UNSW THE UNIVERSITY OF NEW SOUTH WALES | Arts and Social Sciences

SCHOOL OF HUMANITIES AND LANGUAGES

ARTS2302

The Scientific Revolution: Science and Religion

SESSION 2, 2013

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COURSE STAFF

Convener Details:

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COURSE DETAILS

Units of Credit: 6 Hours Per Week: 3 (no parallel teaching) Offered: Session 2

Course description: This course examines fundamental issues and concepts in the history and philosophy of science through historical study of the origins of modern European science, with particular focus on the lives and work of Copernicus, Galileo, Kepler, Descartes, and Newton. The religious, cultural and economic factors shaping the new science are analysed. In examining case studies such as the conflict between Galileo and the Catholic Church, emphasis is placed on critical historical thinking and use of tools from the sociology of scientific knowledge, as it has developed from the work of Thomas S. Kuhn and his successors. Fundamental issues in the history and philosophy of science—such as the theory-loaded nature of scientific facts, the existence and role of scientific method, the process of scientific discovery and whether there really are scientific revolutions—are critically analysed and applied to the historical case study material.

COURSE AIMS

1. To provide a Level 2 course in the history and philosophy of science dealing with the most important and widely studied problem in the field—the rise, nature and dynamics of modern European science 1500-1700.

2. To provide, via a carefully calibrated process of analytical introduction and historical application, a map of the key concepts needed to advance beyond introductory level in the study of history, philosophy and sociology of scientific knowledge.

3. To encourage awareness of, and interest in, contemporary issues concerning the images, social relations and social understandings of science, by reflection upon the implications of the historical case study material in this course, for example, the relations of science and religion, the dynamics of scientific progress and the role of contextual forces in shaping the sciences.

4. To gain awareness of, and literacy within, the major philosophical debates of the past century concerning science (its nature, method and ethics), particularly the Popper/Kuhn debates and the rise of post-Kuhnian history and sociology of science.

5. To prepare students for further work at third year level in history and philosophy of science, in terms of sedimentation of networks of key disciplinary concepts, and skills of research.

6. To continue the development of several of the graduate attributes, as noted below, by means of the carefully calibrated and layered course content and related learning activities.

STUDENT LEARNING OUTCOMES

At the completion of this course students will be able to:

1. Describe and analyse debates concerning the nature of modern science and about the reasons it developed in Western Civilisation.
2. Appraise critically and communicate effectively ideas about the role of social, religious and economic factors in shaping scientific theories.
3. Describe and evaluate debates about the existence and efficacy of scientific method, and about scientific discovery and revolution, with particular reference to the competing theories of scientific change of Sir Karl Popper and Thomas S. Kuhn.
4. Understand the perspectives and analytical concepts at stake in assessing the so-called 'conflict' of science and religion.
5. Apply techniques for understanding and evaluating of historical source materials in the field of history of science.
6. Feel more confident about their ability to communicate clearly and concisely, and to construct sound arguments, both in written and spoken form.

LEARNING AND TEACHING RATIONALE

The course aims to engage students in learning through critical analysis and discussion, delivered in a seminar format. Contextualised learning strategies allow students to draw and reflect on their own learning experiences, and contribute to classes in an inclusive way. In particular, engaged practice of history and philosophy of science by students is facilitated and encouraged. The teaching rationale in this course is focussed on student-centred learning.

TEACHING STRATEGIES

The teaching strategies in this course involve seminars and group discussion (groups to be assigned in Week 1). They are designed to support the intended student learning outcomes by offering a climate of mutual inquiry that challenges and stimulates students, and links them to research and scholarship in the discipline. Students will have the opportunity to reflect on and explore their experiences, challenge current beliefs, and develop new practices and understandings. The seminars provide disciplinary knowledge and concepts, and exemplify critical analysis and discussion for the students. Dialogue and debate are encouraged in the seminars. Readings for seminars challenge and develop students' comprehension and interpretive skills, and provide a basis for group work and discussion. The seminars are designed to reinforce and extend disciplinary themes and concepts, and encourage students to apply their knowledge and understanding in a strategic way to material that tests their

analytical and critical skills. Seminar discussions and written work allow students to reflect on their learning and improve on their performance.

COURSE SCHEDULE

Seminar Timeslot:

MONDAY 09:00 - 12:00 Mathews 123

The seminars are not recorded. Students are expected to attend and actively participate in seminar activities and group work.

Seminar Program:

Week 1. Introduction: Histories of Knowledge [AC]

Secondary text reading
Thomas Kuhn, *The Structure of Scientific Revolutions*, 2nd ed., Chicago: University of Chicago Press, 1970, ch. 1 'Introduction: A Role for History'.

