

## ASTRONOMY C10 / L&S C70U: FALL 2020

### ----- Syllabus -----

The schedule below gives the textbook page numbers (Pasachoff & Filippenko 2019 □ The Cosmos, 5<sup>th</sup> edition) and the slide page numbers (this Reader) for each lecture. Lecture titles listed below might differ a little from those on the webcasts, to more accurately convey the material actually covered in lecture.

Discussion sections will normally concentrate on the material of the three previous class meetings. Discussion sections before the midterm exams will be for general review.

Lecture	Date	Title	Pages in Textbook / Slides	Recorded
<b>PART I: INTRODUCTION</b>				
1.	Wed., 26 Aug	A Grand Tour of the Cosmos	v-xxiii / 1-2	8/28/19
2.	Fri., 28 Aug	Journey Through Space and Time	1-21 / 3-16	8/30/19
3.	Mon., 31 Aug	Light – The Supreme Informant	22-25 / 16-27	9/4/19
4.	Wed., 2 Sep	The Fingerprints of Atoms	26-32 / 28-37	9/6/19
5.	Fri., 4 Sep	Doppler Effect; Thermal Radiation	26-39, 329-334 / 38-44	9/9/19
6.	Fri., 4 Sep	Finish Thermal Radiation; then Telescopes	40-73 / 43-53	9/11/19
	Mon., 7 Sep	LABOR DAY HOLIDAY!		
7.	Wed., 9 Sep	Twinkling; Lunar Phases	74-78, 87 / 54-59	9/13/19
8.	Fri., 11 Sep	Glorious Total Solar Eclipses	79-80, 82-86, 307-311 / 60-63	9/16/19, p1
9.	Mon., 14 Sep	Lunar Eclipses; then Celestial Phenomena	81, 87-92 / 64-70	9/16/19, p2
<b>PART II: THE SOLAR SYSTEM</b>				
10.	Mon., 14 Sep	Celestial Phenomena; Copernican Revolution	7-8, 92-124 / 71-78	9/18/19
11.	Wed., 16 Sep	Finish Copernican Revolution; then Newton	119-125 / 78-89	9/20/19
12.	Fri., 18 Sep	Newton; Origin of Solar System; Earth	263-266, 125-144 / 90-98	9/23/19
13.	Mon., 21 Sep	The Moon, Mercury, Venus, Mars	144-187 / 99-108	9/25/19
14.	Wed., 23 Sep	Jupiter, Saturn, Uranus	188-212 / 109-115	9/27/19
15.	Fri., 25 Sep	Neptune, Pluto, Comets	212-244 / 116-121	9/30/19, p1
16.	Mon., 28 Sep	Comets, Asteroids, Meteors, Collisions	244-254 / 122-129	9/30/19, p2
17.	Mon., 28 Sep	Finish Collisions; then Exoplanets	239-269 / 129-137	10/2/19
18.	Wed., 30 Sep.	Finish Exoplanets; then Our Sun	269-302 / 137-146	10/4/19
<b>PART III: THE STARS AND THEIR LIVES</b>				
19.	Fri., 2 Oct	Finish Our Sun; then Distant Stars	302-328 / 146-154	10/7/19
20.	Mon., 5 Oct	“Social Stars”: Binaries and Clusters	329-367 / 154-167	10/14/19, p1
21.	Wed., 7 Oct	How Stars Shine; Stellar Evolution	367-383 / 167-173	10/14/19, p2
	Fri., 9 Oct	MIDTERM I! Through “Exoplanets” (Slide 142)		
22.	Mon., 12 Oct	Stellar Evolution; Exploding Stars	383-388 / 173-181	10/16/19
23.	Mon., 12 Oct	Exploding Stars: Celestial Fireworks!	389-397 / 181-187	10/21/19, p1
24.	Wed., 14 Oct	SN 1987A; Star Corpses; Black Holes	397-417 / 187-195	10/21/19, p2
25.	Fri., 16 Oct	Black Holes: Hearts of Darkness	417-422 / 195-203	10/23/19
<b>PART IV: A UNIVERSE OF GALAXIES</b>				
26.	Mon., 19 Oct	The Milky Way Galaxy; Other Galaxies	83, 446-491 / 208-221	<b>10/22/18</b>
27.	Wed., 21 Oct	The Dark Side of Matter	491-503 / 222-231	<b>10/24/18</b>
28.	Fri., 23 Oct	The Expansion of the Universe	503-521 / 231-242	<b>10/26/18</b>

