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

SCHOOL OF HUMANITIES & LANGUAGES

ARTS1300

Rethinking Science & the Environment

science *n.* **1.** (arch.) knowledge. **2.** systematic and formulated knowledge...**3.** (**natural**) **-,** physical or natural sciences collectively. **4.** branch of knowledge (esp. one that can be conducted on scientific principles), organized body of the knowledge that has been accumulated on a subject; **applied -** (studied for practical purposes); **natural -,** one dealing with material phenomena and based mainly on observation, experiment, and induction, as chemistry, biology; PHYSICAL *science*; **pure -,** one depending on deductions from self-evident truths, as mathematics, logic, or one studied without practical applications....

technology *n.* (science of) practical or industrial art(s); ethnological study of development of such arts; application of science; hence **techno**LOGICAL....

society *n.* **1.** social mode of life, the customs and organization of an ordered community....

environment *n.* surrounding; surrounding objects, region, or conditions, esp. circumstances of life of person or society…

SEMESTER 2, 2013

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COURSE STAFF

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Outside consultation hours please communicate with David via email

COURSE DETAILS

Environmental issues inescapably involve science and technology. The first two parts of the course deal with the generation of scientific knowledge and the nature of technological systems respectively, both of which are central to understanding the dynamics of environmental issues and debate. The final part of the course applies these insights directly to the most complex and compelling environmental issue of our era, namely climate change.
Units of Credit: 6

COURSE AIMS

The aims of this course are:

- To provide a first year introduction to study of the humanities at tertiary level
- To provide an introduction to key concepts and approaches in the study of the historical and contemporary relations of science, technology and environmental issues
- To prepare students for further work in environmental humanities
- To assist the development of graduate attributes such as: generic skills in analysis and in verbal and written communication of views and arguments; the ability to work collaboratively and in a multidisciplinary way
- To encourage aware involvement and interest in environmental humanities and the social relations of science and technology (thus developing the Graduate Attributes of responsiveness to change and social responsibility).

STUDENT LEARNING OUTCOMES

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

- Expound and make use of key concepts concerning the nature of scientific, technological and social change and the relationships between those processes to our understanding of environmental problems and solutions
- Recognise the relevance of these concepts to historical understanding and to dealing with environmental challenges faced by society
- Critically evaluate views expressed by scientists, policy makers, the media, environmental groups and others about these questions
- Communicate well-formulated views on the theoretical and topical issues dealt with in the course
- Appreciate what is involved in an active, ethically aware and socially responsible approach to environmental questions and to associated scientific, technological and social change.

LEARNING AND TEACHING RATIONALE

Learning requires hard work and engagement in linking together closely: (1) the absorption of information and ideas; (2) private, quiet thought about, and careful, critical consideration of, that information and those ideas and (3) communication to others of the outcomes of that thought and consideration through debate and discussion. Successful communication with others is, in the end, a crucial test of whether understanding has been achieved. Another important test is whether the concepts acquired can be effectively applied to new material and new situations. You need to be encouraged (and have the courage) to apply your developing understandings to new material and especially to the debates and discussions going on around you in everyday life in Australia now. Again your ability to do this is a measure of how well you have learnt and how well we have taught. Being open to divergent viewpoints is important, as is the effort to understand their varied bases. The quality of the reasoned convictions that you arrive at will depend on the extent to which you have carefully considered and analyzed other points of view.

TEACHING STRATEGIES

Lectures provide information and ideas and also try to exemplify what careful, systematic (and adventurous) thought and analysis involves. **Readings** undertaken for tutorials also convey information and ideas and provide an opportunity to test comprehension and analyze arguments given certain foci of attention, which are provided by the tutorial questions. **Discussions in tutorials** offer a chance to try out ideas and understandings in a sympathetic environment. Those discussions and written assignments enable the student and the teacher to **assess** whether successful learning and teaching is occurring and to take remedial steps if necessary. **Working with a group in tutorials** will help you to understand the opportunities and difficulties of successful collaborative work. **Consultations** (which are generally under-used by students) represent an opportunity to discuss ideas one on one with a member of staff and to seek clarification of material in lectures or tutorials that you have found difficult. The **course** is carefully and cunningly designed to enable cumulative understandings.

