 Date: March 2013

**History of Science Part I –
Ancient History to the Golden Age of Science in Islam and Judaism**

**Year of Studies:** 2013-2014  **Semester:** Fall **Hours/credits:** 2

**Lecturer: Dr, Israel Belfer**

1. **Course Goals**

Understanding the broad outlines of scientific-conceptual development from ancient to modern times within a broad cultural perspective; acquaintance with ancient scientific writings, core secondary literature; various perspectives of the history of ideas..

1. **Course Content**

The course follows the history of science and technology through three main time periods: Antiquity (Sumer, Babylon and Egypt - 3600-1500 B.C.E.), Ancient Greece (650-200 B.C.E.); Early middle ages (350-900 C.E.); Beginning of Islamic Golden Age (750-1100 C.E.)

Three levels of analysis will be employed: the material foundations of thought (writing, representation, knowledge dissemination); cultural background; the scientific principles and world system of each era. A perspective of these will be considered also from the Jewish point of view.

**Topical Structure (in order of lectures):**

1. **Introduction**
* Perspectives of a Scientific Revolution [example- visibility: Prometheus, Garden of Eden, Daedalus and Icarus, sight beyond human limits]; Technology and the creation of new Knowledge.
* History and science [History – contingency and locality, vs. Science – striving towards immutable laws of Nature]. Scientific development as historical contingency; Science challenging history.
* Western View and beyond it; ‘Jerusalem and Athens’.
1. Technology of conceptual revolutions: Writing systems and reflective thought. Sorting and knowing; Evolution of Writing (from political and institutional to abstract concepts); Medium vs. Message – ancient and current; Jewish perspective of written vs. oral teaching.
2. Knowledge and Know-How: science and technology (example: greek and roman approaches, the Talmudic view)
3. Writing systems of the ancient world; transition from poetics and verbal education to the written word: Memory, depersonalization of knowledge, the need for abstract and general nouns.
4. Ancient civilizations (Sumer, Egypt) and the development of technical know-how.
5. Ancient Greek society and Pre-Socratic science (themes in pre-Socratic thought from Thales to Parmenides).
6. Platonic science - Plato’s philosophy: Criticism of democratic system, modes of knowledge and rejection of the senses; dialectics as skepticism; mathematization of the world; Creation, matter and order in the *Timaeus*.
7. Aristotelian science: criticism, of Plato; man as capable of understanding; understanding as sorting and ordering; science and pure thought; observation and experience; the four Causes, hierarchy of knowledge; the soul, the structure of the world; theory of matter; strength and weakness of Aristotelian system.
8. Hellenistic science: disintegration of the Polis; philosophical shift – from communal to personal happiness; Greek mathematics; “saving the phenomena” as a scientific principle; dialogue and discussion (Lucretius and Plutarch); different approaches to medicine in Greece.
9. Science and Christianity: Tension between Christianity and Hellenistic thought; Augustinian synthesis; allegory in scientific analysis; the Two Books model of creation and revelation.
10. Muslim Science: Continuity in scientific thought in the Muslim world; the translation movement; contributions to science (Astronomy, Optics, Mathematics etc)
11. Jewish appreciation and contribution to medieval science – Maimonides, Gershonides, Ibn Ezra, Abraham bar Hiyya; Alfonsine tables (Yehuda Ibn Said, Yehuda ben Moshe)
12. **Course Requirements:**

Prior courses required: None

Reading assignments from course-book , Exam

1. **Bibliography:**

**Course Book**

Deming, David. 2010. *Science and Technology in World History, Vol. 1: The Ancient World and Classical Civilization*. McFarland.

Deming, David. 2010. *Science and Technology in World History, Vol. 2: Early Christianity, the Rise of Islam and the Middle Ages*. McFarland.

**Primary Literature**

Aristotle, “On the Heaven (*De caelo*),” 268a- 270b, 283b-284a, 287b-290a, 291a.; “On the Soul (De anima), Bk.II, chap. 7, Bk. III, chap 5. in *The Complete Works of Aristotle*, ed. J. Barnes (1984), Vol. I.

*Euclid’s Elements*. Dana Densmore, ed. T. L. Heath, trans. Santa Fe, NM: Green Lion Press, 2002.

Lucretius. *On the Nature of the Universe*. London: Penguin, 1994.

Plato, “Timaeus,” 27d-59c, in *The Collected Dialogues of Plato*, eds. Hamilton and Cairns (Princeton, 1961)

Plutarch, *Concerning the Face which Appears in the Orb of the Moon*, translated by Harold Cherniss and William C. Helmbold, in *Moralia*, XII. 15 vols. Cambridge, Mass.: Harvard University Press, 1957.

