Exam for the Geo 1327A course Introduction to Planetology

11:00 - 13:00, Tuesday June 16, 2015

You have 2 hours to complete this examination. Beware: There are 10 questions. Each of them is worth 10 points. The total will be divided by 10 to form your "exam grade".

WRITE YOUR NAME AND STUDENT NUMBER ON EACH PAGE.

Closed book examination.

First read the full question before starting to answer it.

Please answer clear and concise in either blue or black ink, and provide full name and student number on each separate paper/paper-booklet you hand in. Also it can be handy where appropriate but not explicitly asked to include sketches (hand drawings) to clarify or illustrate your answer.

1. The Sun

a. Make a schematic drawing of the Sun with its different parts. Name the different parts. Indicate what happens to the temperature and density (no need to give exact values) when traveling from the core to the outside.

b. Name a few features of the Sun and indicate in which layer they occur.

2. Our Solar System

a. Define and describe the four different types of bodies in our Solar System.

b. This definition is relatively recent and was driven by observations. What was one driver to make this classification (or what was observed) and which body suffered most.

3. Orbital dynamics

a. Describe the three laws of Kepler.

b. Who confirmed these three laws?

c. What is the escape velocity and how is it derived?

4. Small bodies

There are three classes of meteorites, stony, stony-iron and iron. Stony is subdivided into two categories. What are these two categories and their characteristics?

5. Impacts

The Nice model was developed to explain among others the Late Heavy Bombardment and the formation of the Oort cloud. This model is based on five steps / assumptions that where outlined in the course. List these five steps.

6. Planetary habitability

a. Several factors define habitability, one of them being the presence of heavy elements. Give three reasons why heavy elements are important.

b. Three orbital parameters are suggested to play a role in planetary habitability. Name at least two parameters and explain why these are important.

7. Venus

Venus has a very intriguing atmosphere, dominated by very different processes than we know form the Earth.

a. One of these processes is the runaway greenhouse effect. Explain this effect.

b. What happened to the water on Venus?

c. According to the cartoon at the end of the lecture notes, there is a link between Venus and the Netherlands. Explain the link / story.

8. The Moon

a. We discussed five different formation hypotheses of the Moon, name at least three.

b. Four parameters need to be explained by these hypotheses. Name at least three.

9. Mars

There are two geological timescales for Mars.

a. Each time scale is based on different feature of the Martian surface, which?

b. Draw each time scale and name the processes that defined the different eras. You don't need to note the exact timing of transition, but you do need to show whether the transition was early or later in the Martian history.

10. Gas giants and their moons

a. Name the four moons of Jupiter and give their characteristics.

b. What is the major driving force behind the internal processes in the moons that have any?