The material in early sections is relevant to, and should be thought about in connection with, that in later ones.

COURSE SCHEDULE

SECTION 1

Beyond the Myth of Method—Rethinking Science

Week	Date	Lecture (Tues 9-10, Matthews Theatre B; Wed 12-1, CLB 6)	Tutorial (Wed 1-2, Webster 302 or Friday 10-11, QUAD 1045, as per your enrolment)
1	30 July	**Lecture 1**: Introduction: Four Commonly Accepted Tales about Science, Technology, Society and Progress	**NO TUTORIALS IN WEEK 1**
	31 July	**Lecture 2**: The Standard Story of Scientific Method: Objectivity and Progress based on Facts and Tests	
2	6 Aug	**Lecture 3**: Beyond the Myth of Scientific Method: the 'Theory-Loading of Facts'	
	7 Aug	**Lecture 4**: Different Theories-Different Facts: Oxygen vs Phlogiston in the 18th Century	**Tutorial 1: Organisation/Aims plus** Science, 'Facts', Publics and YOU
3	13 Aug	**Lecture 5**: The Manufacture of Scientific Knowledge: Was Oxygen 'Constructed' or 'Discovered'?	
	14 Aug	**Lecture 6**: Why Experimental Tests are never Definitive — The 'Politics' of Testing	**Tutorial 2:** The Myth of Method and the Theory-Loading of Facts
4	20 Aug	**Lecture 7**: Sir Karl Popper's Attempt to Save the Story of Scientific Method	
	21 Aug	**Lecture 8**: How Science Develops without a Method: Kuhn's Theory of History of Science	**Tutorial 3:** Learning from our Chemical Case Study
5	27 Aug	**Mini-Quiz 1 & Assignment Hand-in**	
	28 Aug	**Lecture 9**: Making 'big' Modern Science :The Politics of Testing and Negotiation of discovery--the strange case of solar neutrinos	**Tutorial 4:** Popper's mythical method: Testing in Science as a Social and Political Process
6	3 Sept	**Lecture 10**: Science, Technology and Progress	
	4 Sept	**Lecture 11**: Technological Determinism and Social Determinism	**Tutorial 5**: Moving beyond the Kuhn vs Popper debate:

SECTION 2
Understanding Technology: Beyond the Myths of Technological Determinism and Progress

Week	Date	Lecture	Tutorial
7	10 Sept	**Lecture 12**: Do Artifacts have Politics?	
	11 Sept	**Lecture 13**: Technology and the Spectrum of Flexibility	**Tutorial 6:** How Artifacts have Politics and How they Acquire Them
8	17 Sept	**Lecture 14**: The Social Construction of Technology	
	18 Sept	**Lecture 15**: Technological Controversies I	**Tutorial 7** The Social Construction of the Bicycle
9	24 Sept	**Lecture 16**: Technological Controversies II	
	25 Sept	**Lecture 17:** Technological Controversies III	**Tutorial 8**: An Integrative Case-Study
MID-SESSION BREAK: 30 September - 6 October			

SECTION 3
Climate Change: Knowledge Politics; Technological Change and Ways of Life

Week	Date	Lecture	Tutorial
10	8 Oct	**Lecture 18**: Climate Change – An Environmental Case Study: Overview & Introduction	
	9 Oct	**Lecture 19**: Climate Change Science and its Discontents	**Tutorial 9:** Climate Change: History of a Problem
11	15 Oct	**Lecture 20**: Technology as a Climate Change Fix : Geo-engineering	
	16 Oct	**Lecture 21**: Carbon Markets	**Tutorial 10:** Climate Change as a Problem of Knowledge
12	22 Oct	**Lecture 22**: Climate Change: The Case of Transport	
	23 Oct	**Lecture 23**: Mini-Quiz 2 (40 mins) Where to from here?	**Tutorial 11**: Climate Change as a Problem of Technology

13	29 Oct	NO LECTURES IN WEEK 13	
	30 Oct		**Tutorial 12:** Concluding discussions

CONDUCT OF TUTORIALS

We shall do tutorials 1-3 as common group work and each person will be asked to write up a tutorial exercise (to be distributed) which tests comprehension of the material in those tutorials.

