



The Point

Astrophysics is big. A big, big subject. (In case you couldn't tell from the big, big book.) This course needs an arc---a unifying topic that ties it all together. So here's what we are going to do. We are going to consider the story of a proton, from once it left the Big Bang, until it became part of this planet which eventually spawned you.

Along the way, we figure out stellar evolution, supernovae, stellar nucleosynthesis, planet formation and migration along with a hundred other details that make up our overall picture of the formation of systems like our own. That we can tell the story of how we came to be, over the vast expanse of cosmic time, is a little shocking, really.

You'll have a lot of questions. Here's how to ask 'em when they happen outside of class time:

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The Points:

35% Every week, you will have homework. Sometimes this is observing. Sometimes it's observing with a telescope. Sometimes it's calculating things on paper. With a pencil. Sometimes it's calculating things in the computer. And sometimes it's explaining what you've found out, so that your mom or dad or the kid down the street could understand it. This homework is generally due on the Friday after you hand it in, but check the top of each assignment in case of variations.

35% You'll also have a project to work on. This definitely involves reading. And writing. Aren't you glad you took all those English classes now? Oh, and probably some calculating. And maybe

some observing. Definitely plotting and problem-solving and literature review. We'll have more about this when you have some context.

30% You'll also have a couple of cumulative exams. Stop groaning. These are good for you. On the one hand, in life you will often have the vast internet at your fingertips. On the other hand, it's absolutely useless to you unless you already know what questions to ask. Which means you have to know something. You have to know it so well that you can call it up at a moment's notice. This is power. Don't give it up just because you are really busy!

Office Hours:

M: 11:30-12:30
T: 2:00-3:00
W 9:30-10:30
R: 12:00-2:00
F: 10:30-11:30

If none of these work for you, check my door for my schedule to see what the latest version of what my week looks like.

The Textbook:

We will be using 'The Big Orange Book' (aka BOB): Modern Astrophysics by Carroll and Ostlie, 2nd Edition, Pearson/Addison-Wesley, publishers. All complaints about this book should go to Dr. Carroll.

Readings in this textbook are short on pages, but long on the time required to understand them. I've organized the course calendar to indicate which pages we will be going over that day in class, so you should read the pages listed for Nov. 7 before Nov. 7.

Occasionally (especially during the research methods portion of the course), you will be reading handouts that you will get from me in the class period beforehand.

The New York Times: Science Times

Each Tuesday, you are required to pick up the New York Times, and read the astronomy articles. We will discuss these and their relevance to the course each Wednesday. You will be responsible for this material on exams, and in

your final project.

Any student requiring accommodations or services due to a disability must contact Services for Students with Disabilities in room 181 of the Student Services Center. SSD can also arrange to provide course materials in alternative formats if necessary.

Week of	Monday	Wednesday	Friday
8/22	Introduction; Universe Survey	News; Binary Stars: Classification and mass Reading: BOB, pp 180-194	Formation of Spectral Lines Reading: BOB, pp 202-218 <i>HW 1: Binary Stars; linked from website</i>
8/31	H-R Diagram Reading: BOB, pp 219-228	News; Stellar Opacity Reading: BOB, pp 231-250	Radiative Transfer and the Transfer Equation Reading: BOB, pp 251-266 <i>HW 2: Lifetimes of Stars</i>
9/5	Labor Day; no class	News; Profiles of Spectral Lines Reading: BOB, pp 267-278	Hydrostatic Equilibrium and the Equation of State Reading: BOB, pp 284-295 <i>HW 3: BOB Problems: 7.4, 8.9, 8.12, 8.15, 8.16, 9.1, 9.6, 9.7, 9.12, 9.26</i>
9/12	Stellar Energy: Sources and Transport Reading: BOB, pp 296-328	News; The Main Sequence Reading: BOB, pp 340-343	Solar Interior Reading: BOB, pp 349-359 <i>HW 4: Building a Stellar Model in Mathematica</i>
9/19	Solar Atmosphere Reading: BOB, pp 360-380	News; Solar Cycle Reading: BOB, pp 381-393	Interstellar Medium Reading: BOB, pp 398-411 <i>HW 5: Researching Primary Sources: Solar Influence on Earth's Climate</i>
9/26	Star Formation to Main Sequence Reading: BOB, pp 412-441	News; Main Sequence Evolution Reading: BOB, pp 446-456	Planetary Nebulae and White Dwarfs Reading: BOB, pp 457-473 and 559-571 <i>HW 6: BOB Problems: 10.3, 10.21, 10.22, 11.2, 11.4, 11.13, 12.1, 12.3, 12.4, 12.7</i>
10/3	Supernovae Reading: BOB, pp 529-542	News; Neutron Stars and Pulsars Reading: BOB, pp 578-603	General Relativity, Intervals and Geodesics Reading: BOB, pp 609-632 <i>HW7: BOB Problems: 13.6, 13.8, 13.9, 14.1, 15.5, 15.6, 15.12, 15.15, 16.1, 16.10</i>

10/10	Black Holes Reading: BOB, pp 633-646	News; Close Binaries and Type Ia Supernovae Reading: BOB, pp 673-688	<i>Exam I: Stars</i>
10/17	Detecting Extrasolar Planets Reading: BOB, pp 195-198; Handout	Characteristics of Extrasolar Planets Reading: BOB, pp 848-856 <i>HW 8: Data Mining: 51 Pegasi</i>	Fall break; no class
10/24	Planet Formation and Migration Reading: BOB, pp 857-869	News; Survey of Solar System Reading: BOB, pp 714-718	Tidal Forces Reading: BOB, pp 719-723 <i>HW 9: Planet Migration Models in Mathematica</i>
10/31	Physics of Climate: Venus, Earth, Mars Reading: BOB, pp 724-732; handout	News; Mercury Reading: BOB, pp 737-739	Venus Reading: BOB, pp 740-744; handout <i>HW 10: Astrophysical Climates</i>
11/7	Earth Reading: BOB, pp 745-753	News; The Moon Reading: BOB, pp 654-761	Mars Reading: BOB, pp 762-770; handout <i>HW 11: Water on Mars?</i>
11/14	Giant Planets Reading: BOB, pp 775-789	News; Moons of Giant Planets Reading: BOB, pp 790-800	Ring Systems Reading: BOB, pp 801-807 <i>HW 12: Resonances and Orbits</i> <i>Project Due</i>
11/21	Review	<i>Exam II: Planets</i>	Thanksgiving; no class
11/28	Dwarf Planets and Kuiper Belt Reading: BOB, pp 813-829	News; Asteroids and Meteorites Reading: BOB, pp 830-844	Review; Last day! <i>Final in T.C.</i>