

**Education 830:
Historical and Philosophical Roots of Science Education
Instructor: Jay Lemke**

This course provides an introduction not only to philosophical discussions of the nature of science, but to historical and sociocultural perspectives on science and science education as social institutions. Current research and discussion in science education increasingly addresses social, cultural, linguistic, and political issues and draws on theory and methods from sociology, cultural anthropology, linguistics, and critical studies. This course will provide an introduction to key concepts and perspectives from these areas and examine their use in science education now and for the future.

Required Texts:

DeBoer, George E. 1991. *A History of Ideas in Science Education: Implications for Practice*. New York: Teachers College Press.

Kuhn, T.S. (1996). *The Structure of Scientific Revolutions*. 3rd Edition. Chicago: University of Chicago Press.

OUTLINE OF THE COURSE

Philosophical Perspectives

Turner, S. & Sullenger, K. (1999). Kuhn in the classroom, Lakatos in the lab: Science educators confront the nature-of-science debate. *Science, Technology and Human Values* 24 (1): 5-30.

Kuhn, T.S. (1996). *The Structure of Scientific Revolutions*. 3rd Edition. Chicago: University of Chicago Press.

The View from Science Studies

McGinn, M. K., & Roth, W.-M. (1999). Towards a new science education: Implications of recent research in science and technology studies. *Educational Researcher* 28(3), 14-24.

Latour, B. & Woolgar, S. (1986). An anthropologist visits the laboratory. In B. Latour & S. Woolgar, *Laboratory life: The construction of scientific facts* (pp. 43-90). Princeton, N.J.: Princeton University Press.

Latour, B. (1987). *Science in action*. Cambridge, MA: Harvard University Press.
[Excerpts]

History of Science Education

DeBoer, George E. 1991. *A History of Ideas in Science Education: Implications for Practice*. New York: Teachers College Press. [selected chapters]

Cultural Perspectives on Science Education

Week 1. Science Education and Cultural Differences

Lemke, J.L. "Articulating Communities: Sociocultural Perspectives on Science Education." *Journal of Research on Science Teaching* 38 (3): 296-316. 2001.

Aikenhead, G. & Jegede, O. [Transcending Cultural Borders: Implications for Science Teaching](#). NARST 1999. Published in *Journal for Science & Technology Education*, Vol. 17, 45-66. 1999.

Supplementary Readings:

Erickson, F. (1986). Culture Difference and Science Education. *Urban Review* 18(2), 117-24.

Lee, O. (1999). Science knowledge, world views, and information sources in the social and cultural contexts: Making sense after a natural disaster. *American Educational Research Journal*, 36, 187-219.

Fradd, S. H. & Lee, O. (1999). Teachers' roles in promoting science inquiry with students from diverse backgrounds. *Educational Researcher*, 28(6), 14-20.

Rosebery, A. S., Warren, B., & Conant, F. R. (1992). Appropriating science discourse: Findings from language minority classrooms. *The Journal of the Learning Sciences*, 2, 61-94.

Week 2. Cultural Anthropology and Science

Verran, Helen Watson. (2001). *Science and an African Logic*. Chicago: University of Chicago Press. [excerpt]

Discourse and Multimedia Perspectives

Week 1. Language in the Science Classroom

Lemke, J.L. (1990). *Talking science: language, learning, and values*. Norwood, NJ: Ablex Publishing. [Chapter 5; Chapter 8 is optional but recommended]

Week 2. Multimedia learning in the classroom

Lemke, J. L. (1998). Multimedia demands of the scientific curriculum". *Linguistics and Education* 10(3): 247-272.

Wells, G. (1998). Modes of meaning in a science activity. *Linguistics and Education* 10(3): 307-334.

Week 3. Multiple representations in scientific practice

Lynch, M. & Woolgar, S. Eds. (1990). *Representation in scientific practice*. Cambridge, MA: MIT Press. [Excerpt: M. Lynch, "The externalized retina: Selection and mathematization in the visual documentation of objects in the life sciences", pp. 153-186.]

Gender, Science, and Education

Week 1.

Keller, Evelyn Fox. (1987). "The Gender/Science System" in Biagioli: 234- 242 and coursepak.

Haraway, Donna. (1988). "Situated Knowledges: the Science Question in Feminism" in Biagioli: 172-188 and coursepak.

Week 2.

Traweek, Sharon. (1988). "Pilgrim's Progress" in Biagioli and coursepak (abridged).

The Politics of Science and Science Education

Harding, Sandra. (1998). *Is Science Multicultural?* Bloomington: Indiana University Press. [chapter 1]

Course Requirements

Students should write TWO short papers (about 10 pages each), relating different topic areas from the course to science education or science education research. (If science education is not your main interest, substitute another field of education or research.) The first of these should build on readings from one of the *first three* major topic areas, and the second should be based on readings from one of the *remaining four* topic areas.

Recommended Books

If you wish to purchase additional books, I recommend the following, listed in order of the major topic areas:

Latour, Bruno. (1987). *Science in action*. Cambridge, MA: Harvard University Press.

Lemke, J.L. (1990). *Talking science: language, learning, and values*. Norwood, NJ: Ablex Publishing.

Lynch, Michael. & Woolgar, Steven., Eds. (1990). *Representation in scientific practice*. Cambridge, MA: MIT Press.

Bourdieu, Pierre. 1991. *Language and Symbolic Power*. Cambridge: Polity Press.

Keller, Evelyn Fox. *Reflections on Gender and Science*. New Haven, CT & London: Yale University Press, 1985.

Noble, David F. (1992). *A world without women: The christian clerical culture of western science*. Oxford: Oxford University Press

Harding, Sandra. (1998). *Is Science Multicultural?* Bloomington: Indiana University Press.

Harding, Sandra, Ed. (1993). *The "Racial" Economy of Science*. Bloomington: Indiana University Press.

Additional articles can be found in the Course Bibliography online.

Citations for full versions of articles excerpted in:

Biagioli, M. (Ed.) 1999. *The science studies reader*. New York: Routledge.

Keller, Evelyn Fox. (1987). "The Gender/Science System" in *Hypatia*, vol. 2

Haraway, Donna. (1988). "Situated Knowledges: the Science Question in Feminism" *Feminist Studies* 14 (3): 575-600.

Traweek, Sharon. (1988). "Pilgrim's Progress" from *Beamtimes and Lifetimes*, Harvard University Press, pp. 74-105.