- Length: 500 words or 2 pages maximum,
- Due: Tuesday 27 August
- 10% of course mark.
- This early exercise will help you gauge your progress in the course so far.

Tutorial work: Each tutorial class will be divided into 4 sub-groups. Each sub-group will be responsible for presenting the weekly tutorial every fourth week, beginning with tutorial 4 (Week 5 in the Session). Thus each sub-group will perform two times during the session. Sub-group tutorial responsibility will be on the following rotation: #1 tutorials 4 and 8; #2 tutorials 5 and 9; #3 tutorials 6 and 10 and #4 tutorials 7 and 11 (see table, below).

Each time your group is responsible for the tutorial, you personally will have one or two questions on which to lead the discussion. Thus you won't ever lead an entire tutorial as an individual, but you will be part of a group that leads two tutorials in total.

Assessment of Tutorial Work: You will write up your answer to **one** of the questions you discussed in the tutorial and the write up, 500 words or 2 pages maximum, will count 15% of your mark in the course. Hence in total 2 write-ups counting 30% of course mark.

- All work must be on A4, double -spaced, wide margins, 12-point font, a simple staple in the corner. No stiff covers, plastic sleeves, etc.
- Your name, student number, name of the course, and clear identification of the question(s) being addressed must be included.
- Ideas and content not your own must be cited with name of author and page number. For example: (Schuster, p.12). Written tutorial assignments are based on the assigned readings and do not require full bibliographic information. Your essay will include full bibliographic references.

Session Week	Tutorial	Tutorial Contribution due	Written tutorial work due	Date of Tutorials
2	1	Everyone		7 or 9 August
3	2	Everyone		14 or 16 August
4	3	Everyone		21 or 23 August
5	4	Group 1	Common assignment due at lecture 27 August	28 or 30 August
6	5	Group 2	Group 1	4 or 6 September
7	6	Group 3	Group 2	11 or 13 September
8	7	Group 4	Group 3	18 or 20 September
9	8	Group 1	Group 4	25or 27 September
MID-SESSION BREAK				
10	9	Group 2	Group 1	9 or 11 October
11	10	Group 3	Group 2	16 or 18 October
12	11	Group 4	Group 3	23 or 25 October
13	12	Everyone	Group 4	30 Oct or 1 Nov

TUTORIAL TOPICS, READINGS AND QUESTIONS

Tutorial 1 (Week 2; 7 or 9 August)

(a) Organization and Aims

Reading

Although this week we will focus on organization and aims, you should begin your reading by having a look at:
JA Schuster, *An Introduction to the History and Social Studies of Science,* Chapter 1.
[This is available at:
http://descartes-agonistes.com/index.php?option=com_docman&task=cat_view&gid=37&Itemid=53]

(b) Scientists, 'Facts', Publics and YOU

Reading

'Mysterious Killer Chemical' in Dr Karl's 'Great Moments in Science'. Go to the following address and read the transcript or hit the 'Audio' link:

http://www.abc.net.au/science/k2/moments/s1631494.htm

Discussion points

1. Were you initially taken in by the account of DHMO?

2. What was the original 'exposure' of DHMO intended to illustrate?

3. What do you think Dr Karl's program implied about the relationship between scientists and non-expert publics?

4. What did Dr Karl mean when he said, in response to the question "how gullible are we?": "We're pretty gullible depending upon our particular field of ignorance"

5. Are facts supplied to publics by scientists ever 'wrong'? If so, how do we know which are wrong and which are right?

6. Would a UNSW Graduate react differently to the DHMO spoof than a 'normal' member of the public? In what way?

7. Looking forward to our historical chemical case study in tutorial 3, find out what DHMO was according to Antoine Lavoisier and Joseph Priestley in the late eighteenth century.

