New College of the Humanities

Critical Reasoning Course Guide

Course	Critical Reasoning	Faculty	Philosophy
Course code	NCH_C1	Course Leaders	Prof. Anthony Grayling Dr Ioannis Votsis
FHEQ level	Level 4	Author	Dr Ioannis Votsis
Core/optional	Core		
Pre-requisites	None	Date modified	August 2019

WELCOME

A warm and friendly welcome to Critical Reasoning. This course introduces you to the fundamental methods and principles of good reasoning. You will learn how to identify patterns of argument, evaluate evidence, and articulate your ideas clearly and persuasively. This will not only inform the close reading, essay writing and debating you do as part of your degree, but will also allow you to express yourself intelligently and authoritatively after you graduate, no matter what you decide to do next. If you have any questions please don't hesitate to raise them to the course leaders either by e-mail or in person.

DESCRIPTION

Critical reasoning is actually divided into two courses. The first course, Formal and Informal Reasoning, is jointly taught in the Michaelmas term by Prof. Anthony Grayling and Dr. Ioannis Votsis. It introduces students to essential concepts in formal and informal logic and demonstrates how these can be applied to natural language. Among other things, the course teaches students how to identify patterns of argument, how to assess an argument for virtues such as validity, soundness, and relevance, as well as how to structure and present arguments clearly and effectively. This does not only inform all the close reading, essay writing and debating a student undertakes as part of their degree, but also augments the abilities to express themselves intelligently and authoritatively, something that is useful beyond their undergraduate studies and no matter what career or postgraduate degree they wish to pursue. The second course, Scientific Reasoning, is taught in Hilary term by Dr Ioannis Votsis. This course introduces students to key methodological ideas found in the natural and social sciences and aims to cultivate a general understanding and appreciation of scientific reasoning. Among

other things, the course teaches students how to apply the concepts of logic in the domain of science, how to evaluate and weigh scientific evidence, how to construct experiments and how to discriminate between ad hoc and non-ad hoc hypotheses. As with the first course, this course does not only inform all the reading, writing and debating a student undertakes as part of their degree, but also augments their abilities in ways that are useful beyond the academic world.

AIMS

The course aims to:

- Promote an active understanding of logical and scientific reasoning.
- Develop critical reasoning skills that can be applied across a variety of contexts.
- Enhance research skills, including the ability to construct, argue for and even test hypotheses.
- Cultivate an appreciation of rational discourse and its place in culture.

LEARNING OUTCOMES

The intended outcome of the course is awareness of the concepts and skills fundamental to clear and perceptive thinking. These are to be applied (a) in reading materials and (b) in discussion and debate, where it is essential to get a clear grasp of an opponent's views at their best so that one can evaluate them properly.

Critical Reasoning Schema:

In evaluating an argument always ask:

1. What is the conclusion being argued for, how is it supported (e.g. what evidence, data, observations), is the argument cogent, plausible, or coercive (difficult or impossible to deny or disagree with)? Does its conclusion follow from its premises? Are the premises consistent with different conclusions?

2. How does the argument under consideration relate to, impinge on, support or infirm other and wider considerations? Is it inconsistent with other principles or views already accepted? Might it be a corrective to such views?

3. Does one agree with the conclusion of the argument being examined? If so, why? If not, why not? What other considerations and evidence should be taken into account – and how forceful and persuasive are they in their own right?

4. State and express everything in the discussion with clarity and precision. Quote when apposite, always fully acknowledge material gathered from sources.

On successful completion of the course, students should be able to:

KNOWLEDGE AND UNDERSTANDING

CK1a Show knowledge and understanding of key logical concepts and types of fallacies as well as central methodological issues in natural and social science.

CK2a Show familiarity with texts and theories of logical and scientific reasoning.

SUBJECT-SPECIFIC SKILLS

CS1a Comprehend and engage clearly with arguments across a variety of domains.

CS2a Employ basic logical and/or scientific methods to support or challenge views.

TRANSFERABLE SKILLS

CT1a Work to deadlines.

CT2a Critically assess assumptions, competing views and arguments.

CT3a Identify and assess resources in key digital and physical databases.

LEARNING AND TEACHING PLAN

The course is taught through weekly 90-minute participatory lecture-seminars across the two main teaching terms. These are designed to enable independent reading and research and to encourage lively, structured, discussion.

In some of the lectures, a polling app is employed to interactively engage with the students. The app, called 'Poll Everywhere', is available for both Android and iOS devices and is free to use.

Further course information and supplementary materials are available through the Moodle 'Critical Reasoning' page.

Students are required to attend and participate in all the timetabled sessions for this course. A student whose attendance at Diploma teaching events and Professorial lectures has fallen below 70% at the time that they complete their degree, irrespective of in which year they have attended the Diploma teaching events, will not be awarded the Diploma. Students are also expected to engage in independent study, informed and structured by the regular lectures and any related reading assignments.

FEEDBACK

Students will receive oral feedback during discussion in the lecture.

