

# 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 XII, “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 XIII, 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 XIV, 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 5<sup>th</sup> 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) describes the importance of defining life, physical entity engaged in chemical processes. Key points and terms:  
the carbon advantage  
metabolic processes  
entropy  
information**
- **Section B, info on the carbon atom, on which physical life is based**
- **Section C, metabolism—what is it?**
- **Section D, 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 E. Cells—the basic chemical factory unit) is about the cell. Straightforward and to the point.**
- **Section F. 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,” “rich organic soup oceans,” and “tidal pools.”
- Sections E (During the 1960's scientists’ growing understanding...began to lead scientists to reject the cool, reducing the surface of early Earth) Why the change in thinking about the important atmosphere model) and F, Miller-Urey experiment
- Section G, chemical evolution, describe aspects
- Sections H, growing evidence and insights: A number of advances in our understanding of the origin of life are given here. Be able to describe several of them for the test and NB the last point regarding the two major open questions re the origin of life.
- In Section I (An intriguing, 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 and their degree of sensibility. (range of scientific plausibility)

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