Tutorial 2 (Week 3, 14 or 16 August)
The Myth of Method and the Theory-Loading of Facts—Objectivity, Progress, Whig History

Reading: textbook

JA Schuster, *An Introduction to the History and Social Studies of Science,* Review Chapter 1; read Chapters 2 and 3

Reader (From Study Kit)

A Chalmers, *What is this Thing Called Science? (1982 Edition)*, 22-37 'The Theory Dependence of Observation'

Questions to think about during your reading:

1. According to the standard story about scientific method, what is the role of unbiased observation in science; what is the role of experimental testing?

2. According to the standard story about scientific method, how and why has Western science progressed since its origins in the 16th and 17th century?

3. According to the standard story about scientific method, why is science a special form of knowledge superior to all others?

4. What is 'whig history'; why does it present a problem about understanding the past; why is it a particular problem in understanding the development and history of science.

5. In the lectures, and in Chalmers, *What is this Thing ...?*, various 'gestalt figure' diagrams have been discussed. What do they imply about the nature of observation and testing? In what ways do they cast doubt on the standard story of scientific method?

6. Here are some statements describing simple, commonsense 'facts'. Can you detect any 'theory-loading' in them deriving from the very nature of our language:
   "This pen is blue"
   "The sun rose this morning" or do you like this better:
   "The sun and the horizon move apart at an average velocity of 15 degrees per hour"?

Tutorial 3 (Week 4, 21 or 23 August)

Learning from our Chemical Case Study: Negotiating Discovery and Theory Change in Science

Reading: textbook
JA Schuster, *An Introduction to the History and Social Studies of Science,* Chapters 4-5.

Reading (From Study Kit):
Andrew Ede and Lesley Cormac, *A History of Science in Society: From Philosophy to Utility*, Broadview Press, Ontario, 2004, pp.209-218
Thomas Hankins, *Science and the Enlightenment* (Cambridge UP, Cambridge, 1985), 94-106

Questions to think about during your reading:

1. Give some examples of how the phlogiston theory and the oxygen theory gave different accounts of the same situations - that is 'loaded' different 'facts'. Give some examples of facts that phlogiston theory could explain but oxygen theory could not, and vice versa. Could a 'crucial' test be devised to prove oxygen theory true and phlogiston theory false? Why not?

2. What does it mean to 'discover' something - as in 'Columbus discovered America', or 'I discovered where I had misplaced my lecture notes'? Did Lavoisier 'discover' oxygen or did he construct it? That is, was Lavoisier's oxygen a fact (in the naive, dictionary sense) or was it an artefact, a construct - is it more like America or is it more like a particular type of CD player, amongst others?

3. What roles do politics and social negotiation play in discoveries?

4. Was phlogiston theory an error, a fantasy, and did Lavoisier discover the truth? If you think the answer is yes, then consider this: Lavoisier's version of 'oxygen' is not ours - did Lavoisier make a 'mistake' and have we discovered the truth?

5. In the end should we talk about 'errors' corrected by 'discoveries of the truth' that then turn out to be 'errors' as well? Isn't all this talk just a reflection of the myth of scientific method and scientific progress? What do you make of this alternative story?

Phlogiston was a construct made, used and 'sold' by some smart guys in the 18th century. It was naturally taken as a true fact. Lavoisier's oxygen was a (slightly) different construct that had uses and applications that were partly similar to and partly different from those of phlogiston. Neither 'product' could be 'proven' by test to be truer or better than the other. But Lavoisier, by power and persuasion and negotiation in the field of chemistry, sold the uses and future promise of oxygen to his colleagues, and as the balance began to shift, Lavoisier's oxygen began to be a fact. But over the 200 years since, other different, revised constructions of oxygen have been invented and sold, and at the moment our oxygen is a product at least as different from Lavoisier's as his was from phlogiston. (That is, a little bit different and a little bit the same.) [Story © J A Schuster, 2005]

Tutorial 4 (Week 5, 28 or 30 August)

Popper's Mythical Method: Testing in Science as Social and Political Process

Reading: textbook
JA Schuster, *An Introduction to the History and Social Studies of Science,* Chapters 6 and 7.

