

THE WAGNER FREE INSTITUTE OF SCIENCE

Fall 2016 Course
HISTORY OF SCIENCE SERIES
The Cosmos: A History of Early Astronomy
Professor Darin Hayton

This course will be held at the **Independence Branch of the Free Library**, located at 18 S. 7th Street (7th and Market Streets), Philadelphia.

6 Wednesdays, September 21 to November 2, 2016 (no class on October 12)

LECTURES ARE HELD FROM 6:15 to 7:45 PM

Course Description:

The history of astronomy is a journey through foreign lands populated with cultures that struggled to understand the heavens, as we still struggle to do today. But when peoples in the past looked up, they saw a different sky, they asked different questions, and they looked for different answers. This course will explore some of these cultures to learn why they invested considerable time and effort in studying the heavens and the uses to which they put their knowledge of the stars and planets. Our journey will take us from early Babylonian clay tablets to a solar system that looks vaguely familiar. Along the way we will look at horoscopes, priceless instruments, medieval maps, and calendars.

Lectures

1. Wednesday, September 21, 2016 - Ancient Mathematical Astronomy

Humans have tracked the motions of the planets and stars throughout recorded history. Early efforts to understand and predict those motions encouraged long-term observational programs, the development of sophisticated mathematical tools, and the invention of complicated modeling systems. Our history of astronomy starts in ancient Babylon and from there moves to the ancient Greek world.

2. Wednesday, September 28, 2016 - What the Romans Cared About

Roman astronomy looks very different from Greek astronomy. The difference is often explained by implying a Roman aversion to real science, i.e., mathematical astronomy. Rather than dismiss Roman astronomy as “astronomy light,” we will instead look at why the Romans cared about astronomy at all. We will try to understand what the Romans were doing when they did astronomy.

3. Wednesday, October 5, 2016 - The Problem of the Calendar

The year seems like such a simple concept, yet we continue to adjust it with leap years and even carefully timed leap seconds. Astronomers in antiquity had already realized the difficulties in correlating the motions of the sun, the moon, and the stars to a calendar. We will learn about the source of these difficulties and how astronomers throughout the Middle Ages tried to correct for it.

Wednesday, October 12, 2016 – NO CLASS (holiday)

4. Wednesday, October 19, 2016 - The Earth was Never Flat

For at least the last 2,500 years of Western history astronomers and anybody educated enough to write have known the earth was round (more people alive today believe in a flat earth than ever before in history). They had good observational evidence and logical inferences for that knowledge. By 200 B.C. astronomers had even calculated the circumference of the earth. As we will see, since then the shape and size of the earth have remained common knowledge. Contrary to what generations of school children have learned and countless astronomers continue to repeat, Columbus didn't prove the earth is round.

5. Wednesday, October 26, 2016 - Astrolabes and Early Astronomical Instruments

Early astronomers designed amazing instruments to model the motions of the planets and stars, such as planetariums, astrolabes, and, of course, the Antikythera Mechanism. Those instruments could be used to demonstrate how those celestial objects moved, to show their positions as some point in the past, or to predict their positions in the future. Those instruments might also simply demonstrate the owner's prestige and wealth. Tonight we will learn about the art and science of most common early instrument, the astrolabe.

6. Wednesday, November 2, 2016 - Decentering the Earth

Sometime in the 16th century the earth became a planet. We typically identify this as the moment when science (astronomy) triumphed over superstition (astrology) and celebrate Nicholas Copernicus as the first real astronomer. During this class we will learn not only about Copernicus's heliocentric model and how much it shared with the earlier geocentric model, but also what might have prompted him to suggest such a radical change.

November 9, 2016 reserved for make-up class.

Suggested Readings:

General Histories:

- The History of Astronomy: A Very Short Introduction, by Michael Hoskin.
- The Cambridge Illustrated History of Astronomy, by Michael Hoskin.
- The Norton History of Astronomy and Cosmology, by John North.

Calendar:

- Calendar: Humanity's Epic Struggle to Determine a True and Accurate Year, by David Ewing Duncan.

Flat Earth Myth:

- Flat Earth: The History of an Infamous Idea, by Christine Garwood.
- Inventing the Flat Earth, by Jeffrey Russell.

Astrolabes and the Antikythera Mechanism:

- M.G. Edmunds, "The Antikythera Mechanism and the Mechanical Universe" Contemporary Physics 55 (2014): 263–285.
- Tony Freeth, "Decoding an Ancient Computer" Scientific American 301 (2009): 76–83.
- An Introduction to the Astrolabe, by Darin Hayton.
- Eastern Astrolabes, by David Pingree.
- Western Astrolabes, by Roderick & Marjorie Webster.

Copernicus:

- Copernicus: A Very Short Introduction, by Owen Gingerich.

Professor Bio

Darin Hayton is a historian of science whose research focuses on the creation and dissemination of scientific knowledge, especially the science of the stars (astrology and astronomy) in pre-Modern Europe and the late Byzantine Empire. He has recently published a book, *The Crown and the Cosmos: Astrology and the Politics of Maximilian I*. He is an Associate Professor of the History of Science and Chair of the History Department at Haverford College.