Lecture	Date	Title	Pages in Textbook / Slides	Recorded
29.	Mon., 26 Oct	Quasars – Cosmic Powerhouses	522-530 / 243-249	10/29/18, p1
30.	Wed., 28 Oct	Quasar Engines: Supermassive Black Holes	531-551 / 207, 250-255	11/1/19
31.	Fri., 30 Oct	The Quest for Black Holes (“Halloween Lec.”)	422-445 / 204-207	10/30/19
<b>PART V: THE BIRTH AND LIFE OF THE UNIVERSE</b>				
32.	Mon., 2 Nov	Cosmology and the Dark Night Sky	552-559 / 256-265	11/4/19
33.	Wed., 4 Nov	The Age of the Universe	559-567 / 266-272	11/6/19
	Fri., 6 Nov	MIDTERM 2! Through “Quasars” (Slide 255)		
34.	Mon., 9 Nov	The Geometry of the Universe	567-574 / 272-281	11/13/19
	Wed., 11 Nov	VETERANS DAY HOLIDAY!		
35.	Fri., 13 Nov	Einstein’s Biggest Blunder?	574-587 / 281-288	11/15/19
36.	Fri., 13 Nov	Original Big Bang Theory; CMBR	588-594,600-606/287-298	11/18/19, p1
37.	Mon., 16 Nov	The Contents of the Universe	594-600 / 289, 297-310	11/18/19, p2
38.	Wed., 18 Nov	The Inflationary Universe	606-609 / 310-318	11/20/19
39.	Fri., 20 Nov	The Inflationary Universe (Part 2)	609-613 / 317-324	11/22/19
40.	Mon., 23 Nov	The Inflationary Universe (Part 3), Q&A	609-613 / 324-329	11/25/19
	Wed., 25 Nov	NON-INSTRUCTIONAL DAY!		
	Fri., 27 Nov	THANKSGIVING HOLIDAY!		
41.	Mon., 30 Nov	The Ultimate Free Lunch, and a “Multiverse”?	613-621 / 325-334	12/2/19
42.	Wed., 2 Dec	The Search for Extraterrestrial Life	622-633 / 335-338	12/4/19
43.	Fri., 4 Dec	Interstellar Travel; Conclusion	628-629, 633-644 / 338-345	12/6/19

**Final exam (cumulative):** Tuesday, 15 December 2020, 7:00–10:00 pm PST (Exam Group 8).  
If you have a DIRECT conflict, the exam will be during Exam Group 7 (3:00–6:00 pm PST, 15 December).

All students are automatically signed up with bCourses when they enroll (or waitlist) the course on SIS.  
To access the course website on bCourses, simply follow these steps:

1. Open your web browser to <http://bcourses.berkeley.edu>.
2. Enter your CalNet ID and Passphrase to authenticate.
3. Click on the “courses” tab and then “Introduction to General Astronomy” to access the course website.

From inside the site, you can use the links on the left side of the screen to access various features. Some of the most important ones are as follows.

- Announcements: Important notifications from Alex and from the GSIs during the semester.
- Grades: Allows you to check your scores. You should examine this regularly to be sure that your homework assignments, exam scores, and quizzes have been correctly entered. [Note, however, that in many cases the point values for assignments posted there do not follow the grading system outlined in the Reader. For example, each 50-point homework assignment is actually worth only about 3 course points.]
- Files: Where homework solutions, practice exams, and other supplementary documents will be posted over the semester. (The assignments themselves are in the Course Reader.)

The website also includes many other tools, including discussion forums, live chat, and general information.