TEACHING SCHEDULE

Michaelmas Term
Course I: FORMAL AND INFORMAL REASONING

There are 10 sessions in the Michaelmas term. Each session has two components: a general theme and a cumulative introduction to the basics of formal logic.

Week	Course I: Formal and Informal Reasoning	Lecturer
1	***Theme*: Conceptual schemes and frames of thought (how our thinking is essentially conditioned by assumptions, traditions and conventions of various kinds). *Logic:* Basic concepts (argument, form, validity, soundness, inference, implication and entailment, contradiction and contrariety).**	Prof. Anthony Grayling
2	***Theme:* A typology of inferences Part I (deduction and induction). Logic: Monotonic and non-monotonic systems (broad and narrow construals of logic, risk and novelty, types of induction, e.g. enumerative induction, induction-to-the-next-instance, induction-to-unobservables, induction-to-causes, direct inference, retrodictions and multiple instantiations).**	Dr. Ioannis Votsis
3	***Theme:* Concepts important in all thinking: empiricism, necessity, the a priori, analyticity, truth. Logic: Deduction and induction.**	Prof. Anthony Grayling
4	***Theme:* A typology of inferences Part II (abduction and why we ought to care about logic). Logic: (explanation and inference, comparisons to deduction and induction).**	Dr. Ioannis Votsis
5	***Theme:* Informal logic, fallacies in the media and beyond. *Logic*: Valid inference forms.**	Dr. Ioannis Votsis
6	***Theme*: Informal logic, fallacies (continued). *Logic*: Valid inference forms.**	Prof. Anthony Grayling
7	READING WEEK	
8	***Theme:* Techniques in reasoning (how to formulate more modest views, how to modify one's views in light of contradictory evidence, how to argue from analogy). *Logic*: Valid inference forms continued.**	Dr. Ioannis Votsis
9	***Theme*: Rhetoric and persuasion, bias, emotive language. *Logic*: Valid inference forms continued.**	Prof. Anthony Grayling
10	***Theme*: Rhetoric and persuasion, continued. *Logic*: Quantification and other logics.**	Prof. Anthony Grayling
11	**REVISION**	Dr. Ioannis Votsis
12	**EXAM**	

Hilary Term
Course II: SCIENTIFIC REASONING

There are 10 sessions in the Hilary term.

Week	Course II: Scientific Reasoning	Lecturer
1	***Theme*: Observation and Theory. *Key ideas*: Theories as general claims, theories vs. hypotheses,**	Dr. Ioannis Votsis

	the mathematisation of science, direct vs. indirect observation, the significance of observations in constructing and altering theories as well as choosing between rival theories, the theory-ladenness of observations, fighting bias in observations. *Reading*: Kukla (2008).	
2	***Theme*: Induction and Falsification. *Key ideas*: Inductivism and confirmation, the principle of the uniformity of nature, the problem of induction, conjectures and refutations, the demarcation problem, falsifiability as a demarcation criterion. *Reading*: Nola & Sankey (2007, Ch. 5:§5.1-5.3).**	Dr. Ioannis Votsis
3	***Theme*: Scientific Explanation and Confirmation. *Key ideas*: The covering law model, the deductive-nomological account, explaining phenomena, laws and theories, problems against sufficiency and necessity, hypothetico-deductivism and paradoxes of confirmation. *Reading*: Hempel (1962).**	Dr. Ioannis Votsis
4	***Theme:* Thought Experiments. *Key ideas*: The value of thought experiments, actual vs. thought experiments, destructive vs. constructive thought experiments, the a-priori vs. the a-posteriori view, famous thought experiments. Reading: Brown and Fehige (2014).**	Dr. Ioannis Votsis
5	***Theme*: The Social Science and Humanities Context. *Key ideas*: The lessons learned in weeks 1-4 in the context of the humanities and the social sciences. *Reading*: None.**	Dr. Ioannis Votsis
6	***Theme*: Methods in Psychology. *Key ideas*: Experimental vs. observational studies, dependent vs. independent variables, lab vs. field studies, self-reports vs. third-person reports, random and systematic error, observer vs. subject expectancy effects, the value of negative results. *Reading*: Gray (2014, Ch. 2) and Fanelli (2012).**	Dr. Ioannis Votsis
7	READING WEEK	
8	***Theme*: Evidential Standards in Medicine. *Key ideas*: Evidence-based medicine, evidence hierarchies, randomised-controlled trials, confounding factors, internal vs. external validity. *Reading*: Howick (2011, Chs. 1-2).**	Dr. Ioannis Votsis
9	***Theme*: Data Science (part I). *Key ideas*: artificial intelligence, automating statistics, machine learning, deep neural networks, big data, supervised vs. unsupervised learning, data visualisation. *Reading*: None.**	Dr. Ioannis Votsis
10	***Theme*: Data Science (part II). *Key ideas*: programming computers, programming with data, optimisation problems, random walks, clustering and classification. *Reading*: None.**	Dr. Ioannis Votsis

11	**REVISION**	Dr. Ioannis Votsis
12	**EXAM**	

Please refer to your CELCAT timetable for exact dates and times of lectures and any seminars.