Reading (From Study Kit):
T.S. Kuhn, 'Normal Measurement and Reasonable Agreement', in B Barnes and D Edge (eds.), *Science in Context* (MIT, Cambridge, Mass., 1982), 75-83

Questions to think about during your reading:

1. In what ways does 'theory-loading' enter a typical test situation?

2. Did Galileo prove his claims about motion through experimental testing? Can we ever say that a test 'proves' or 'disproves' a scientific or technical claim? What role do politics and social negotiation play in the evaluation of tests? *(If no test actually 'proves' or 'disproves' a claim or theory, why is such terminology used in scientific debates and in the media? What role does this talk of proof/disproof play, if strictly speaking no experimental proof or disproof is possible? If you can answer this question, you have mastered the material in this section of ARTS1300!)*

3. Popper's version of the story of scientific method, 'falsificationism', relies - as usual - on 'testing'; but here testing plays a special and specific role - what is that role and why does Popper think it is so important?

4. What would the history of scientific progress look like if Popper were to write it? For example, can you imagine a Popper fable called 'what happened in the chemical revolution of the 18th century'?

5. Can Popper's version of scientific method escape the problems of theory-loading?

Tutorial 5 (Week 6, 4 or 6 September)

Moving Beyond the Kuhn vs Popper Debate: A Case of Modern 'Big Science'

Reading: textbook
JA Schuster, *An Introduction to the History and Social Studies of Science,* Chapters 8, 9,10

Questions to think about during your reading:

1. What is 'normal', 'paradigm' based science' according to Kuhn; why does Kuhn liken it to the solving of puzzles? Why according to Kuhn must the training of a scientist be quite dogmatic and authoritarian?

2. Kuhn, like Popper believes in Scientific Revolutions--why, according to Kuhn do they occur?

3. What does Kuhn mean by saying that two competing paradigms are "incommensurable" and that their advocates "live in different worlds". Can this view be sustained in the case of the phlogiston and oxygen paradigms in the 'chemical revolution of the 18th century?

4. How do Popper and Kuhn differ on the role of testing in science? How do Kuhn and Popper compare on the nature and causes of 'scientific revolutions'; How do Kuhn and Popper compare on the issue of the nature of scientific 'progress'.

5. Popper is perhaps the last great 'methodologist'--why, according to Kuhn is there no real, unique, transferable, effective 'scientific method'.

6. Chapter 8 of Schuster's *Introduction to the History and Social Studies of Scienc*e argues that Kuhn had a more realistic view of science than did Popper, but that Kuhn's own

account now seems outdated from a contemporary HPS perspective, although Kuhn's work contributed to these modern views. What are the bases for these claims in the Chapter?

7. Consider whether Kuhn's or Popper's model of science could account for the history of the solar neutrino experiment. What would be the main shortcomings of a Kuhnian and Popperian account of the experiment?

8. What is the role of factors and forces beyond the sciences in the shaping of the solar neutrino experiment?

9. What does Pinch's account of the solar neutrino experiment tend to show us about the nature of scientific instruments?

10. Even if the solar neutrino controversy were to reach a consensus and close, there would be no gain, and much to lose by writing up the story as a 'whig history'. Why?

FOOD FOR THOUGHT AS YOU PREPARE FOR SECTION 2:
In the past several weeks you have been asked to reconsider and perhaps revise the understandings you previously had of such science buzz-words as 'method', 'fact', 'discovery', 'test' and 'progress'. For each term consider the difference between your understanding before you began this course, and your view now, applying these understandings to the Pinch solar neutrino case. How do these new understandings open up the possibility of further study of the social, political and historical aspects of science? Are these new understandings in any senses empowering for the average person eager to understand and participate in scientific, environmental, medical & technological controversies? What you have learned so far is only the tip of the science, technology, society and environment iceberg. What limitations / gaps / implausibilities can you see in the material offered thus far?

