vectors and differential equations.

## Grades

1. **Quizzes 5% (bonus)** Approximately one quiz per week.
2. **Homework 40% + 5% (bonus)** Approximately one homework every two weeks. Please turn in EVERY homework even if you cannot finish it. Turn in homework early if you cannot attend the class on its due day. The solution to each assignment will be posted in UNM Learn after the assignments have been collected. There will be NO MAKEUP HOMEWORK.
3. **Exams 4×15%** Three in-class exams will be held on **Sep. 15**, **Oct. 11**, and **Nov. 10**. The last exam will be held during the final week. All exams will be closed-book, but you may bring a calculator and notes on a double-sided, letter-sized paper.

## Preliminary Schedule

Here is a preliminary schedule of this course. The actual schedule may vary which can be found in the Calendar tool in the course home page at UNM Learn.

WK	LEC	DATE	TOPIC	CHAPTER
1	1	8/23	Coordinate and magnitude	1.3, 3.1-2
	2	8/25	Planetary motion	2.2-3
2	3	8/30	Motion of binary systems	2.1-3, 7.2
	4	9/1	Nature of light	3.3, 5.2
3	5	9/6	Blackbody radiation	3.4-5
	6	9/8	Color indices	3.6
4	7	9/13	Spectral lines	5.3-4
		9/15	EXAM I	
5	8	9/20	Lorentz transformation	4.1-2
	9	9/22	Space and time	4.3
6	10	9/27	Binary stars and stellar parameters	7.1-3
	11	9/29	Binary stars and white dwarfs	7.3, 16.1-3
7	12	10/4	Properties of white dwarfs	16.3-4
	13	10/6	Neutron stars	16.6
8		10/11	EXAM II	
		10/13	FALL BREAK	
9	14	10/18	Stellar spectra and Saha equation	8.1-2
	15	10/20	Radiation field	9.1-2
10	16	10/25	Radiative transfer (I)	9.1-3
	17	10/27	Radiative transfer (II)	9.2-4
11	18	11/1	Spectral profiles	9.5
	19	11/3	Stellar pressure	10.1-2
12	20	11/8	Stellar energy sources	10.3
		11/10	EXAM III	
13	21	11/15	Stellar energy transport	10.3-4
	22	11/17	Stellar model	10.4-6
14	23	11/22	Collapsing of interstellar clouds	2.4, 12.2
		11/24	THANKSGIVING	
15	24	11/29	Pre-main-sequence and main-sequence stellar evolution	12.2-3, 13.1
	25	12/1	Post-main sequence stellar evolution	13.2
16	26	12/6	Supernovae	15.1-3
	27	12/8	General relativity and black holes	17.1-3
17			EXAM IV	