ASSESSMENT

Please refer to the 'formative and summative assessment planner' for **EXAM or ASSIGNMENT DATES**.

FORMATIVE

Course I: Formal and Informal Reasoning
The material will be delivered through exposition and discussion in the lecture-seminars. There is no set text for the course.

Course II: Scientific Reasoning
The material will be delivered through exposition and discussion in the lecture-seminars as well as the readings listed here. Students must do the reading before they come to the lecture-seminar.

SUMMATIVE

The course is summatively assessed through two end-of-term exams consisting of several multiple-choice questions.

READING

The required reading can be found below and may include content made available through the Critical Reasoning portal of the Digital Diploma platform. You can access the platform here:

https://www.nch-diploma.com/

Additional reading may be announced from time to time in order to respond to the needs of course participants. It is important that students check for updates on Moodle every week.

Course I: Formal and Informal Reasoning
There is no set text for the course: the material will be delivered through exposition and discussion.

Recommended (but not required) reading:
Bergmann, M. et al. (2014) The Logic Book, New York, NY: McGraw-Hill.
Dowden, B. (2015) 'Fallacies', *Internet Encyclopedia of Philosophy*, http://www.iep.utm.edu/ fallacy/

Groarke, L. (2011) 'informal Logic', The Stanford Encyclopedia of Philosophy(Spring 2013 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/spr2013/entries/logic-informal/>.
Walton, D. N. (1989) *Informal Logic*: *A Handbook for Critical Argumentation*, Cambridge: Cambridge University Press.

Course II: Scientific Reasoning

Required:

Brown, J.R. and Y. Fehige (2014) 'Thought Experiments', *The Stanford Encyclopedia of Philosophy* (Fall 2014 Edition), Edward N. Zalta (ed.), URL =<http://plato.stanford.edu/ archives/fall2014/entries/thought-experiment/>.
Fanelli, D. (2012) 'Negative Results are Disappearing from Most Disciplines and Countries', *Scientometrics*, vol. 90: 891–904.
Gray, P. (2014) *Psychology*, 7th ed., New York: Worth Publishers, Chapter 2.
Hempel, C. G. (1962) 'Two Basic Types of Scientific Explanation' in Curd, Cover and Pincock (eds.), *Philosophy of Science: The Central Issues*, second edition, 2012, New York: W.W. Norton & Company, pp. 685-694.
Howick, J. (2011) *The Philosophy of Evidence-Based Medicine*, Chichester: Wiley-Blackwell, Chs 1-2.
Kukla, A. (2008) 'Observation', in M. Curd and S. Psillos (eds.), *The Routledge Companion to Philosophy of Science*, New York, NY: Routledge.
Nola, R. and H. Sankey (2007) *Theories of Scientific Method*, Stocksfield: Acumen, Chs 2 and 5.

Recommended:

Franklin, A. (1986) *The Neglect of Experiment*, Cambridge: Cambridge University Press.
Howson, C. and P. Urbach (1993) *Scientific Reasoning*: *The Bayesian Approach*, second edition, La Salle, Illinois: Open Court.
Lakatos, I. (1970) The Methodology of Scientific Research Programmes', in I. Lakatos and A. Musgrave, A. (Eds.), *Criticism and the Growth of Knowledge*, Cambridge: Cambridge University Press.
Popper, K.R. ([1959] 2002) *The Logic of Scientific Discovery*, New York: Routledge.
Schurz, G. (2014) *Philosophy of Science: A Unified Approach*, New York: Routledge.
Worrall, J. (2007) 'Evidence in Medicine and Evidence-Based Medicine', *Philosophy Compass* 2/6: 981–1022 (Sections 1-3).

OTHER READING SOURCES

For a detailed reading list please consult the course's syllabus which can be found on the corresponding Moodle webpage.

APPENDIX 1 GRADE MARKING SCALE

Generic Grading Criteria Marking Band*	Grade Mark	Numeric Equivalent
Exceptional in most / all aspects, substantially exceeding expectations for this level	A1	100
	A2	92
Excellent quality, exceeding expectations for this level in many aspects	A3	83
	A4	74
Meets all the intended learning outcomes and exceeds the threshold expectations for this level in several of them	B1	68
	B2	65
	B3	62
Meets all the intended learning outcomes and exceeds the threshold expectations for this level in some of them	C1	58
	C2	55
	C3	52
Meets all the intended learning outcomes at, but rarely exceeding the threshold expectations for this level	D1	48
	D2	45
	D3	40
Fails to meet all of the intended learning outcomes and is marginally inadequate for this level	F1	35
Fails to meet all of the intended learning outcomes and is inadequate for this level	F2	20
	F3	15
Submitted	S	1
Non-submission	N	0