PHYS 122: Life in the Universe
Class Session 14, March 1st 2011

LEARNING OBJECTIVES

1) Explain the three key requirements for life found at the base of the Europan ocean that could support the origin of simple life. List which key requirement is likely insufficient to sustain abundant life (like as seen on Earth's ocean bottom) and why?

2) Explain the concept of our Sun's habitable zone (as defined in your book). Describe the kind of planet this applies to and the conditions which must be supported on that planet surface to label it as 'habitable'.

3) Explain why and how the sample of exoplanets found thus far has altered slightly our idea of how solar systems form and evolve. Describe the observational plan for (almost) proving LIFE exists on exoplanets.

Required Textbook readings b4 class: pp 304-310, 329-332, 369-384 (start 9.2, 10.1, 11.2)

1. What evidence is there for liquid water on Europa? Does Europa have all the key ingredients to support life? What kind of life might we expect there?
2. What is the habitable zone of a star and what does it mean for the planet which exists in it.
3. Can life exist on a planet or moon outside of a star's habitable? How so (give examples)?
4. What is the difference between direct and indirect methods of detecting exoplanets and which is presently being used by astronomers today?
5. What are the two methods used to detect small orbital motions of stars due to exoplanets?
6. What are transits? How can Gravitational Lensing help us to detect exoplanets?
7. How do the exoplanets being found differ from our own Solar System? Are there any biases with the kinds of planets we are seeing 'first' with current search methods? What is planetary migration?
8. How might we detect life on a distant exoplanet?

Websites of interest:

A nice website on exoplanet detection (with animations) : http://rml3.com/a10p/index.htm

The current list of ALL Exoplanets known: http://exoplanets.org/planets.shtml