OLLI Course Bio

Prof. Basri has taught in the Astronomy Dept. at UC Berkeley for 35 years. His favorite classes were the introductory courses for non-majors and small freshman seminars. He enjoys making science accessible to the general public, and has been given the Sagan award for this talent.

Title: Cosmic Origins

People have always had stories about the origin of the world. Now for the first time we are actually able to observe the formation of stars and planets, galaxies, the elements, and the Universe itself. Just a few physical principles operate to produce it all. I will explain what they are in simple terms (no math!), and how they have worked to produce our current cosmos. I will also introduce you to the observations that produce this solid empirical understanding of cosmic origins.

While no reading is required for this course, there is a very helpful free online book called "Astronomy" that is written at an appropriate level and has a lot of relevant material. Go to the link below and click on the "Contents" button. You can then easily navigate to each of the sections that are listed below to the right of topics.

https://cnx.org/contents/LnN76Opl@18.1:_45u6IpQ@7/Introduction

Syllabus

Week 1	Overview of the Universe; A Star is Born	
1.1-1.3		
	Cosmic objects: planets, stars, nebulas, galaxies	1.6
	A brief review of distances and motions	1.4
	Telescopes as time machines	1.5
	The interstellar medium: site of star formation	
20.1-2		
	Gravity and Angular Momentum: the main players	21.1
	Observations: Ongoing star formation	
	The Role of Magnetic Fields	

Skater angular momentum: https://www.youtube.com/watch?v=FmnkQ2ytlO8

Week 2 A Planet is Born

Disks: a pervasive structure 21.3
Accretion and Aggregation in Disks
Oligarchic formation of Terrestrial Planets
Formation of Giant Planets
Observations: the ubiquitous planetary zoo 21.5

A star is born (drama): https://www.youtube.com/watch?v=mkktE_fs4NA
Star formation simulation: https://www.youtube.com/watch?v=YbdwTwB8jtc
Moon formation simulation: https://www.youtube.com/watch?v=wfImQOZp3hE

Week 3 The Elements are Born

The Structure and Power of Stars 22.1
Nuclear Forces: building the elements inside stars
The role of stellar mass; the lives of stars 22.4-5
Observations: star clusters test the theories 22.2-3
Stellar deaths: the formation of heavy elements 22.5

Scale of stars: https://www.youtube.com/watch?v=GCTuirkcRwo

Week 4 A Galaxy is Born

The Milky Way: a Spiral Galaxy 25.1-2
Dwarf Galaxies 26.2-3
Giant Ellipticals and Galaxy Clusters
Galaxy Collisions and Mergers 28.2
Observations: The Assembly of the Milky Way 25.6

Week 5 The Universe is Born

Equivalence of Mass and Energy 16.2
Unfolding of the Big Bang 29.3
Appearance of Particles; Nucleosynthesis

	Observations: The Cosmic Microwave Background	29.4
	Dark Matter and the Cosmic Web	
28.3-5		

Week 6	The Cosmic Perspective	
	Inflation: Before the Big Bang	29.6
	The Universe as a Spacetime Structure	29.2
	The Fate of the Universe	
	Life in the Universe	
30.1-2		
	Making Meaning in the Cosmos	