The Pluto Saga: How Do You Become a Planet and Stay a Planet?

KHC AS101

Fall 2012
Mondays/Wednesdays
9:30-11:00 AM
Room: CAS 500

Michal Mendillo
Office hours: Mondays 2:30-4:00 PM and Thursdays 10:00-11:30 AM, or by appointment
Office location: CAS 603
mendillo@bu.edu
(617) 353-2629

Course Description

The goal of this course is to use the recent controversy over Pluto's status as a planet to explore the astronomical concepts involved, together with the cultural, political and religious aspects that get linked to such science-and-society issues. The scientific topics deal with how solar systems form----our Sun and planets --- as well as planets around other stars. These involve the "Classic Physics" of Newton's Laws of Gravity and Motion. For larger context, the new views of gravity and space-time introduced by Einstein's Theory of General Relativity lead to discussions of Dark Matter and Dark Energy—the vast unseen components of the Universe. The central theme of the seminar is how to gather and evaluate evidence. We will discuss this by examining the broader scope of how science proceeds in quantitative ways using methods of sampling and observations. The special role that visualization plays in describing Nature is examined. Research skill development, observing opportunities, and museum visits.

Required Texts

1. *The Pluto Files: The Rise and Fall of America's Favorite Planet* by Neil deGrasse Tyson, W. W. Norton, 2009.
2. *Galileo and the Scientific Revolution* by Laura Fermi and Gilberto Bernardini, Dover Science Books, 2003.
3. *The Cosmic Perspective: Fundamentals* by Bennett, Donahue, Schneider and Voit, Addison-Wesley/Pearson, 2010.

---Plus two additional books needed for book reports---

4. *Case for Pluto: How a Little Planet Made a Big Difference* by Alan Boyle, Wiley & Sons, 2010.
5. *How I Killed Pluto and Why It Had It Coming* by Mike Brown, Spiegel & Grau, 2010.

(all books available at the BU Barnes & Nobel Bookstore)

This is a seminar course, and the expectation is that readings assigned for each topic/meeting are done prior to meetings. Student participation is a crucial component of the seminar. A detailed schedule will be provided.

Attendance

Attendance in class is required.

Academic Dishonesty

It is my expectation that each student does his or her own work. Joint study groups or team project efforts should not result in students submitting the same/copied report. All cases of suspected misconduct on exams or assignments will result in an official report to the Kilachand Honors College for possible disciplinary action. Students are expected to abide by both KHC and BU's Undergraduate Academic Conduct Code. The Academic Conduct Code can be found at http://www.bu.edu/academics/resources/academic-conduct-code/.

Grading

The final semester grade depends upon the following five components:

- ☐ The higher score of two "hourly exams": 20%
- ☐ Two papers: 20% (10% each)
- ☐ Quantitative Project #1 (Survey): 20%
- ☐ Quantitative Project #2 (Observing): 20%
- ☐ Final Exam: 20%

Components of KHC AS101 Seminar

In addition to exams (see Schedule for assignment dates and due dates):

Paper #1 will deal with an aspect of evidence: What constitutes evidence? How is evidence evaluated? Do scientists and non-scientists have a fundamentally different notion of 'belief' versus 'confidence' in asserting a finding or opinion? Specific topics to be discussed in class.

Paper #2 will deal with visualization in science. What constitutes description? How can "reality" be portrayed? Is seeing, believing? Can we understand Nature without visualization? Again, specifics to be discussed in class.

Quantitative Project #1 will deal with formulation of a poll on Pluto's status. Opinion, rather than observational evidence, is examined. Clarity of goals and how to specify them; statistical analyses of results.

Quantitative Project #2 will require individual observations of the Moon, with data analysis to determine properties of the lunar terrain. You will be provided with a telescope to use (and keep) for this project. Use of BU Observatory will also be available in this multi-month project.