**ASTRONOMY C10 / L&S C70U: FALL 2020 – Lecture recordings**

<b>Lec.</b>	<b>2020 date</b>	<b>Recorded</b>	<b>YouTube link</b>
1	Wed. 26 Aug.	8/28/19	<a href="https://www.youtube.com/watch?v=POwhTdXNVBE">https://www.youtube.com/watch?v=POwhTdXNVBE</a>
2	Fri. 28 Aug.	8/30/19	<a href="https://www.youtube.com/watch?v=ZCBGbtuM_g">https://www.youtube.com/watch?v=ZCBGbtuM_g</a>
3	Mon. 31 Aug.	9/4/19	<a href="https://www.youtube.com/watch?v=Fpwtj79zs3M">https://www.youtube.com/watch?v=Fpwtj79zs3M</a>
4	Wed. 2 Sep.	9/6/19	<a href="https://www.youtube.com/watch?v=8F1DT7krdio">https://www.youtube.com/watch?v=8F1DT7krdio</a>
5	Fri. 4 Sep., part 1	9/9/19	<a href="https://www.youtube.com/watch?v=HTWEOsGbgYE">https://www.youtube.com/watch?v=HTWEOsGbgYE</a>
6	Fri. 4 Sep., part 2	9/11/19	<a href="https://www.youtube.com/watch?v=T-npRTaK-xs">https://www.youtube.com/watch?v=T-npRTaK-xs</a>
7	Wed. 9 Sep.	9/13/19	<a href="https://www.youtube.com/watch?v=RgEeEa1knaA">https://www.youtube.com/watch?v=RgEeEa1knaA</a>
8	Fri. 11 Sep.	9/16/19, part 1	<a href="https://www.youtube.com/watch?v=0Y_e5qtG-sY">https://www.youtube.com/watch?v=0Y_e5qtG-sY</a>
9	Mon. 14 Sep., part 1	9/16/19, part 2	<a href="https://www.youtube.com/watch?v=B8W0RBxixes">https://www.youtube.com/watch?v=B8W0RBxixes</a>
10	Mon. 14 Sep., part 2	9/18/19	<a href="https://www.youtube.com/watch?v=rWmqTEEEhLo">https://www.youtube.com/watch?v=rWmqTEEEhLo</a>
11	Wed. 16 Sep.	9/20/19	<a href="https://www.youtube.com/watch?v=h2Y_I94gPn0">https://www.youtube.com/watch?v=h2Y_I94gPn0</a>
12	Fri. 18 Sep.	9/23/19	<a href="https://www.youtube.com/watch?v=K6G8hKkkQrg">https://www.youtube.com/watch?v=K6G8hKkkQrg</a>
13	Mon. 21 Sep.	9/25/19	<a href="https://www.youtube.com/watch?v=ioeg_k9PgxQ">https://www.youtube.com/watch?v=ioeg_k9PgxQ</a>
14	Wed. 23 Sep.	9/27/19	<a href="https://www.youtube.com/watch?v=i0Iz_xb29AA">https://www.youtube.com/watch?v=i0Iz_xb29AA</a>
15	Fri. 25 Sep.	9/30/19, part 1	<a href="https://www.youtube.com/watch?v=IZYvD-B9iwM">https://www.youtube.com/watch?v=IZYvD-B9iwM</a>
16	Mon. 28 Sep., part 1	9/30/19, part 2	<a href="https://www.youtube.com/watch?v=nxps0omeTpW">https://www.youtube.com/watch?v=nxps0omeTpW</a>
17	Mon. 28 Sep., part 2	10/2/19	<a href="https://www.youtube.com/watch?v=0aNTP16t2EY">https://www.youtube.com/watch?v=0aNTP16t2EY</a>
18	Wed. 30 Sep.	10/4/19	<a href="https://www.youtube.com/watch?v=4Y84YNNYhLU">https://www.youtube.com/watch?v=4Y84YNNYhLU</a>
19	Fri. 2 Oct.	10/7/19	<a href="https://www.youtube.com/watch?v=B1OonP4li-E">https://www.youtube.com/watch?v=B1OonP4li-E</a>
20	Mon. 5 Oct.	10/14/19, part 1	<a href="https://www.youtube.com/watch?v=5sMYLkXWdnU">https://www.youtube.com/watch?v=5sMYLkXWdnU</a>
21	Wed. 7 Oct.	10/14/19, part 2	<a href="https://www.youtube.com/watch?v=BQjBnFXFBEO">https://www.youtube.com/watch?v=BQjBnFXFBEO</a>