Week 2. Historical Judgement [AC]

Secondary text reading
David C. Lindberg, 'Conceptions of the Scientific Revolution from Bacon to Butterfield: A preliminary sketch', in Lindberg, D.C. and Westfall, R.S. (eds), *Reappraisals of the Scientific Revolution*, Cambridge: Cambridge University Press, 1990, pp. 1-26.

Week 3. The Cultural & Institutional Background to the Scientific Revolution [JG]

Set-text readings
- John Henry, *The Scientific Revolution and the Origins of Modern Science,* 3rd ed., Houndmills: Palgrave Macmillan, 2008, ch. 2 'Renaissance and Revolution'.
- Peter Dear, *Revolutionizing the Sciences. European Knowledge and its Ambitions, 1500-1700*, Houndmills: Palgrave Macmillan, 2001, Introduction, ch. 1 '"What was Worth Knowing" in 1500', Ch. 2 'Humanism and Ancient Wisdom: How to Learn Things in the Sixteenth Century', section 1 'Language and Wisdom'.

Primary text readings
- Extract from Pico della Mirandola, *Discourse on the Dignity of Man* (1486) http://www.historyguide.org/intellect/pico.html
- Extracts from Johannes Kepler, Mysterium Cosmographicum (1596) from D.C. Goodman (ed.), *Science and Religious Belief 1600-1900* (Open University Press, 1973), pp. 7-17.

Secondary text reading
R.S. Westfall, 'Scientific Patronage: Galileo and the Telescope', *Isis*, 76 (1985), pp. 11-3.

Week 4. Copernicus, Rationality and Paradigm Change [AC]

Secondary text readings

- T.S. Kuhn, *The Copernican Revolution: Planetary Astronomy in the Development of Western Thought*, Cambridge, Massachussetts: Harvard University Press, 1957, ch. 5 (selections).
- Ernan McMullin, 'Rationality and Paradigm Change in Science', in Horwich, P. (ed.), *Thomas Kuhn and the Nature of Science*, Cambridge, Massachussetts: MIT Press, 1993, pp. 55-78.

Week 5. Kepler and the 'New' Astronomy [AC]

Primary text reading
Johannes Kepler, *Epitome of Copernican Astronomy & Harmony of the World*, trans. C.H. Wallis, New York: Prometheus Books, 1995, pp. 305-323.
Secondary text reading
Owen Gingerich, *The Eye of Heaven: Ptolemy, Copernicus*, Kepler, New York: American Institute of Physics, 1993, pp. 305-323.

Week 6. Religio-Scientific Questions: Galileo [AC]

Primary text reading
Galileo Galilei, 'Letter to Castelli', in M.A. Finocchiaro (ed. And trans.), *Galileo Galilei: The Essential Galileo*, Indianapolis: Hackett Publishing Company, Inc., 2008, pp. 103-109.
Secondary text readings
- Richard J. Blackwell, *Behind the Scenes at Galileo's Trial*, Notre Dame, Indiana: University of Notre Dame Press, 2006, pp. 93-104.
- Jean D. Moss, *Novelties in the Heavens: Rhetoric and Science in the Copernican Controversy*, Chicago: University of Chicago Press, 1993, pp. 301-329.

Week 7. The Growth of Scientific Institutions [JG]

Set-text reading
Peter Dear, Revolutionizing the Sciences. European Knowledge and its Ambitions, 1500-1700, Houndmills: Palgrave Macmillan, 2001, ch. 6 'Extra-Curricular Activities: New Homes for Natural Knowledge'; ch. 7 'Experiment: How to Learn Things about Nature in the Seventeenth Century, section III "Baconian" experimentation
Primary text reading
Extracts from Thomas Sprat, History of the Royal Society (1667)

http://andromeda.rutgers.edu/~jlynch/Texts/sprat.html

Secondary text reading
Peter Dear, '"Totius in verba": Rhetoric and authority in the early Royal Society', *Isis*, 76 (1985), pp. 144-61.

Week 8. World-Building: Galileo and Descartes [AC]

Set-text reading
Peter Dear, *Revolutionizing the Sciences. European Knowledge and its Ambitions, 1500-1700*, Houndmills: Palgrave Macmillan, 2001, ch. 5 'Mechanism: Descartes Builds a Universe'.
Primary text readings
- Galileo Galilei, *Dialogue Concerning the Two Chief World Systems*, Berkeley: University of California Press, 1967, pp. 9-29.
- Rene Descartes, *Principles of Philosophy*, Part 2, Sections 1-40 (see URL in Blackboard)

Week 9. Cultural Meanings: Cartesianism [AC]

Primary text reading
Rene Descartes, *Meditations on First Philosophy*, Meditation 3 (see URL in Blackboard)
Secondary text reading
Margaret C. Jacob, *The Cultural Meaning of the Scientific Revolution*, New York: Alfred A. Knopf, 1988, pp. 43-69.

