PHL 232

What is Science

S2 Day 2019

Dept of Philosophy

Contents

General Information 2

Learning Outcomes 2

General Assessment Information 3

Assessment Tasks 3

Delivery and Resources 5

Unit Schedule 6

Policies and Procedures 7

Graduate Capabilities 8

Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

General Information

Unit convenor and teaching staff Alexander Gillett alexander.gillett@mq.edu.au	
Credit points 3	
Prerequisites (12cp at 100 level or above) or admission to GDipArts	
Corequisites	
Co-badged status	
Unit description How does science work? Should scientific methods be privileged over other ways of knowing? Is the history of science an unfolding tale of intellectual and technological progress, or is it a messier process? This unit introduces central issues in the philosophy of science. We will discuss scientific revolutions, and whether they should be understood as fully rational. We will ask whether science describes the world as it “really is”. We will also consider challenges to science from sociology of science, feminism, and science studies. Is science really value-free? Should we want it to be? This unit presumes no particular background in science – it is suitable for students with a background in arts disciplines as well as for students in the social, behavioural, biological, and physical sciences.	

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

Learn the basic ideas, problem spaces, and approaches in philosophy of science

Learn to express your own ideas and interpretations of philosophical arguments and scientific findings both verbally and in writing

Learn to closely read and evaluate philosophical and scientific texts

Learn to research and write philosophical arguments and essays

General Assessment Information

Unless a Disruption to Studies request has been submitted and approved, (a) a penalty for lateness will apply – two (2) marks out of 100 will be deducted per day for assignments submitted after the due date – and (b) no assignment will be accepted seven (7) days (incl. weekends) after the original submission deadline. No late submissions will be accepted for timed assessments – e.g. quizzes, online tests.

Assessment Tasks

Name	Weighting	Hurdle	Due
Participation	15%	No	Weekly
Discussion Guides	15%	No	Weeks 2-7, 8-10, 12-13
Quizzes	30%	No	12/9/19 and 7/9/19
Essay Plan	10%	No	22/10/19
Research Essay	30%	No	14/11/19

Participation

Due: **Weekly**
Weighting: **15%**

For internal students, participation marks will be based on attendance and participation in seminars. Your participation will be assessed based on whether you've done the reading, your involvement in the classes, and your willingness to engage.

On successful completion you will be able to:

- Learn the basic ideas, problem spaces, and approaches in philosophy of science
- Learn to express your own ideas and interpretations of philosophical arguments and scientific findings both verbally and in writing
- Learn to closely read and evaluate philosophical and scientific texts

Discussion Guides

Due: **Weeks 2-7, 8-10, 12-13**
Weighting: **15%**

The ability to engage with philosophical arguments and scientific findings is crucial. This assessment task requires you to hand in a short written piece of writing each week (weeks 2-7, 8-10, 12-13) based on that week's readings. This is roughly one or more pages A4 which briefly summarises what each reading was about, and raises a question or point of reflection. These will

be handed in at the end of that week's tutorial and handed back in the following week. This assessment task is designed to help you focus on completing that week's readings and scaffolding your involvement in the seminar discussions.

On successful completion you will be able to:

- Learn the basic ideas, problem spaces, and approaches in philosophy of science
- Learn to express your own ideas and interpretations of philosophical arguments and scientific findings both verbally and in writing
- Learn to closely read and evaluate philosophical and scientific texts
- Learn to research and write philosophical arguments and essays

Quizzes

Due: **12/9/19 and 7/9/19**
Weighting: **30%**

Two online quizzes will test students on the core concepts taught on the course. Multiple choice questions will cover material discussed in the weekly readings. Each quiz is worth 15% and relates to the two halves of the course: the first quiz covers weeks 2-7; and the second quiz covers weeks 8-13. Marks are determined by the accuracy of the student's responses to the quiz questions.

On successful completion you will be able to:

- Learn the basic ideas, problem spaces, and approaches in philosophy of science
- Learn to closely read and evaluate philosophical and scientific texts

Essay Plan

Due: **22/10/19**
Weighting: **10%**

Prior to the research essay, students will submit an essay plan of their intended chosen question for the research essay. The choice of question topics relates to all weeks of the course. You will write a 500 word short document outlining how the argument would be structured. With a clear introduction, key points of the main body of the argument, a conclusion which discusses the implications, reservations and importance of the argument, and a references cited list (the reference list will not count towards the word count total).

