

Test Three Preview

AST 105 Life in the Universe

As before, your overall guide is the blue Course Outline. Refer to the start of the Preview Sheet for Test 1 for general study advice.

As you study for the test, you may find some of the subjects mentioned below only in the textbook. There will be a few questions taken explicitly from the homework assignments.

Unit XIII, “Life on Planets around other Stars”

Habitability Zones - know the relevant factors to this concept. This is a central, basic concept relevant to the consideration of the probability of life in the universe.

–extremophiles

Extra-solar Planets

- difficulties in detecting
- three ways of detecting
- first planets not detected til about when?
- what is the major selection effect?
- what are we learning about planetary systems?
- how to explain “hot Jupiters”? Why such low density for them?
- how many currently known?

Rare Earth

- An estimate for the probability of simple life forms
- An estimate for the probability of complex life forms
- An estimate for the probability of intelligence
- know examples given in notes and text and related aspects
- know responses or questions raised to this hypothesis

Unit XIV, Earth, Moon, and Cosmic Perspectives

The Moon

Basic Data. Be able to describe the maria and highlands. Be familiar with its internal structure and why maria appear only on the Moon’s near side. Know the four hypotheses (names with descriptions) that have been proposed to explain the Moon’s origin and which is the favored one. What was the scientific value of the moon as enabled by the Apollo missions? Brief history of the moon.

The Earth

Basic Data.

The age of the Earth

The 4 sources of energy that made the early Earth hot

The internal structure of the Earth. Know, related to this, the terms plate tectonics, seismology, gravitational differentiation.

The 3 fundamental rock types of the crust

The composition of the atmosphere at first and now

Regarding the origin and subsequent evolution of life on Earth know the following terms: Snowball Earth, Cambrian Explosion

Cosmic Perspectives

The interplaying roles of atmosphere and life in regard to oxygen

A possible “kick start” for the development of complex life.

Cosmic Perspective aspects

Be able to mention several examples of cosmic influences on earth.

Unit XV, Life on Earth.

The test covers the material in the first two sections The Nature of Life and The Origin of life.

The Nature of Life

There are five sections in this unit, the 5th covering the cell. It is the longest of the sections. There is a lot of minutiae in this unit that you needn't worry over memorizing. However, the minutiae are there to flesh out the main points regarding the nature of life. What are the main points? Well, here we take advantage of the outline format. The format tells you major points and not-so-major points and their interrelationships. The first three sections present the major ideas we need to ponder the nature of life.

- **Section A (of class notes), physical entity engaged in chemical processes. Key points and terms:
 - the carbon advantage**
 - metabolic processes**
 - entropy**
 - information****
- **Section B, Defining life—what and where to look for it occurs.**
- **Section C, Information aspect of life**
 - **DNA and its structure, including the names and locations of the four bases.**
 - **gene**
 - **chromosome**
 - **genome**
 - **RNA. Here, RNA is mentioned only in terms of function, so know that. Learn more about RNA at the end of Section D.**
- **Section D. Cells—the basic chemical factory unit) is about the cell. Straightforward and to the point.**
- **Section E. Simply know the four chemical compounds of life.**

The Origin of Life on Earth

- **In Section B (Numerous Creation Myths) peruse thru the “top10 intelligent designs” site and select one other than the Judeo-Christian tradition that you have probably been acculturated into, that interests you. Be able to describe it reasonably well on the test. In addition, be able to simply name several of these creation myths.**
- **Sections C (First scientific hypothesis—Spontaneous Generation) and D (First 20th century hypothesis—the reducing atmosphere with primordial rich organic soup oceans) offer several scientific hypotheses proposed to explain the origin of life. You don’t need to be able to regurgitate all the details, but you should be able to describe them. Key terms: “spontaneous generation” and “rich organic soup oceans”**
- **Sections E (During the 1960's scientists’ growing understanding...began to lead scientists to reject the cool, reducing atmosphere model) and F (Growing evidence and insights) So what was this growth in understanding? What was some of the new evidence?**
- **Section G (Life forms exposed on the surface of early Earth) Why the change in thinking about the importance of tidal pools?**
- **Sections H (Understanding the origin of life necessitates knowing where, and under what conditions, it formed) and I (And so, latest thinking has it that first life arose in the dark under anaerobic (no O₂) conditions) Well, what to know here is mentioned in the title of Section H.**
- **In Section J (Chemical Evolution) What is the natural principle that applies to both biological AND chemical evolution? How did the chicken-egg argument over RNA and DNA settle out in favor of being first?**
- **In Section K (A literally far-out, origin-of-life group of hypotheses...Panspermia) and assessments of various versions of Panspermia. Be able to distinguish among the various panspermia hypotheses.**

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