[NB: Monday Week 10 is a Public Holiday]

Week 11. Philosophical Differences: Descartes and Newton [AC]

Set-text reading
Peter Dear, *Revolutionizing the Sciences. European Knowledge and its Ambitions, 1500-1700*, Houndmills: Palgrave Macmillan, 2001, ch. 8 'Cartesians and Newtonians'.
Primary text reading
Isaac Newton, *Descartes, Space and Body*, Sections 7-13 (see URL in Blackboard).

Week 12. The Scientific Revolution & the Enlightenment [JG]

Set-text readings
- John Henry, *The Scientific Revolution and the Origins of Modern Science*, Houndmills: Palgrave Macmillan, 2002, Conclusion.
- Peter Dear, *Revolutionizing the Sciences. European Knowledge and its Ambitions, 1500-1700*, Houndmills: Palgrave Macmillan, 2001, Conclusion.
Primary text reading
- Extracts from Jean D'Alembert, *Preliminary Discourse to the Encyclopedia* (1751)
http://courses.ischool.berkeley.edu/i103/s11/SLIDES/DalembertSelections.pdf
- Admiralty Instructions for James Cook's Endeavour voyage, 1768-71.
http://foundingdocs.gov.au/resources/transcripts/nsw1_doc_1768.pdf
Secondary text reading
- John Gascoigne, 'Motives for European exploration of the Pacific in the age of the Enlightenment', *Pacific Science*, 54 (2000), pp. 227-37.
- Paula Findlen, 'Science as a Career in Enlightenment Italy: The Strategies of Laura Bassi', *Isis*, 84 (1993), pp. 441-469.

Week 13. Conclusion: Revolution and Difference [AC]
Class Test

COURSE EVALUATION AND DEVELOPMENT

Student evaluative feedback on this course is welcomed and is gathered periodically, using among other means UNSW's Course and Teaching Evaluation and Improvement (CATEI) process.

Student feedback is taken seriously, and continual improvements are made to the course based in part on such feedback. Significant changes to the course will be communicated to subsequent cohorts of students taking the course.

REFERENCES

Texts

The seminar readings (or URL links to them) for the topics in the weekly seminar program (see above) are available on Moodle, except in cases where copyright restrictions make it necessary for you to refer to Peter Dear's book (below).

Dear, P., *Revolutionising the Sciences: European Knowledge and its Ambitions, 1500-1700*, New York: Palgrave, 2001.

Suggested References

Beyond the seminar readings, there are hundreds of things you could read. However, I do suggest one general (and short) book about the Scientific Revolution for further reference:

Henry, J., *The Scientific Revolution & the Origins of Modern Science*, 3rd ed., Palgrave, New York, 2008.

This book contains an excellent list of relevant sources, and provides orientations to debates about the Scientific Revolution in the field of HPS. Also, two selections from this book are used in the seminar program.

Journals

The following journals are significant in HPS, but far from exhaustive:

Annals of Science
British Journal for the History of Science
History of Science
Isis
Journal of the History of Ideas
Social Studies of Science
Studies in History and Philosophy of Science
Osiris
Perspectives on Science

Websites

The simplest thing to do is search 'history philosophy science'. Useful sites include:
http://www.intute.ac.uk/artsandhumanities/hps/
http://www.imss.fi.it/~tsettle/index.html

Students seeking resources can also obtain assistance from the UNSW Library. One starting point for assistance is:
info.library.unsw.edu.au/web/services/services.html

ASSESSMENT

The course assessment is both formative (intended to assist students to identify weaknesses in their understanding, so that they may improve in their understanding and enhance their learning) and summative (intended to pass judgment on the quality of a student's learning in terms of grades and marks). These forms of assessment align with the learning outcomes for the course regarding the acquisition of knowledge about the history and philosophy of science, training in the skills and techniques employed in the discipline of HPS, the development of students' communication skills, and the development of students' critical skills (especially in evaluating and constructing arguments). They are also aligned with the University's Graduate Attributes.