Your essay plan should be submitted online via Turnitin. Your essay plan will be assessed based on clarity of argument, understanding, structure, and research. Brief feedback will be given to aid in the writing of the final essay.

On successful completion you will be able to:

- Learn the basic ideas, problem spaces, and approaches in philosophy of science

- Learn to express your own ideas and interpretations of philosophical arguments and scientific findings both verbally and in writing
- Learn to research and write philosophical arguments and essays

Research Essay

Due: **14/11/19**
Weighting: **30%**

Students will write a 2500 word essay on one of the topics discussed during the the course. This essay must demonstrate research of the topic beyond the mandatory readings. Each week is accompanied by a recommended further reading list to aid with this. Your essay should be submitted online via Turnitin. Your essay will be assessed based on clarity of exposition, understanding, argumentation, and research. A rubric and detailed instructions for the essay will be made available and assessment criteria discussed in seminars.

On successful completion you will be able to:

- Learn the basic ideas, problem spaces, and approaches in philosophy of science
- Learn to express your own ideas and interpretations of philosophical arguments and scientific findings both verbally and in writing
- Learn to research and write philosophical arguments and essays

Delivery and Resources

Required Reading

There will be core texts to read for each week of the course. It is mandatory that these be read as the weekly seminar is based on these. You will also be required to submit weekly discussion guides relating to these readings at the end of each seminar. The weekly readings are directly available via the ilearn. It is also recommended that students get a copy of Peter Godfrey-Smith's (2003) *Theory and Reality.* Suggestions for optional and further readings will be indicated on the ilearn in each week, but it is up to students to obtain these themselves using online databases and the library services. These will be useful for the research essay.

Technology Used and Required

We use an iLearn website, and the Echo360 lecture recordings. Any other material you need will be available through the iLearn website. We recommend you have access to a reliable internet connection throughout the semester.

Assignment Submission

Essay assignments in this course will be submitted electronically, as word documents. There is

no need for a coversheet - the iLearn assignment submission (Turnitin) involves declaring your details and honesty in submitting your work. Please note, we do not accept submission by email attachment.

Weekly discussion guides are to be submitted to the course convenor at the end of the seminar as part of your attendance and are not to be handed in at any other time unless otherwise arranged.

Unit Schedule

Weekly topic	Synopsis	Date
1. Introduction	Provides an introduction to the course, an outline of the assessment structure, and an overview of the following weekly topics and dominant themes.	1/8
2. Logical Empiricism	Logical empiricism is a set of dominant ideas at the beginning of the last century which shaped much of the development of philosophy of science. Much of the subsequent week's discussions can be seen as responding to the issues with this position.	8/8
3. The Problem of Induction	Induction is a core aspect of the 'scientific method' and yet there is a set of troubling philosophical puzzles surrounding this notion. We begin with how this problem was first identified by Hume and how it has been elaborated upon by more recent philosophers.	15/8
4. Popper and Falsification	Perhaps the most famous response to the problem of induction comes from the work of Sir Karl Popper and his emphasis on falsification as demarcating science from pseudo-science and non-scientific inquiry.	22/8
5. Kuhn and Theory Change	Another major problem is the issue of theory change. Kuhn's *The Structure of Scientific Revolutions,* one of the most famous texts of the last century, argued that social processes (not just pure rationality) are crucial for understanding how communities undergo 'paradigm shifts'.	29/8
6. After Kuhn: Lakatos, Laudan, Feyerabend	A number of philosophers responded to Kuhn's work. This week we examine Lakatos' emphasis on 'research programmes' and compare it to Feyerabend's (in)famous claim that "anything goes".	5/9
7. Feminist approaches and social studies	Several branches of philosophy of science have emphasised the political aspects of scientific work - especially feminist epistemology. This week we discuss the notion of whether science is 'value neutral' and varying aspects of social constructivism.	12/9
8. Naturalism and Social Structure of Science	After the mid-term break we turn to bringing together these various themes to explore the division of cognitive labour in scientific communities.	3/10
9. Interdisciplinarity, collaboration, and the Trading Zone	Science is becoming increasingly specialised into an ever-growing number of sub-fields. This has raised questions about how to conduct interdisciplinary research in an effective manner.	10/10
10. Non-Western Philosophy	Approaches to scientific endeavour have been developed in many philosophical traditions. This week we will be joined by a guest speaker, Philip Martin, to discuss non-western philosophical themes in scientific epistemology and intercultural dimensions of the development of modern science.	17/10
11. Essay writing week	No seminar this week. Essay Plan due	n/a
12. Models, experiments, instruments	A growing area of research in philosophy of science surrounds questions about scientific models: what are they? how do they represent the world? what role do they play in scientific theorising? Similar questions have also arisen around experiments and other scientific instruments.	31/10

