Philosophy 350: History and Philosophy of Ancient Science Topic for 2013-14: Ancient Astronomy.

Mathematical astronomy, in Babylonia and Greece, was the first genuinely successful science outside of pure mathematics. We will ask how that happened, and how it worked. We will study the science from the inside, as ancient students (and everyone down to Kepler in the early 17th century) would have studied it, but we will also stand "outside" the science to ask philosophical and historical questions about it. After discussing some of the motivations for ancient astronomy, and learning how to work with ancient calendars, star-phases, the theory of the celestial sphere, and the length of daylight at different latitudes and times of the year, we will study both the Babylonian and the Greek versions of solar, planetary and lunar theory, comparing the Babylonian arithmetical and the Greek geometrical approaches to astronomy. We will learn to make sense of Babylonian ephemerides and of the arguments of Ptolemy's Almagest, and will rederive the parameters for (notably) the lunar orbit using Ptolemy's methods but modern data. A week after the end of classes there will be a total lunar eclipse, which we will first predict (by Ptolemy's methods) and then observe. If time permits, we will end with a brief overview of the contributions of Copernicus, Kepler, and Newton, which ended by overthrowing the ancient style of astronomy. This will be a mathematically rigorous course. The mathematics involved is not difficult--a good high-school background is sufficient--but it requires some patience, and the course is not for people with math anxiety. All calculations will be in base 60, and all dates will be in the Egyptian calendar, era Nabonasar--the calendar standardized by Ptolemy, but still used by Copernicus. The course will work best if there is a mix of students from philosophy, classics, history and philosophy of science, physics, mathematics, and other programs. There are no prerequisites beyond high-school-level mathematics, but no one will find the course too easy, and graduate students are welcome.