Ptolemy's *Almagest*

Archimedes, *On Floating Bodies*.

St. Augustine of Hipo, *De Trinitate*, Bk. XI

**Secondary and Supplementary Literature:**

Baird, Davis (2004). *Thing Knowledge: A Philosophy of Scientific Instruments*. Berkeley: University of California Press.

Cardwell, D. (2001), Wheels, Clocks, and Rockets: A History of Technology, New York. [pp. 79-133].

Chidester, David (1983). “The Symboliosm of Learning in St. Augustine,” *Harvard Theological Review* 76: 73-90.

Drachmann, A. G. *The Mechanical Technology of Greek and Roman Antiquity*. Madison: University of California Press, 1962.

Goody, Jack (1977). “What’s in a List?” *The Domestication of the Savage Mind*, [pp. 74-111].

Grattan-Guinness, Ivor (1997). *The Norton History of the Mathematical Sciences: The Rainbow of Mathematics*. New York: Norton.

Havelock, E. A. (1983). “The Linguistic Task of the Presocratics,” *Language and Thought in Early Greek Philosophy*. Ed. K. Robb, [pp. 7-41].

Hoyrup, Jens (1987). "The Formation of 'Islamic Mathematics': Sources and Formation," *Science in Context* 1: 281-329.

Klein, Jacob (1968). *Greek Mathematical Thought and the Origin of Algebra*. Trans. Eva Brann [pp. 26-60, 117-125]**.**

Lear, J. (1982) “Aristotle’s Philosophy of Mathematics,” *Philosophical Review* 91:161-192.

Lindberg, David C. (1992). *The Beginnings of Western Science*. Chicago: University of Chicago Press, 1992.

Lindberg, David C. (1992). *The Beginnings of Western Science: The European Scientific Tradition in Philosophical, Religious, and Institutional Context, 600 B.C. to A.D. 1450.*

Lloyd, G.E.R. (1979). *Magic, Reason, and Experience*, chap. 4

Lloyd, G.E.R., "Plato on Mathematics and Nature, Myth and Science," *Humanities* 17, [pp. 11-30].

McClellan, J. (2002) , *Science and Technology in World History: An Introduction*, Baltimore 2001. [pp. 277-292].

Miles, Margaret (1983). “Vision: The Eye of the Body and the Eye of the Mind in St. Augustine’s *De Trinitate* and *Confessions*,” *Journal of Religion* 63:125-142.

Murray, Alexander (1985). *Reason and Society in the Middle Ages*, 213-233

Netz, Reviel (2002), "Counter Culture: Towards a History of Greek Numeracy," *History of Science,* 40:1-32.

Nussbaum, Martha C. (1986). *The Fragility of Goodness: Luck and Ethics in Greek Tragedy and Philosophy,* [pp. 122-135].

Sabra, A.I. (1987), ‘The appropriation and subsequent naturalization of Greek Science in Medieval Islam: A Preliminary Statement’, *History of Science*, 25: 223-243.

Sabra, A.I. (1996) ‘Situating Arabic Science. Locality vs. Essence’, *Isis*, 87: 654-670.

Smith, A. Mark (1981), Getting the Big Picture in Perspectivist Optics, *Isis*, 72:568-589

Sorabji, Richard. (1988) *Matter, Space and Motion: Theories in Antiquity and Their Sequel*. Ithaca: Cornel University Press, 1988

Vernant, J. P. (1982), *The Origin of Greek Thought*, [chaps. 4,6,8].

**Online Resources:**

*Perseus Digital Library*<http://www.perseus.tufts.edu/hopper/>

*Stanford Encyclopedia of Philosophy*.
<http://plato.stanford.edu.>

University of Delaware Library (*History of Science and Technology)*
[www2.lib.udel.edu/subj/hsci/internet.html](file:///C%3A%5CDocuments%20and%20Settings%5CAdministrator%5CMy%20Documents%5CMy%20Dropbox%5CSyllabi%5Chistory%20of%20sci%20and%20Judaism%5Cwww2.lib.udel.edu%5Csubj%5Chsci%5Cinternet.html)

*Ancient Languages and Scripts*<http://www.plu.edu/~ryandp/texts.html>

*The MacTutor History of Mathematics Archive*[www-history.mcs.st-and.ac.uk](http://www.mcm.edu/academic/galileo/ars/arshtml/arstoc.html)