13. Distributed cognition	Continuing on from the previous week, we conclude the course by exploring the more radical claim that models, experiments, notation, and instruments, etc. are not just specialised epistemic tools but are themselves actually part of the cognitive processes of working scientists.	7/11

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- Academic Appeals Policy
- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy
- Fitness to Practice Procedure
- Grade Appeal Policy
- Complaint Management Procedure for Students and Members of the Public
- Special Consideration Policy *(**Note:** The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.)*

Undergraduate students seeking more policy resources can visit the Student Policy Gateway (https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/study/getting-started/student-conduct

Results

Results published on platform other than eStudent, (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

- Learn the basic ideas, problem spaces, and approaches in philosophy of science
- Learn to express your own ideas and interpretations of philosophical arguments and scientific findings both verbally and in writing
- Learn to closely read and evaluate philosophical and scientific texts

- Learn to research and write philosophical arguments and essays

Assessment tasks

- Participation
- Discussion Guides
- Essay Plan
- Research Essay

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcomes

- Learn the basic ideas, problem spaces, and approaches in philosophy of science
- Learn to express your own ideas and interpretations of philosophical arguments and scientific findings both verbally and in writing
- Learn to closely read and evaluate philosophical and scientific texts
- Learn to research and write philosophical arguments and essays

Assessment tasks

- Participation
- Discussion Guides
- Essay Plan
- Research Essay

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcomes

- Learn the basic ideas, problem spaces, and approaches in philosophy of science
- Learn to express your own ideas and interpretations of philosophical arguments and

scientific findings both verbally and in writing
- Learn to closely read and evaluate philosophical and scientific texts
- Learn to research and write philosophical arguments and essays

Assessment tasks

- Participation
- Discussion Guides
- Essay Plan
- Research Essay

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Learn the basic ideas, problem spaces, and approaches in philosophy of science
- Learn to express your own ideas and interpretations of philosophical arguments and scientific findings both verbally and in writing
- Learn to closely read and evaluate philosophical and scientific texts
- Learn to research and write philosophical arguments and essays

Assessment tasks

- Participation
- Discussion Guides
- Quizzes
- Essay Plan
- Research Essay

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Learn the basic ideas, problem spaces, and approaches in philosophy of science
- Learn to express your own ideas and interpretations of philosophical arguments and scientific findings both verbally and in writing
- Learn to closely read and evaluate philosophical and scientific texts
- Learn to research and write philosophical arguments and essays

Assessment tasks

- Participation
- Discussion Guides
- Essay Plan
- Research Essay

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Learn the basic ideas, problem spaces, and approaches in philosophy of science
- Learn to express your own ideas and interpretations of philosophical arguments and scientific findings both verbally and in writing
- Learn to closely read and evaluate philosophical and scientific texts
- Learn to research and write philosophical arguments and essays

Assessment tasks

- Participation
- Discussion Guides
- Essay Plan
- Research Essay

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess,

write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- Learn the basic ideas, problem spaces, and approaches in philosophy of science
- Learn to express your own ideas and interpretations of philosophical arguments and scientific findings both verbally and in writing
- Learn to closely read and evaluate philosophical and scientific texts
- Learn to research and write philosophical arguments and essays

Assessment tasks

- Participation
- Discussion Guides
- Essay Plan
- Research Essay

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcomes

- Learn the basic ideas, problem spaces, and approaches in philosophy of science
- Learn to express your own ideas and interpretations of philosophical arguments and scientific findings both verbally and in writing
- Learn to closely read and evaluate philosophical and scientific texts
- Learn to research and write philosophical arguments and essays

Assessment tasks

- Participation
- Discussion Guides
- Essay Plan
- Research Essay

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcomes

- Learn the basic ideas, problem spaces, and approaches in philosophy of science
- Learn to express your own ideas and interpretations of philosophical arguments and scientific findings both verbally and in writing
- Learn to closely read and evaluate philosophical and scientific texts
- Learn to research and write philosophical arguments and essays

Assessment tasks

- Participation
- Discussion Guides
- Essay Plan
- Research Essay