Assessment task	Length	Weight	Learning outcomes assessed	Graduate attributes assessed	Due date
Critical reading exercise	700 words	20%	1, 2, 3, 4, 5, 6	1, 2, 3, 4, 5, 6, 7	Mon 19 August
Two seminar papers	1,500 words each	30% + 30%	1, 2, 3, 4, 5, 6	1, 2, 3, 4, 5, 6, 7	The week after the chosen seminar topic
Class test	50 minutes	20%	1, 2, 3, 4, 5, 6	1, 2, 3, 4, 5, 7	Mon 28 October

(i) Critical reading exercise: The critical reading exercise is a formative assessment. It assesses conceptual understanding of course material, capacity for critical and analytical thinking, and communication skills. Assignments are returned within two weeks with written feedback. This early exercise will help you gauge your progress in the course. In cases of poor performance, students should speak to their tutor. Students will have an opportunity to respond to/use feedback in the seminar papers.
This assignment is integrated with the Seminar program and will be based on critical reading of texts in that program. Please take careful note of the Seminar discussions before you proceed to the exercise (to be distributed).
Due Date: Monday 19 August.

(ii) Seminar papers: The seminar papers are both formative and summative assessment. They will be based on seminar topics discussed during the Semester. Details to be provided.
NB: The papers must be fully referenced, and students *must* use sources *additional* to those already included in the seminar program (that is, use the set readings *plus* other sources).

(iii) Class test: This in-class test (Week 13) is a summative assessment, and is directed at the general (and thematic) content of the course. It will take a short answer form.

Assignment Submission

- The cut off time for all assignment submissions in the School is **4pm** of the stated due date.
- 2 assignment copies must be submitted for every assessment task - 1 paper copy and 1 electronic copy.
- All hard/paper copy assessments should be posted into the Assignment Drop Boxes outside the front counter of the School of Humanities and Languages on level 2, Morven Brown Building by 4pm on the due date.
- A completed cover sheet must be securely attached to assignments. The School is not responsible for any missing pages from poorly bound or stapled assignments.
- In addition, a soft copy must be sent through **Moodle** on Turnitin by 4pm on the due date.

Assignment Collection

Assignments should be collected from your lecturer/tutor and must be collected by the owner/author of the assignment. A Stamped Self Addressed Envelope must be provided on submission if students require their assignment to be posted back to their home address.

Assignment Extensions

A student may apply to the Lecturer/Tutor for an extension to the submission date of an assignment. Requests for extension must be made via myUNSW before the submission due date, and must demonstrate exceptional circumstances, which warrant the granting of an extension. If medical grounds preclude submission of assignment by due date, contact should be made with subject coordinator as soon as possible. A medical certificate will be required for late submission and must be appropriate for the extension period.
To apply for an extension please log into myUNSW and go to My Student Profile tab > My Student Services channel > Online Services > Special Consideration

Late Submission of Assignments

Assignments submitted after the due or extended date will incur a 3% penalty of the maximum marks available for that assignment. Assignments received more than 14 calendar days after the due or extended date will not be allocated a mark.

ATTENDANCE

To successfully complete this unit you are required to attend minimum 80% of classes. If this requirement is not met you will fail the unit. The Lecturer/Tutor will keep attendance records.

ACADEMIC HONESTY AND PLAGIARISM

Students seeking information on plagiarism should visit the following web site:
http://www.lc.unsw.edu.au/plagiarism/index.html

OCCUPATIONAL HEALTH AND SAFETY POLICY

UNSW's Occupational Health and Safety (OHS) Policy requires each person to work safely and responsibly, in order to avoid personal injury and to protect the safety of others.

Any OHS concerns should be raised with your immediate supervisor, the School's OHS representative, or the Head of School. The OHS guidelines are available at:
http://www.ohs.unsw.edu.au/ohs_policies/index.html

STUDENT EQUITY AND DIVERSITY

Students who have a disability that requires some adjustment in their learning and teaching environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of the course. Alternatively, the Student Equity and Diversity Unit can be contacted on 9385 4734. Further information is available at:
http://www.studentequity.unsw.edu.au

GRIEVANCES

All students should be treated fairly in the course of their studies at UNSW. Students who feel they have not been dealt with fairly should in the first instance attempt to resolve any issues with their tutor or the course convenors. If such an approach fails to resolve the matter, the School of Humanities and Languages has an academic member of staff who acts as a Grievance Officer for the School. This staff member is identified on the notice board in the School of Humanities and Languages. Further information about UNSW grievance procedures is available at: https://my.unsw.edu.au/student/atoz/Complaints.html

OTHER STUDENT INFORMATION

myUNSW is the single online access point for UNSW services and information, integrating online services for applicants, commencing & current students and UNSW staff. To visit myUNSW please visit either of the below links:

https://my.unsw.edu.au
https://my.unsw.edu.au/student/atoz/ABC.html