22	Mon. 12 Oct., part 1	10/16/19	<a href="https://www.youtube.com/watch?v=MB2VOUqybu0">https://www.youtube.com/watch?v=MB2VOUqybu0</a>
23	Mon. 12 Oct., part 2	10/21/19, part 1	<a href="https://www.youtube.com/watch?v=5MoIuq3K5Pc">https://www.youtube.com/watch?v=5MoIuq3K5Pc</a>
24	Wed. 14 Oct.	10/21/19, part 2	<a href="https://www.youtube.com/watch?v=a0EFAPhZ1-w">https://www.youtube.com/watch?v=a0EFAPhZ1-w</a>
25	Fri. 16 Oct.	10/23/19	<a href="https://www.youtube.com/watch?v=yZ1Dhx93jbI">https://www.youtube.com/watch?v=yZ1Dhx93jbI</a>
26	Mon. 19 Oct.	10/22/18	<a href="https://www.youtube.com/watch?v=runVoasq-lc">https://www.youtube.com/watch?v=runVoasq-lc</a>
27	Wed. 21 Oct.	10/24/18	<a href="https://www.youtube.com/watch?v=9Y0blgudOFs">https://www.youtube.com/watch?v=9Y0blgudOFs</a>
28	Fri. 23 Oct.	10/26/18	<a href="https://www.youtube.com/watch?v=F0kFXEc6TIE">https://www.youtube.com/watch?v=F0kFXEc6TIE</a>
29	Mon. 26 Oct.	10/29/18, part 1	<a href="https://www.youtube.com/watch?v=-effG_SJ3U8">https://www.youtube.com/watch?v=-effG_SJ3U8</a>
30	Wed. 28 Oct.	11/1/19, part 2	<a href="https://www.youtube.com/watch?v=EIP03A_eozw">https://www.youtube.com/watch?v=EIP03A_eozw</a>
31	Fri. 30 Oct.	10/30/19	<a href="https://www.youtube.com/watch?v=fpq65blsRpU">https://www.youtube.com/watch?v=fpq65blsRpU</a>
32	Mon. 2 Nov.	11/4/19	<a href="https://www.youtube.com/watch?v=kL8COEMOAdY">https://www.youtube.com/watch?v=kL8COEMOAdY</a>
33	Wed. 4 Nov.	11/6/19	<a href="https://www.youtube.com/watch?v=oJ9LSE7mDpE">https://www.youtube.com/watch?v=oJ9LSE7mDpE</a>
34	Mon. 9 Nov.	11/13/19	<a href="https://www.youtube.com/watch?v=KrD49Tx4G8o">https://www.youtube.com/watch?v=KrD49Tx4G8o</a>
35	Fri. 13 Nov., part 1	11/15/19	<a href="https://www.youtube.com/watch?v=NmDjKyUrmmU">https://www.youtube.com/watch?v=NmDjKyUrmmU</a>
36	Fri. 13 Nov., part 2	11/18/19, part 1	<a href="https://www.youtube.com/watch?v=L4FpHNp6Xv8">https://www.youtube.com/watch?v=L4FpHNp6Xv8</a>
37	Mon. 16 Nov.	11/18/19, part 2	<a href="https://www.youtube.com/watch?v=dlkG6MESwRw">https://www.youtube.com/watch?v=dlkG6MESwRw</a>
38	Wed. 18 Nov.	11/20/19	<a href="https://www.youtube.com/watch?v=sEgYQjhgB_Q">https://www.youtube.com/watch?v=sEgYQjhgB_Q</a>
39	Fri. 20 Nov.	11/22/19	<a href="https://www.youtube.com/watch?v=U884A_o6Aw8">https://www.youtube.com/watch?v=U884A_o6Aw8</a>
40	Mon. 23 Nov.	11/25/19	<a href="https://www.youtube.com/watch?v=q0uQvgINRa0">https://www.youtube.com/watch?v=q0uQvgINRa0</a>
41	Mon. 30 Nov.	12/2/19	<a href="https://www.youtube.com/watch?v=RjVP4F4Fvds">https://www.youtube.com/watch?v=RjVP4F4Fvds</a>
42	Wed. 2 Dec.	12/4/19	<a href="https://www.youtube.com/watch?v=3x5udN0IZ4Y">https://www.youtube.com/watch?v=3x5udN0IZ4Y</a>
43	Fri. 4 Dec.	12/6/19	<a href="https://www.youtube.com/watch?v=z8Axe6aISi4">https://www.youtube.com/watch?v=z8Axe6aISi4</a>