Tutorial 6 (Week 7, 11 or 13 September)

How Artifacts have Politics and How they Acquire Them.

Readings (from Study Kit)

Arnold Pacey, *The Culture of Technology*, Blackwell, Oxford, 1983, pp. 1–12.

Langdon Winner, 'Do Artifacts have Politics?' In: Langdon Winner, *The Whale and the Reactor*, The University of Chicago Press, Chicago, 1986, pp. 19–39.

Ruth Schwartz Cowan, 'Automobiles and Automobility', In R. Cowan, *A Social History of American Technology*, Oxford University Press, Oxford, 1997, pp. 224–248.

Questions to think about during your reading

1. What is meant by the view that technology is "culturally, morally and politically neutral"? What according to Pacey, is wrong about this view? What alternative does he suggest?

2. What do we tend to miss when we view the snowmobile in narrow technical terms? Think of other examples of how a limited technical focus on technology (and its 'consequences') misses important points about the place of technology in our lives. (The quotation that Pacey gives from C.S. Lewis is important here).
3. What does someone believe if they are a 'technological determinist'? What do they believe if they are a 'sociological determinist' about technology?

4. Langdon Winner has reservations about both technological determinism and sociological determinism. What are those reservations? How does the example of Robert Moses and the Long Island bridges illustrate Winner's point about artefacts having politics?

5. Based on Cowan's survey of car technology in the twentieth century, what is the difference between the automobile and 'automobility'?

6. In what sense(s) did the automobile have politics in 1900, in 1950, and in 2000?

Tutorial 7 (Week 8, 18 or 20 September)

The Social Construction of the Bicycle

Reading (From Study Kit)

Trevor J. Pinch and Wiebe E. Bijker, 'The Social Construction of Facts and Artifacts: or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other', In: Wiebe E. Bijker, Thomas P. Hughes and Trevor J. Pinch (eds), *The Social Construction of Technological Systems,* The MIT Press, Cambridge, MA, 1987, pp. 17–50.

Questions to think about during your reading

1. Think back to some of the new ideas about scientific facts that came up in the first section of the course. What is meant by the idea that facts are constructed? How does this open up ways in which the wider society might shape the very 'content' of science?

2. What parallels do Pinch and Bijker draw between their approach to technological things and the constructivist approach to scientific facts?

3. What's wrong with linear models of innovation, according to Pinch and Bijker? Why is it important to adopt instead a' multi-directional' model?

4. Thinking about the bicycle in its early days, what do Pinch and Bijker mean when they describe it as having 'interpretative flexibility'? (It's also interesting to consider the automobile again. Did it have interpretative flexibility in the early years?)

5. How, according to Pinch and Bijker, are competing versions of the bicycle eventually sorted out? Why do they use the term 'closure' to describe this process? (Again it's interesting to think about closure with respect to the automobile. What sorts of closures occurred in the twentieth century? Are there senses in which some people are trying to re-open negotiations on the car?)

Tutorial 8 (Week 9, 25 or 27 September)

An Integrative Case Study: Carcinogenic Risk Assessment

Reading (From Study Kit)

Brendan Gillespie, Dave Eva and Ron Johnston, 'Carcinogenic Risk Assessment in the USA and UK: The Case of Aldrin/Dieldrin', *Social Studies of Science*, 1979, 9, 265–301.

Questions to think about during your reading

1. How would you characterize this case study? Is it an example of science or technology or environmental/health policy, or what? In what sense is it integrative of what we've done so far in the course?

2. If you held the view that science can and does produce objective facts then why would you find this case study surprising or worrying? What would be your response to it?

3. Why is the development of conclusive scientific tests of the carcinogenicity of Aldrin/Dieldrin so difficult?

4. How do the following affect the construction of scientific tests: the scientific specialties, or paradigms, of the leading scientists involved in the USA (Saffiotti) and in the UK (Barnes);

the institutional contexts in which those scientists worked and argued; wider legal and political frameworks and cultures within which the action took place.

