Introductory Special Topics in Astrophysics

Physics 150

Sample Syllabus (for an Exoplanets 'Special Topic')

Illinois Institute of Technology

Overview

This class will introduce students to the physical processes that govern both stellar and planetary formation and evolution. Emphasis will be placed on habitability of exoplanets.

Learning will be project based, with some work done individually and some done collaboratively.

Goals

By the end of the course students will:

- Understand the physical processes governing both star & planet formation and evolution over cosmic timescales
- Have learned how and why spectroscopy is the tool of choice astronomers use to study exoplanets and their host stars
- Understand the methods astronomers use to discover exoplanets and their general properties
- Understand basic orbital dynamics, specifically with regard to planets
- Understand the main geologic and atmospheric phenomenon governing habitability
- Have developed the skills to visualize and describe possible realistic environments on other planets

Materials

Textbook: None required; students will be supplied a list of non-calculus based general astronomy texts for reference (e.g., The Essential Cosmic Perspective, Discovering the Cosmos, Horizons: Exploring the Universe)

Resource material will be provided digitally, including but not limited to:

Instructor's slides / lecture notes

The research paper Earth-like: An education & outreach tool for exploring the diversity of planets like our own

Various websites for investigating astrophysics phenomenon, including participating in citizen science projects (e.g., stellarium.web, earthlike.world, zooniverse)

Assignments & Assessments

There will be no exams in the course, but assessment will be done primarily through projects, some of which will be collaborative while others independent. Students will also be required to regularly write reflections on what they have learned. In class participation in discussions and presentations will also be required.