

MODULE 2 (2001/2)

Interpreting the History of Science and Technology

OBJECTIVE:

The module examines the relation between society on the one hand and science and technology on the other from the historical perspective. Stress is given to some key developments in European and American history, namely the scientific revolution of the 17th century, the enlightenment and the two industrial revolutions. A part of the module is also devoted to the process by which modern science entered the Ottoman Empire. All these developments were highly complex, and the aim of the module is to show how different interpretations of such historical processes can be scrutinized, evaluated and put into perspective. By this, a more complete understanding on the development of modern societies and the role science and technology have played and continue to play in them is to be reached. At the same time, the historian's business of analysing historical evidence and then putting his analysis into a proper context will be trained – part of the preparation for the students' own research work.

MODULE STRUCTURE:

There are seven pairs of a lecture and a seminar. The lecture serves as an introductory into the respective topic, while the seminar is the place where students have to review historical work on more specific topics together with their tutor. The first lecture and the last seminar, which both carry the number seven, tie the module together, the first setting the frame of the related problems, the last discussing them in the perspective of the course work of three weeks time. Generally, there is some amount of time between lecture and seminar to allow students some more in-depth preparations for the seminar.

SKILLS TRAINING 1a-f: Evidence, Fact and Contextualisation

Object of this training is to enhance students' ability to understand and review scientific literature. It is therefore directly connected to the assignment of the module that consists of such a review. Beside an introduction into basic concepts such as evidence, fact, meaning, evaluation, interpretation, discussion and context, guidance in practical writing will be given.

Skills Training Readings:

Poovey, Mary (1998). *A History of the Modern Fact*, Chicago, London: Univ. of Chicago Press

Stanford, Michael (1986). *The Nature of Historical Knowledge*, Oxford, New York: Basil Blackwell.

SKILLS TRAINING 2: Qualitative Research Methods

As one of the traditional and popular types of research, qualitative research enables the researcher to understand the in-depth motivations and underlying reasons of individual persons or phenomena. Qualitative research methods provide insight in and understanding of different problem settings. Such methods are widely used in many disciplines of social sciences such as psychology, sociology, or economics. Thus, the objectives of this skills training are to explain the differences between qualitative and quantitative research, the advantages and functions of qualitative research, and to discuss various forms of qualitative research and their applications.

ASSESSMENT:

These last units are closely connected to the assignment of the module, a critical review that discusses one of the texts given as a reading for the last seminar. Here, students have to demonstrate their ability to test historical claims by contextualising them with evidence from different sources.

Lecture 1
(Perspective Lecture)

THE SCIENTIFIC REVOLUTION OF THE 17TH CENTURY

The following topics will be treated in the lecture:

1. Why do we call it the Scientific Revolution and its pivotal role in the history of science and technology.
2. The social and ideological changes in Europe.
3. The end of Aristotelianism. The new system of the world and the new approaches to the study of nature.
4. Astronomy and problems of motion.
5. Copernicus, Descartes, Bacon, Kepler, Galileo, Newton.

Lecture Readings:

Butterfield, Herbert (1957). *The Origins of Modern Science 1300-1800*, London: Bell

Seminar 1:

Reading some documentary material

1. Reading and discussion of the letter of dedication of Copernicus' *De Revolutionibus*
2. Reading and discussion of sections of Galileo's letter to Duchess Christina.
3. Reading and discussing the minutes from Galileo's trial

Seminar Readings:

Henry, John (1997). *The Scientific Revolution and the Origins of Modern Science*, London: MacMillan

Lecture 2
(Issue Lecture)

THE CULTURE OF NEWTONIANISM

The following topics will be treated in the lecture:

1. The great synthesis of *Principia* and what it meant for the study of nature.
2. The new scientific institutions
3. The new science travels across Europe
4. Science, techniques and technology

Lecture Readings:

Koyre, Alexander (1958). *From the Closed World to the Infinite Universe*. New York: Harper

Westfall, Richard (1993). *The Life of Isaac Newton*, Cambridge University Press

Seminar 2:

