Mathematics, Reality & Philosophy

Course Description:

Mathematics can describe reality remarkably well. Consequently, it is used in virtually every field that tries to discover truths about the world, from physics and chemistry to sociology and marketing. But this was not always the case. Before the seventeenth century, it was commonly thought that mathematics lacked the representational power to capture the world as it actually is. Curiously, it was still held up as a paragon of knowledge. Why was mathematics held up as an paragon and what did it exemplify? Why did philosophers think it was lacking? How did all this change? The course will address these three questions. We'll begin with Aristotle and Scholasticism and end with the revolution in mathematics of the seventeenth century. Students are encouraged to develop research projects that engage directly with contemporary philosophy, as long as those are grounded in the history of the problem.

Week 1: Introduction. Pythagoras and Wigner. Paper Topics. How to get Texts. Use of Primary Texts.	Week 9: Descartes's Quasi-Mathematical Physics.
Week 2: Aristotle's Philosophy of Mathematics.	Week 10: Physics and Metaphysics. Metaphysics and Mathematics.
Week 3-4: Aristotle on Kind Crossing.	Week 11: Buffer
Week 5-6: Aristotle on Mathematics in Medieval Commentaries, and the Scholastic Textbook.	Week 12: NO CLASS.
Week 7: Did the Scientific Revolution Require Mathematics? The case of Hooke vs. Newton.	Week 13: Buffer.
Week 8: Descartes's New System of Philosophy	Week 14: NO CLASS.
	Week 15: PAPER PRESENTATIONS.

Texts:

Alternate versions of primary texts are okay. If you write a paper on any one of them, consult me for appropriate scholarly versions. Several are available as electronic sources from the library. Most will be distributed as PDFs.

- Charlton, W. (1970). *Aristotle's Physics. Books I & II.* Clarendon Press, Oxford.

- Ross, W. D. (1965). *Aristotle's Prior and Posterior Analytics: A Revised Text with Introduction and Commentary.* Clarendon Press, Oxford.

- Descartes, R. (1984). The Philosophical Writings of Descartes. Volume I. Cambridge University Press, Cambridge; New York. OR Descartes, R. (1983 [1644]). *Principles of Philosophy.* D. Reidel, Dordrecht.

- Ariew, Roger (2014). *Descartes and the First Cartesians.* Oxford: Oxford University Press.

- Gal, O. and Chen-Morris, R. (2013). *Baroque Science.* The University of Chicago Press, Chicago.

- Cottingham, J., editor (1992). *The Cambridge Companion to Descartes.* Cambridge University Press, Cambridge; New York.

- Various essays (see schedule).

Recommended:

- Zinsser,William Knowlton. *On Writing Well.* Many editions exist.

Grading:

- Weekly Participation (10%): This is a seminar and class time will be taken with discussion, not lecture. You should actively participate in discussion.

- Weekly Presentations (%20): One student will be responsible for presenting each reading, each week. Parameter will be discussed in class.

- Presentation of Draft Paper (20%): During the last weeks, each student will give a 15 to 20 minute presentation (with 10 min or so of discussion afterward) of their planned paper topic. The presentation should have three parts: 1) a brief setting of the context 2) a clear articulation of the argument and some defense of it 3) a statement of lingering questions or worries you have concerning the project. You'll also submit a corresponding draft paper that everyone will read and on which we will all offer feedback.

- Research Paper (50%): a 4000-7000 word paper on a topic of your choice (and related to the presentation). Topic should be cleared with me no later than week 10.

- Attendance: any absences must be cleared prior to the absence. I reserve the right to drop anyone from the course who misses two or more sessions without my advance approval.

Schedule: Reading are due on the date specified.

| 1 | 8/26/13 | Wigner, Eugene (1960). The Unreasonable Effectiveness of Mathematics in the Natural Sciences. |

2	**9/2/13**	• Aristotle and Mathematics. Stanford Encyclopedia of Philosophy. Henry Mendell. • Lear, J. (1982). Aristotle's philosophy of mathematics. *Philosophical Review*, 91:161–91. • Mueller, I. (1970). Aristotle on geometrical objects. Archiv fur Geschichte der Philosophie, 52:156–171. Reprinted in [?] pp. 96–107. • Optional: Hankinson (1995). Aristotle's Philosophy of Science. In *Cambridge Companion to Aristotle*.
3	**9/9/13**	• McKirahan, R. D. (1978). Aristotle's subordinate sciences. *British Journal for the History of Science*, 11:197–220. • Hankinson, R. J. (2005). Aristotle on kind-crossing. In Sharples, R. W., editor, *Philosophy and the Sciences in Antiquity*, pages 22–54. Ashgate, Aldershot, Hampshire, England. • Distelzweig, P. (2007). The intersection of mathematics and natural science: The subordinate sciences in aristotle. Apeiron, 44(2):85–105.
4	**9/16/13**	• Mueller, I. (2006). Physics and astronomy: Aristotle's Physics ii.2.193b22-194a12. Arabic Sciences and Philosophy, 16:175–206. • Lennox, J. G. (2008). 'as if we were investigating snubness': Aristotle on the prospects for a single science of nature. Oxford Studies in Ancient Philosophy, XXXV:149–186. • Optional: Biener (mss). The More Natural Branches of Mathematics.
5	**9/23/13**	• Mueller, I. (1990). Aristotle's doctrine of abstraction in the commentators. In Sorabji, R., editor, *Aristotle Transformed*, pages 463–82. Cornell University Press, Ithaca, New York. • Mikkeli, H. (2001). The aristotelian classification of knowledge in the early sixteenth century. In Pade, M., editor, *Renaissance Readings of the Corpus Aristotelicum*, pages 103–127. Museum Tusculanum Press, Copenhagen.
6	**9/30/13**	• Ariew, Roger (2014). *Descartes and the First Cartesians*. Oxford: Oxford University Press. Chap 2.1, 2.3, 2.4.
7	**10/7/01**	• Gal, O. and Chen-Morris, R. (2013). Baroque Science. The University of Chicago Press, Chicago. Ch. 4 & 6.
8	**10/14/13**	• Ariew, Roger (2014). *Descartes and the First Cartesians*. Oxford: Oxford University Press. Chap 3.1, 3.2, 3.3, 4.3.
9	**10/21/13**	• Cottingham, J., editor (1992). *The Cambridge Companion to Descartes*. Cambridge University Press, Cambridge; New York. Ch. 10, Daniel Garber, "Descartes' physics."
10	**10/28/13**	• Nadler, S. M. (1990). Deduction, confirmation, and the laws of nature in Descartes's Principia philosophiae. *Journal of the History of Philosophy*, 28(3):359–383.
11	**11/4/13**	• Buffer
12	**11/11/13**	• **NO CLASS.**
13	**11/18/13**	Buffer

14	11/25/13	NO CLASS.
15	12/2/13	PAPER PRESENTATIONS.
	12/14/13	TERM PAPER DUE BY 5PM.