Tutorial 9 (Week 10, 9 or 11 October)

Climate Change: History of a Problem

Reading (Online)

Spencer Weart, 'Introduction: A Hyperlinked History of Climate Change Science', in *The Discovery of Global Warming* (2007) at:
http://www.aip.org/history/climate/summary.htm

Spencer Weart, 'The Modern Temperature Trend', in *The Discovery of Global Warming* (2007) at:
http://www.aip.org/history/climate/20ctrend.htm

Questions to think about during your reading

1. What would you describe as the main phases in the history of climate change science?

2. What does the history show us about the relationship between theoretical and observational activities?

3. What does the history show us about the progress of climate science and wider political and social conditions?

4. How would the dispute about the modern temperature trend be characterized (a) in Popperian terms (b) in Kuhnian terms (c) in post-Kuhnian terms?

5. Why did the 'Hockey Stick' controversy become the focus that it did?

6. How does Spencer Weart treat the skeptics and the denialists? Is he justified in this? What is the basis for the justification?

Tutorial 10 (Week 11, 16 or 18 October)
Climate Change as a Problem of Knowledge Formation

Reading (Online via UNSW Library)

Naomi Oreskes, 'Beyond the Ivory Tower: The Scientific Consensus on Climate Change' *Science* 306 (3 December 2004): 1686

Naomi Oreskes, 'The Scientific Consensus on Climate Change: How Do We Know We're Not Wrong?', In Joseph F. DiMento and Pamela Doughman (eds), *Climate Change: What it Means for US, Our Children, and our Grandchildren* (MIT Press, 2007), pp. 65-99.
(Available online at: http://med.ucsd.edu/documents/Oreskes_2007_MIT_Press.pdf

J.P. van dre Sluijs, R. van Est and Monique Riphagen. 'Beyond Consensus: Reflections from a Democratic Perspective on the Interaction between Climate Politics and Science', *Current Opinion in Environmental Sustainability* 2 (2010): 409–415.

Additional Reading

Mike Hulme and Martin Mahony, 'Climate Change: What do we Know about the IPCC?', *Progress in Pysical Geography* 34 (2010): 705-718.

Questions to think about during your reading

1. How does Oreskes argue for the existence of a scientific consensus 'on climate change' in the short article in the journal *Science* ? Compare this with the argument in her longer article. How does the longer argument differ?

2. Oreskes considers evidence for climate change in light of a number of accounts of scientific knowledge production, some of which we've also considered in the course. How might you criticize her approach from a post-Kuhnian, constructivist perspective? To what extent would that perspective agree with Oreskes on the importance of consensus?

3. Van der Sluijs *et al.* suggest a number of 'interfacing strategies' in relating scientific knowledge to policy. What are these strategies? How do they differ? In what respects are they the same?

4. In what sense(s) do van der Sluijs *et al.* want to take us beyond reliance on consensus?

Tutorial 11 (Week 12, 23 or 25 October)
Climate Change as a Problem of Technology

Reading (Online from UNSW library)

J.G. Shepherd, 'Geoengineering and the Climate: An Overview and Update', *Philosophical Transactions of the Royal Society A* 370 (2012): 4166–4175.

Mike Hulme, 'Climate Change: Climate Engineering Through Stratospheric Aerosol Injection', *Progress in Physical Geography* 36 (2012): 694–705.

Questions to think about during your reading

1. What are some of the major geoengineering schemes directed at dealing with climate change?
2. We have discussed the idea of 'technological fixes'. What are the advantages of tech fixes (that is, why do they appear an attractive approach)? What are the disadvantages?
3. Why is there considerable skepticism about the wisdom of geoengineering, as in the particular case of Stratospheric Aerosol Injection?
4. On what grounds does such an eminent body as the Royal Society argue that we should not dismiss geoengineering as an option. What stance has that body taken on the question?
5. The other, and more usual, technological 'solutions' lie with new, non-fossil fuel energy technologies. Given what you now know about processes of technological change, what are the prospects of (a) nuclear energy (b) renewables such as solar and wind energy?