1. Readings from J.Fauvel, R.Flood, M.Shortland, R.Wilson (eds.), *Let Newton Be!*, Oxford University Press, 1988.
The God of Isaac Newton by John Brooke
Anti-Newton by Geoffrey Cantor
2. Readings from B.Teeter Dobbs and Margaret Jacob, *Newton and The Culture of Newtonianism* (Humanities Press, 1995) pp.61-123.
3. Readings from Roy Porter and Mikulas Teich *The Scientific Revolution in National Context*, (Cambridge University Press, 1992).
The Scientific Revolution in France by L.Brockliss
The Scientific Revolution in the German Nations by W.Clark
The Scientific Revolution in England by J.Henry

Lecture 3
(Issue Lecture)

18TH CENTURY AND ENLIGHTENMENT

The following topics will be treated in the lecture:

1. The shifts in philosophy and values
2. Enlightenment as a program
3. Science as the dominant paradigm for society. Private vs. public science
4. The social sciences
5. The rise of literacy and the blooming of publishing.
6. Controversies in science, the case of *vis viva*.
7. The *Encyclopedie*

Lecture Readings:

T.L.Hankins, (1985). *Science and Enlightenment*, Cambridge University Press

Seminar 3

The following topics will be treated in the seminar (from Dorinda Outram's book *The Enlightenment* [Cambridge University Press, 1995])

- The rise of modern paganism: Religion and the Enlightenment
- Science and the Enlightenment: God's order and man's understanding
- Europe's mirror? The Enlightenment and the exotic
- Enlightenment thinking about gender
- Enlightenment and Government: new departure or business as usual?
- The end of Enlightenment: conspiracy and revolution?

Lecture 4
(Issue Lecture)

THE FIRST INDUSTRIAL REVOLUTION

In this lecture, the main features of the Industrial Revolution are scrutinized. What is the meaning of the term, and in how far is it possible to coin it as a revolution? Was industry really the driving force behind it? What was the role of technology? Questions of this kind are very controversially discussed in the pertinent historical literature. Whereas the lecture aims at lining out the main positions of different schools of thinking, in the seminar students will be invited to develop a judgement on a more particular issue in the debate.

Lecture Readings:

Cannadine,(David 1984). “The Present and the Past in the Industrial Revolution, 1880-1980”, *Past and Present* 103 131-72

Toynbee, Arnold 1966 (first printed 1884). *The Industrial Revolution*, Boston: Beacon, pp. 58-66.

Seminar 4:

This seminar concentrates on two central issues in the debate on the Industrial Revolution: The impact of technology, especially of the steam engine, and the social repercussions of the economic change, especially what has been coined the “Making of the English Working-Class”.

Seminar Readings:

E.P. Thompson, *The Making of the English Working Class*, Harmondsworth: Penguin, 1980 (first 1963), esp. 207-32, 441-69.

Joel Mokyr, *The Lever of Riches: Technological Creativity and Economic Progress*, Oxford, New York: Oxford Univ. Press, 1990, 81-112, (see also 239-69)

See also the material collected in the *Virtual History Source-Book, Early Modern History, Industrial Revolution* (at www.fordham.edu)

Lecture 5
(Issue Lecture)

THE SECOND INDUSTRIAL REVOLUTION

The second Industrial Revolution was a process that, among other features, introduced new means of communication and a higher speed to the societies affected by them. These developments will carry the main stress of the lecture.

Lecture Readings:

- Joel Mokyr, *The Lever of Riches: Technological Creativity and Economic Progress*, Oxford, New York: Oxford Univ. Press, 1990, 113-48.
- Fischer, Claude (1988). "Touch Someone!: The Telephone Industry Discovers Sociability," *Technology and Culture*, 29, p. 32-61.
- Kline, Ronald, and Pinch, Trevor (1996): "Users as Agents of Technological Change: The Social Construction of the Automobile in the Rural United States", in *Technology and Culture*, 37, pp. 763-95.

Seminar 5:

The discussion in this seminar turns around the role electricity played in the transformation of industrial society.

