



Sample Syllabi – Subject to Change
LIFE IN THE UNIVERSE AND THE LAWS OF PHYSICS

INSTRUCTOR: David D. Reid

COURSE MATERIALS:

Main Texts:

- *College Physics* by OpenStax*
- *Origins: Fourteen Billion Years of Cosmic Evolution* by Tyson and Goldsmith^{¥,†}
- *Origins of Life: A Cosmic Perspective* by Whittet*

Supplementary Texts:

- *The Evolving Universe and the Origin of Life: The Search for Our Cosmic Roots* by Teerikorpi, Valtonen, Lehto, Lehto, Byrd, and Chernin*
- *Astrobiology: A Brief Introduction* by Plaxco and Gross[†]
- *The Life of the Cosmos* by Lee Smolin[†]

Internet Access: <https://canvas.uchicago.edu/courses/16389>

Equipment: Scientific Calculator

* Available electronically free of charge

† On reserve at the library

¥ Tyson and Goldsmith is the only text that needs to be purchased.

HOMEWORK:

There will be four (4) homework assignments that will focus on the laws of physics and their applications. The assignments will not necessarily be of equal length nor equal point value and will be comprehensive in scope. Homework assignments must be handed in on time.

QUIZZES:

There will be four (4) quizzes that may focus on either the laws of physics and/or facts or applications particular to the topic of Life in the Universe.

PROBLEM ANALYSIS AND PRESENTATION:

In lieu of a final examination, you will be randomly assigned to a team. Each team will be given a problem to analyze that involves the laws of physics as applied to some aspect of the study of life in the universe. Your team must write-up your analysis to be handed in and prepare a presentation to the class.

LABORATORY EXPERIMENTS AND IN-CLASS EXERCISES:

Several laboratory experiments or other activities (8 in total) are planned for this course, including a trip to Fermilab. The number and schedule may be adjusted if needed. You must participate in these. The laboratory experiments will be run by the TA and will be held in a separate lab room the location of which will be announced at the time. Experiments and in-class exercises will generally be performed in pairs or



small groups. The experiments are designed help you learn or understand some aspect of the subject matter. In some cases, the contents of the experiments will be beyond or in addition to topics covered in class.

Tentative Schedule:

E1 – The Universe is Big

E2 – Force and Motion

E3 – Conservation Laws

E4 – Wave Motion and Sound

E5 – The Hubble Law

E6 – Fermi National Accelerator Laboratory

E7 – Elements of the Stars

E8 – What is Life?

GRADING:

Your course grade will be determined according to the following breakdown: The homework assignments count for 30%, the experiments and exercises count for 30%, the quizzes count for 15%, the problem analysis and presentation count for 15%, and class participation counts for 10%.

SYLLABUS:

The most accurate version of the syllabus will be maintained on Canvas. This is to give you an idea of the initial plan which may change somewhat as the pace of the course dictates.

Days 1-2: Intro to Life in the Universe, Size Scales, and Newton's Laws of Motion

Days 3-4: Energy, Linear & Angular Momentum, and Conservation

Days 5-6: Temperature, Waves, and Electromagnetic Radiation

Day 7: Quantum Phenomena and the Fundamental Interactions

Day 8: The Early Universe

Day 9: Galaxy and Star Formation

Day 10: Stellar Evolution and Formation of the Solar System

Day 11: The Development of Life on Earth

Day 12: What is Life? Life in the Solar System

Day 13: Exoplanets and SETI