AST 111 Tu-Thu 10:30am - 11:45am
STUDY GUIDE FOR FINAL EXAM ON
Tuesday December 10, 2013 at 9:50am -11:40 am in PSF 166 (our classroom)
Taking this exam is required to pass the course!

1) THIS STUDY GUIDE CONTAINS ONLY THE MATERIAL THAT IS NEW. YOU MUST USE THE PREVIOUS STUDY GUIDES FOR THE COMPREHENSIVE SECTION OF THE TEST.
If you have lost your copy, they are available on the web- linked from the class syllabus.

2) MAKE SURE THAT YOUR NAME IS ON THE ANSWER SHEET AND YOU HAVE PUT IN YOUR AFFILIATE ID NUMBER LEFT JUSTIFIED. I will subtract points if this is not done.

3) BRING A PICTURE ID. I WILL ASK YOU TO PLACE IT ON THE TABLE IN FRONT OF YOU AND WILL GO AROUND THE CLASS DURING THE EXAM CHECKING EACH ID.

You must not use either your cell phone or your laptop.
You must not share a textbook.

Chapter 24: The Outermost Planets: Uranus, Neptune, Pluto

Uranus:

1. Look at Celestial Profile 9 and 10 (Page 548: Look at the Celestial Profiles for all the planets)
2. When was Uranus discovered and by whom? (Page 536)
3. How is the direction of rotation of Uranus different from that of the Earth? How does that affect the seasons on Uranus? (Discussed in class and Figure 24-3)
4. What is the structure and composition of its atmosphere? I showed recent pictures of the clouds in class.
5. What do we know about the internal structure of Uranus?
6. What is the direction and strengths of the magnetic fields of the outer planets? Why are those of Uranus and Neptune so unusual? (Figure 24-7)
7. How were the rings of Uranus and Neptune discovered? How do they differ from those of Saturn?
   (See pages 544-545)
8. What do we know about the Shepherd satellites of the Uranus rings?
9. How many moons does Uranus have? How many had we found before the Voyager flights?
10. The largest moon is Titania. How does its size compare to that of our own Moon? (Figure 24-9)
11. Look at the pictures on Pages 543 and 546. What are the various explanations of the surface features of Miranda? (Figure 24-11)
12. Where, in the Solar System, is it thought that Uranus and Neptune originated?
13. What is the relationship to their motion outward from where they formed to the Late Heavy Bombardment

Neptune

1. Be familiar with the data in Celestial Profile 10 (and the other Celestial Profiles).
2. When was Neptune discovered and by whom? (A triumph of Newton's laws and the Law of Gravity) (pages 547-548)
3. We know very little about Neptune - even with the Voyager flyby. It shows a lot more atmospheric features than does Uranus.
4. What do we know about the internal structure of Neptune?
5. Do the rings of Neptune also have shepherding satellites?
6. What are some of the unusual features of Triton?
7. How is the orbital plane of Triton and Nereid tilted with respect to the ecliptic? What causes the nitrogen plumes and geysers?
8. How and when were the nitrogen geysers discovered?

Pluto

1. How was Pluto discovered? Could there be any more "planets" as large as Pluto in our Solar System but farther away? (Yes, nearly as large and maybe larger)
2. What is the surface of Pluto like?
3. What is Charon.
4. How was Charon discovered?
5. How many moons does Pluto have? (Lots)
6. Is Pluto massive enough to affect the orbit of Neptune? (No) How long have we known this?

7. What was important about the transits of Charon across Pluto?
8. Does Pluto have an atmosphere? What is its surface like?
9. What are the Kuiper Belt Objects?
10. What space craft is on its way to Pluto and when will it arrive? (Page 554)

Chapter 25. Solar System Leftovers: Meteorites, Asteroids, and Comets

Meteorites:
1. What are meteoroids, meteors, meteorites, meteorwrongs? Where do the particles in meteor showers come from? What is a radiant? (Figure 25-5)
2. What is a Fall and what is a Find?
3. Where is the Barringer Meteorite Crater? How old is it?
4. What are the different kinds of meteorites? What is the importance of carbonaceous chondrites?
5. What is meant by pre-solar grains in meteorites?
6. What do the existence of iron, stony-iron, and stony meteorites tell us about the asteroid belt?
7. Do some meteorites come from Asteroids? From the Moon? From Mars? (Yes)
8. When are some of the important meteor showers? (Table 25-2).

Asteroids:
1. Who was the first to discover an asteroid? When was this and which asteroid was it? How many are known now- roughly?
2. Where are most of the asteroids located? What do they look like? What are their sizes? (Page 569-569)
3. What are the Kirkwood gaps? What are the Trojan asteroids? Where are they located? What is the importance of earth crossing asteroids to us?
4. What is the evidence for asteroid collisions?
5. NEAR orbited and took pictures of which asteroid? (Pages 568-569)
6. What is so interesting about Mathilde? (It has a low density)
7. What are the major classes of asteroids? (C-type, S-Type, M-type –see page 569)
8. What recent spacecraft visited Vesta and took pictures (The Dawn Probe).
9. What is the evidence that some meteorites come from Vesta? (Pages 568-569)

Comets:
1. What are the various parts of a comet? How big are they? What is the composition of the Coma?
2. What is a gas tail? A dust tail? What causes them to face away from the sun? What are the names of some famous comets? (Pages 574-575)
3. What does the nucleus of a comet look like? (Figure 25-14)
4. What happens to the debris from a comet after a passage near the sun? How is this material related to Meteor Showers?
5. How long does a comet last? How does its appearance change as it orbits the sun?
6. What was Shoemaker-Levy 9? What does its existence and behavior tell us about hits on the earth?
7. What is the Oort cloud? The Kuiper belt?
8. What is meant by a “Shower of Comets” (discussed in class)
9. How often do collisions of asteroids and comets with the Earth occur?
10. What is the evidence for these collisions? Is there a nearby crater?
11. What is now thought to have caused the extinction of the dinosaurs? Where is the crater probably located?
12. What was the Tunguska Event? When did it happen? What do people think was the cause?
13. Comet ISON passed near the Sun on Thanksgiving. It did not surive.
14. There was a large impact in Siberia this year. They happen frequently.