Seminar Readings:

- Hughes, Thomas P. (1979). "The Electrification of America: The System Builders," *Technology and Culture*, 20, p. 124-161.
- Kocka, Jürgen. "New Energies in the Nineteenth Century: Towards a Social History of the Electricity Business" in *Industrial Culture and Bourgeois Society: Business, Labor, and Bureaucracy in Modern Germany*, New York, Oxford: Berghahn, 1999, pp. 174-9.

Lecture 6
(Issue Lecture)

MODERN SCIENCE IN THE OTTOMAN EMPIRE

When modern science and technology entered the Ottoman Empire, this was a process that deeply affected Ottoman society and was often regarded as a form of crisis. On the other hand, Ottomans were rather successful, if not in creating modern science and technology then in introducing it. The module focuses on two issues. The first of them is whether science and technology remained the same in the Ottoman context, i.e. whether we deal with a transfer of knowledge or whether this knowledge underwent a change when it was introduced and thus became appropriated in an Ottoman way. The other issue is to understand the role of educational institutions in the process.

Lecture Readings:

Donald Quataert, “The Introduction of Modern Technology in Ottoman Industry During the 18th and 19th Centuries”, *The Introduction of Modern Science and Technology to Turkey and Japan*, ed. Feza Günergun, Kuriyama Shigehisa (n.d., n.y.), 67-74.

Seminar 6

In the seminar, students will be confronted with some source texts that they have to elaborate on in the light of the readings.

Seminar Readings:

Ekmeleddin İhsanoğlu, “Changes in Ottoman Educational Life and Efforts towards Modernization in the 18th-19th Centuries”, *The Introduction of Modern Science and Technology to Turkey and Japan*, ed. Feza Günergun, Kuriyama Shigehisa (n.d., n.y.), 119-36.

Idem, “Some Critical Notes on the Introduction of Modern Sciences to the Ottoman State and the Relation between Science and Religion up to the end of the Nineteenth Century”, *Comité International d’Etudes Pré-Ottomanes et Ottomanes: VIth Symposium; Cambridge, 1st-4th July 1984*, ed. Jean-Louis Bacqué-Grammont, Emeri van Donzel (Istanbul et al.: 1987), 235-53.

Dimitris Dialetis, Kostas Gavroglu, Manolis Patiniotis, “The Sciences in the Greek Speaking Regions During the 17th and 18th Centuries”, *The Sciences in the European Periphery During the Enlightenment*, ed. Kostas Gavroglu (Dordrecht et al.: 1999), 41-71.

Lecture 7
(Issue Lecture)

CHANGE, PROGRESS
AND THE INDUSTRIALISATION OF CULTURE

This lecture is something like the keynote of the whole module. Addressing the main question of the module, it discusses basic concepts such as historical progress or culture, and gives an overview about the historical period relevant to the field.

Lecture Readings:

Schivelbusch, Wolfgang (1977; reprint. Univ. of Calif. Press, 1986), *Railway Journey: The Industrialization of Time and Space in the 19th Century* chs. 3-4, pp. 33-44, 52-69.

Mumford, Lewis (1934, repr. 1963), *Technics and Civilization* San Diego et al.: Harvest, pp. 9-59

Smith, Merritt Roe (1994). "Technological Determinism in American Culture," Smith and Leo Marx, eds., *Does Technology Drive History? The Dilemma of Technological Determinism* (Cambridge, Mass: MIT Press), pp. 1-35.

Kuhn, Thomas (1977). "The historical Structure of Scientific Discovery", in *The Essential Tension: Selected Studies in Scientific Tradition and Change*. Chicago , London: Chicago Univ. Press., 165-77.

Seminar 7:

Taking on topics discussed in the first lecture of this module but referring also to some of the developments discussed later, this seminar discusses the role of technology in contemporary culture from a historical point of view. It serves as a platform for a discussion of the present and the future in historical term.

Seminar Readings:

Mumford, Lewis (1934, repr. 1963). *Technics and Civilization*. San Diego et al.: Harvest, pp. 364-435.

Webster, Frank (1995), *Theories of Information Society*. London: Routledge, pp. 1-51, 74-100, 215-20.