## Weekly Schedule of Discussion Sections, Exams, Homework and Lab Assignments

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Week 1: 26 – 28 Aug.	Overview of the course. Math review. No classes Aug. 24 and 25.
Week 2: 31 Aug. – 4 Sep.	Math review. Discussions. Homework #0 (Academic Integrity Statement) due on Wed., Sep. 2. Homework #1 due on Fri., Sep. 4.
Week 3: 7 – 11 Sep.	Discussions, review. Homework #2 due on Friday, Sep. 11. Labor Day holiday: Monday, Sep. 7 (no classes). Students in Monday sections are encouraged (but not required) to attend <i>any</i> other discussion section this week.
Week 4: 14– 18 Sep.	Discussions, review. Finalize section enrollment. Homework #3 due Friday, Sep. 18.
Week 5: 21 – 25 Sep.	Quiz #1. Discussions. Homework #4 due on Friday, Sep. 25.
Week 6: 28 Sep. – 2 Oct.	Discussions, review. Homework #5 due on Friday, Oct. 2.
Week 7: 5 – 9 Oct.	Review for midterm exam. Homework #6 due on <i>Thursday, Oct. 8</i> (to help you prepare for the midterm exam). MIDTERM #1 ON FRIDAY, OCTOBER 9!
Week 8: 12 – 16 Oct.	Discussions, review. Homework #7 due on Friday, Oct. 16.
Week 9: 19 – 23 Oct.	Discussions, review. First set of labs due on Friday, Oct. 23.
Week 10: 26 – 30 Oct.	Quiz #2. Discussions. Homework #8 due on Friday, Oct. 30.
Week 11: 2 – 6 Nov.	Review for midterm exam. Homework #9 due on <i>Thursday, Nov. 5</i> (to help you prepare for the midterm exam). MIDTERM #2 ON FRIDAY, NOVEMBER 6!
Week 12: 9 – 13 Nov.	Discussions; review. Second set of labs due on Friday, Nov. 13. Veterans Day holiday: Wednesday, Nov. 11 (no classes). Students in Wednesday sections are encouraged (but not required) to attend <i>any</i> other discussion section this week.
Week 13: 16 – 20 Nov.	Discussions, review. Homework #10 due on Friday, Nov. 20.
Week 14: 23 – 27 Nov.	Thanksgiving break, Wed., Nov. 25, through Fri., Nov. 27. Discussions, review, but only for the Monday and Tuesday sections.
Week 15: 30 Nov. – 4 Dec.	Review for final exam. Homework #11 due on Friday, Dec. 4.

NOTE 1: Please don't turn in the homework (or labs) for a particular week earlier than *Monday* of that week; otherwise, it could get confused with the previous week's homework and may be lost. Use Gradescope; your account should have the same email address as is listed in bCourses (the [berkeley.edu](http://berkeley.edu) domain).

NOTE 2: It is to your advantage to attend discussion sections. You will learn the material better, and the GSIs will get to know you. (A small part of your overall grade will be based on your participation in section.)