Exam in the course "Astrobiology" on December 1, 2017

Please write your name and student number on each sheet of paper that you hand in.

-- GOOD LUCK –

1. The fundamental question is: "Are we alone?" Or more specifically, "are we alone as lifeforms in the Universe".

   a) How do we define Astrobiology?
   b) How can astrobiology be addressed today?
   c) Why is astrobiology important today.?
   d) How does it establish it self as a 'real' science?
   e) What kind of questions can be answered by astrobiology?

2. Discuss (briefly) the physics of life (on Earth). Specifically:

   a) What is life?
   b) When do we think life arose on the Earth?
   c) What do we know about how life arose on Earth?
   d) What is Schrödingers paradox?

3. Describe what we know or think we know about the origin and evolution of life on the Earth. Give a simple timeline for the events.

4. What is a "biomarker" or a "biosignature"?

5. The cell is considered the smallest living entity. Describe the general structure of a cell, its building blocks and material, as well as the general aspects of it. What is the relation of the cell's in todays living organisms to the original living cells?

6. What is an "extremophile"? Give a few examples of "extremophile"? Discuss briefly if "extremophile" give us any information about the original life on the Earth.

7. What is the "peptide world"?

8. There must have been a border to pass between a sterile Earth and one with the first (simple) organisms on it. List three steps considered to be necessary to go from the sterile world to the living Earth, and valid for life on the Earth or elsewhere. Discuss the processes and requirements.

9. Generally, we assume that life only forms on a planetary surface or near it. A star is required to provide energy. Describe the steps in the formation of stars and accompanying planets. Where are planets and stars formed? And how?

10. What is the current baseline theory for the formation of Earth's Moon?

11. Is there evidence for organic matter being present when the Solar system formed? In that case where?

12. Describe the formation and evolution of the young Earth and its original structure.

13. It has been stated during the course that in order to begin to search for signs of life outside the Solar system we need to find and study other planetary systems - exoplanetary systems.

   a) How do we find and study such systems today?
   b) What can we currently learn about them?

14. Life elsewhere in the Solar System.

   a) Discuss possible sites in the Solar system where we could find life or

traces of life(fossils).
b) Searches for such life that have already been carried out?
c) What are the necessary prerequisites?

15. The uniqueness of Water. Describe the water molecule. What are the characteristics that make it so special? What make it a necessary pre-requisite for the existence of life (as we know it)?