Tutorial 12 (Week 13, 30 October or 1 November)

In our last tutorial we will have a round-table discussion of the general question of technological 'solutions' to environmental problems , especially the problem of climate change.

COURSE EVALUATION AND DEVELOPMENT

Student Feedback

Student evaluative feedback on this course is welcome 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

During weeks 2 to 7, **much of your reading for tutorials will be from a single text: J.A. Schuster,** ***An Introduction to the History and Social Studies of Science***. This can be

accessed via the following link: http://descartes-agonistes.com/index.php?option=com_docman&task=cat_view&gid=37&Itemid=53

Many of the other readings for tutorials have been collected together in a **Study Kit, which can be purchased from the UNSW Bookshop**. Ask for it by course code (ARTS1300) and title. It is essential that you purchase this set of readings as soon as possible. Readings for Tutorials 9,10 and 11 can be accessed electronically in online journals via the UNSW Library or from other online locations indicated .

Websites

Although you are not required to use the following sorts of resources in your first year study you may wish to familiarize yourself with them. These resources are available through the UNSW Library website via the Sirius collection of databases and electronic journals. As a student at UNSW you have the right of access to electronic databases and journals that the University subscribes to but you must approach them through the Library website. The Library has a Guide to relevant resources as part of the History & Philosophy Guide at: http://subjectguides.library.unsw.edu.au/history
This has links to numerous reference sources, databases and journals in the area. The following are two of the most useful.

(1) Web of Knowledge

This provides bibliographic access (and increasingly full text access) to a large proportion (but far from all) of the world's research output in the sciences, humanities and social sciences. The Web of Science is built up from so-called citation indexes, which record the connections between published papers that are made when one researcher cites, or refers to, the work of another. By capturing this web the Web of Science enables you, among many other things, to build an extended bibliography on a particular topic or detailed research issue by seeing who cites the central papers on that topic and then finding those references. Its use is quite difficult to master but in the longer term well worth the effort.

(2) History of Science, Technology and Medicine

A more straightforward bibliography, which draws together the bibliographies produced by leading journals (such as *Isis* and *Technology and Culture*) and by leading institutions, notably the Wellcome Library for the History of Medicine in London. Very useful and goes a long way back. Not always the best source for the most recent materials.

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

ASSESSMENT

There will be three major components of assessment in the course.

(1) Tutorials: an initial writing exercise (due 27 August) based on tutorials 1-3 (10%); two tutorial write-ups (15% each). Due dates of write–ups depend on which tutorial group you are in. See p.7 of this guide.

(2) An essay of 1500 words, due at the end of week 13 (1 November). (30%)

(3) Two class quizzes: (1) a short answer quiz to be held during the regular lecture hour on 27 August to test your grasp of early key concepts (10%) (2) a short answer quiz in the lecture hour on 23 October which will test your broad understanding of all lecture and tutorial material dealt with up to that date, with an emphasis on your grasp of key concepts (20%)

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 at the School of Humanities & Languages, on level 2 of the 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 by 4pm on the due date by email to assessment@unsw.edu.au. All emailed assessments sent to assessment@unsw.edu.au will receive an electronic acknowledgement.

Important Note

- Electronic copies emailed to assessment@unsw.edu.au will not be marked. Only hard copies submitted in the drop boxes will be marked/assessed.
- The electronic copy will be used as evidence of assignment submission during appeal and dispute cases. Students have no recourse if a soft copy is not submitted. Therefore it is essential that students keep the electronic record of their sent assignment (eg. If assignment was sent to assessment@unsw.edu.au : the original sent email with the attached assignment kept in their 'sent box' and the electronic acknowledgment.

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 5% penalty per day including weekends (calculated from the maximum marks available for that assignment). Assignments received more than 10 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 tutors 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 & 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