Astronomy Final Exam Information

The final exam is on Monday May 16th from 7-9:30 pm in Strain 121.

The final exam is comprehensive and is 20% of the final grade.

The final exam will be similar in format to the quizzes, but longer. There will be 15-20 multiple-choice questions and 5-6 short answer questions. You will have the full 2 ½ hours available but many people will complete the exam within 90 minutes.

Questions will cover material from the entire term, but slightly more questions will be from the Sun, stars and stellar evolution topics then from the earlier material.

I will be holding extra office hours and at least one review session before the final:

Review Session: Sunday May 15, 6-8 pm
Office Hours: Wednesday May 11, 1-4:30 pm
Office Hours: Monday May 16, 3-5 pm and 6-7 pm

Review Suggestions

Review all the homework, quizzes and other assignments.

Chapters 1-12, 16 and parts of 17,20-22 were covered. Looking at the learning goals at the start of each chapter can help you identify concepts and find material quickly.

I have also list of review questions to help you study:

The Sun, stars and stellar evolution

1. How does the sun compare to the planets in terms of mass? Size (diameter)?

2. How is the surface temperature of the sun measured?

3. What are sunspots? How do their temperatures compare with the rest of the sun's surface?

4. What is helioseismology and what is used for?

5. What is the source of the Sun's energy?

6. Why are high temperatures (10 million Kelvin) necessary for fusion?

7. One helium nucleus has less mass than the particles that go into forming it. Where did the mass go?

8. Is the sun losing a significant amount of its mass each year? (In terms of percentage of current total mass.) About how much mass would the sun lose (released as energy) if somehow, all of the hydrogen everywhere in the sun where converted to helium?

9. Briefly explain the feedback mechanism that currently keeps the sun in gravitational equilibrium?

10. Why are neutrinos a useful tool for probing the current state of the sun's interior? Why is the sun's luminous energy output not useful for the same purpose?

11. What one physical stellar characteristic most determines the lifetime and evolution of a star?

12. How are each of the following basic stellar properties determined from observations: mass, surface temperature, composition, distance, radius, apparent brightness and absolute luminosity. For example: distance to a star is determined by parallax.

13. How can a star, like Betelgeuse, be cooler than our Sun yet much more luminous?

14. How can a white dwarf be hotter than our Sun yet less luminous?

15. How do the lifetimes of high mass and low mass stars differ? Briefly explain why they are different?

16. How long is the Sun expected to be a main sequence star? (total age)

17. Stars spend most of their lifetimes on the main sequence. What causes a star to evolve off the main sequence?

18. Why are higher temperatures required to fuse helium (into carbon) then hydrogen (into helium)?

19. In 5 billion years when our sun becomes a white dwarf, it will only have about a mass of about half of what it has now. What happened to most of the "missing" mass?

20. What are the endpoints of stellar evolution for very high mass stars? Low mass stars?

21. Both planetary nebulae and supernova explosions recycle matter back into space. How do the compositions of the material from each differ?

22. About how big is a neutron star? What's its mass? How about its surface gravity?

23. In General Relativity mass curves spacetime. How does that result in gravity?

24. What is an event horizon and what does it have to do with black holes?

25. If the Sun were magically compressed into a black hole (its mass does not change), what would happen to the Earth?

The Planets

26. How is the mass of a planet determined? Average density?

27. What can the density of a planet tell you about the composition of its interior?

28. How do we gather data on the deep interior of the Earth?

29. What is the power source for geological activity on Earth?

30. How does escape speed relate to the kind of atmosphere that a planet can retain? Its temperature?

31. How do we determine the age of lunar surface?

32. How is the lunar surface used to estimate the surface age of other solar system bodies?

33. What is the cause of the ocean tides on the Earth?

34. How have we mapped the surface of Venus? How is its surface similar to the Earth? Different?

35. What evidence shows the presence of liquid surface water on Mars in the distant past? Is there evidence of recent liquid water on Mars?

36. Are the big volcanoes on Mars similar to those on Earth? Different?

37. What atmospheric gases can Jupiter and Saturn retain that the terrestrial planets can not? Why?

38. Briefly explain why Jupiter has light and dark bands.

39. Why is Io volcanically active but our Moon not?

40. What are the bright rings of Saturn made of?

Radiation, Spectroscopy, Telescopes and Foundations of Astronomy

41. How does the light gathering power of a telescope relate to the size of its mirror?

42. How does the ideal angular resolution of a telescope relate to the size of its mirror? And to the wavelength of the light used?

43. Combining radio telescopes into a larger virtual one, improves which more: light gathering power or angular resolution?

44. What three wavelengths regions of the spectrum can be observed from ground based telescopes?

45. Why must x-ray and gamma-ray astronomy be done in space?

46. Why do astronomers observe astronomical objects at many wavelengths?

47. How does the energy carried per photon change with wavelength? With frequency?

48. What is a continuous spectrum? Absorption spectrum? Emission spectrum?

49. When you examine a spectrum of a star which type of spectrum will you see?

50. Why do atoms emit and absorb some wavelengths and not others?

51. How can a spectrum identify the chemical makeup of a substance?

52. What does a spectrum tell you about the physical conditions present where the light originated?

53. What is the Doppler effect?

54. How does the peak (most intense) wavelength vary with temperature? How does the total energy output vary with temperature?

55. Based on blackbody curves why is Betelgeuse (3000K) appear red and Rigel (12000K) appear blue-white?

56. How does the force of gravity between two objects change with distance? With the mass of the objects?

57. What are Kepler's laws of planetary motion? How did Newton refine Kepler's laws?

58. Are objects in orbit accelerating? Why?

59. When do lunar eclipses occur? Solar? Do they happen every month?

60. How does the rotation of the Earth on its axis make celestial objects appear to move each day/night?

61. How the does the motion of the Earth around the sun make celestial objects move over the year?