



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 take the last figure in the book, Figure 30.22, and we are going to 'unpack it'. We will begin by figuring out what each of the blobs represents, then we will proceed to figuring out what the axes mean. After that, we will figure out what the regions on the graph mean. Then we will put it all together, and figure out why this graph represents one of the major achievements of humanity.

Along the way, we figure out galaxies, the difference between doppler shift and cosmological redshift, inflation and cosmology, along with a hundred other details that make up our overall picture of the Universe. The fact that we even HAVE an overall picture of the Universe appears to be unique among living creatures. So we'll spend a little time at the end talking about that too.

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

Your instructor: Dr. Stacy Palen

Office: SL 209

Office phone: 626-7030

Email: spalen@weber.edu

The Points:

35% Every week, you will have homework. 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. Often, it will be problems from the text, or working with astronomical data in IDL, or reading and summarizing journal articles. In any event, on the calendar, the date listed is the day

the assignment goes out. The assignment is generally due on the Friday of the following week.

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 arti-

cles. 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; Figure 30.22	News; Review: Telescopes and Observations	Intro to the Milky Way Reading: BOB, pp 874-881 <i>HW 1: BOB Problems, Ch 24: 1, 3, 10, 15, 17, 20, 21, 24, 27, 31</i>
8/31	Morphology of the Milky Way Reading: BOB, pp 881-897	News; Kinematics of the Milky Way Reading: BOB, pp 898-921	The Galactic Center Reading: BOB, pp 922-932 <i>HW 2: Finding the Center of the Milky Way via Shapley's method</i>
9/5	Labor Day; no class	News; The Hubble Sequence Reading: BOB pp 940-947	Spiral and Irregular Galaxies Reading: BOB, pp 948-963 <i>HW 3: Galaxy Classification</i>
9/12	Spiral Structure Reading: BOB, pp 964-983; YouTube video linked at course site	News; Elliptical Galaxies Reading: BOB, pp 984-993	Interactions of Galaxies Reading: BOB, pp 999-1015 <i>HW 4: BOB Problems, Ch 25: 1, 4, 8, 10, 14, 15, 18, 20, 22, 24</i>
9/19	Galaxy Formation Reading: BOB, pp 1016-1032	News; Extragalactic Distance Scale Reading: BOB, pp 1038-1051	Expansion of the Universe Reading: BOB pp 1052-1057 <i>HW 5: Reading Scientific Papers: the Accelerating Universe</i>
9/26	Clusters of Galaxies Reading: BOB, pp 1058-1081	News; Observations of Active Galaxies Reading: BOB, pp 1085-1107	Unified Model of AGN Reading: BOB pp 1108-1121 <i>HW 6: BOB Problems, Ch 26, 27: 2, 3, 5, 12, 13/2, 4, 8, 11, 13</i>
10/3	Radio Lobes and Jets Reading: BOB, pp 1122-1129	News; Using Quasars to Probe the Universe Reading: BOB, pp 1130-1139	<i>Exam I: Galaxies</i>
10/10	Research I: Introduction to Literature Review; meet in the CPL (SL 220)	Research II: Introduction to The Astrophysical Data Service Reading: Handout	Research III: Introduction to ARA&A Reading: Handout <i>HW 7: Literature Review</i>
10/17	Research IV: "Problem Statements" Reading: handout	Research V: Literature Redux News; <i>HW 8: Stating a Problem</i>	Fall break; no class

10/24	Research VI: Introduction to IDL Reading: handout	Research VII: Introduction to image analysis in IDL Reading: handout	Research VIII: Introduction to IDL utilities Reading: handout <i>HW 9: Image processing and data reduction</i>
10/31	Newtonian Cosmology Reading: BOB, pp 1144-1161	News; The Cosmic Microwave Background Reading: BOB, pp 1162-1182	Relativistic Cosmology Reading: BOB, pp 1183-1198 <i>HW 10: Relativity Review</i>
11/7	Observational Cosmology Reading: BOB, pp 1199-1220	News; Observational Cosmology, cont. Figure 30.22	Problems in Cosmology <i>HW 11: BOB Problems, Ch 29: 2, 9, 10, 14, 16, 17, 20, 22, 25, 32</i>
11/14	The Very Early Universe Reading: BOB, pp 1230-1240	News; The Very Early Universe Reading: BOB, pp 1241-1246	The Origin of Structure Reading: BOB, pp 1247-1275 <i>HW 12: BOB Problems: Ch 30: 1, 3, 5, 6, 8, 9, 10, 11, 12, 13</i> <i>Project Due</i>
11/21	Review	<i>Exam II: Cosmology</i>	Thanksgiving; no class
11/28	Life I	News; Life II	Review; Last day! <i>Final in Testing Center</i>