

The Newtonian Revolution -- Part I

Philosophy 167: Science Before Newton's PRINCIPIA

Overview of the Course; Ptolemaic Astronomy	Sep 2
16th Century Astronomy: Copernicus and Tycho Brahe	9
Readings from Kuhn's <u>Copernican Revolution</u> and articles by Owen Gingerich and James Evans	
Kepler's <u>Astronomia Nova</u> : the Orbit of Mars	16
Readings from Kepler and two papers by Curtis Wilson	
Kepler's Planetary System and the <u>Rudolphine Tables</u>	23
Selections from Kepler's <u>Epitome of Copernican Astro-</u> <u>nomy</u> and the Introduction of <u>Astronomia Nova</u>	
Other Developments in Astronomy from 1609 to 1642	30
Galileo's <u>Sidereus Nuncius</u> , selections from his <u>Dia-</u> <u>logues Concerning the Two Chief World Systems</u> , and part of Wilson's "From Kepler's Laws, So-Called, to Universal Gravitation: Empirical Factors"	
Galileo's <u>Two New Sciences</u> : Local Motion	Oct. 7
Part of the "Third Day" and excerpts from the "First Day"	
Galileo's <u>Two New Sciences</u> : Projectile Motion	14
The rest of the "Third Day" and the "Fourth Day"	
Descartes's <u>Principia</u> : Laws of Motion	21
Part II and excerpts from Parts III and IV	
Descartes's <u>Principia</u> : Planetary Motion	28
Part III and an excerpt from Part IV	

Huygens and the Beginnings of Rational Mechanics	Nov 4
Readings from Huygens on Motion Resulting From Impact, Centrifugal Force, and the Center of Oscillation and a Leibniz note on <i>vis viva</i>	
Other Developments in Astronomy from 1642 to 1684	18
Part of Wilson's "From Kepler's Laws..." and excerpts from Flamsteed, Römer, and Huygens, and a chapter from Van Helden	
Newton's Early Unpublished Work in Mechanics	25
Readings on The Lawes of Motion, on circular motion, on the cycloidal pendulum, and on space and time, plus a part of Wilson's "From Kepler's Laws..."	
Newton's <u>De Motu</u> , the version registered in Dec. 1684	Dec 2
<u>De Motu</u> (version 1), the Hooke-Newton correspondence of 1679-80, and the remainder of Wilson's "From Kepler's Laws..."	
Newton's <u>De Motu</u> , the augmented version, date unknown	9
Two brief excerpts from <u>De Motu</u> (version 3)	
 <u>Course Requirements:</u>	
A brief paper summarizing the three world systems	Sep 16
Three 6-8 page papers on	
1. The status of Copernican theory, as of 1633	Oct 7
2. The status of various basic laws, as of 1651	Nov 4
3. The ramifications of Newton's <u>De Motu</u>	Dec 5
Final versions of the three papers	Dec 29

The Development of Modern Science

Copernicus	1473-1543	<u>De Revolutionibus</u>	1543
Tycho Brahe	1546-1601	Uraniborg "observatory"	1576
Gilbert	1544-1603	<u>De Magnete</u>	1600
Kepler	1571-1630	Elliptical orbits	1609
Galileo	1564-1642	First telescope	1610
Gassendi	1592-1655	Transit of Mercury	1631
The trial and condemnation of Galileo			1633
Mersenne	1588-1648	Crude measurements of g	1636
Descartes	1596-1650	<u>Principia</u>	1644
Riccioli	1598-1671	<u>Almagestum Novum</u>	1651
The Royal Society of London for the Improving of Natural Knowledge			1662
Boyle	1627-1691	Boyle's law	1662
Parisian Academie Royale des Sciences			1666
Huygens	1629-1695	<u>Horologium Oscillatorium</u>	1673
Römer	1644-1710	Speed of light	1676
Newton	1642-1727	<u>Principia</u>	1687
Leibniz	1646-1716	Clarke correspondence	1717
Jo. Bernoulli	1667-1748	Vibrating string	1728
D. Bernoulli	1700-1782	<u>Hydrodynamica</u>	1738
d'Alembert	1717-1783	<u>Treatise on Dynamics</u>	1743
Clairaut	1713-1765	Motion of lunar apsides	1749
Euler	1707-1783	"Newtonian" mechanics	1775
Herschel	1738-1822	Discovery of Uranus	1781
Laplace	1749-1827	The "Great Inequality"	1786
Lagrange	1736-1813	<u>Analytical Mechanics</u>	1788
Cavendish	1731-1810	Direct measurement of G	1798