PH3C5-15 Philosophy of Computing and Artificial Intelligence

24/25

Department
>   Philosophy

Level
>   Undergraduate Level 3

Module leader
>   Walter Dean

Credit value
>   15

Module duration
>   10 weeks

Assessment
>   100% coursework

Study location
>   University of Warwick main campus, Coventry

Description

Introductory description

The purpose of this module is to provide a non-technical introduction to computer science and philosophical issues about computation and artificial intelligence. Among the questions we will address are the following: What is computation? What is an algorithm? What is computational complexity? Are all problems solvable by algorithms? What does it mean for a physical system to compute? What is the role of computation in mathematics and the sciences? What is the role of computation in society? What is meant by "intelligence" and "artificial intelligence"? What prospects and challenges are posed by specific developments in artificial intelligence (e.g. machine learning, large language models)?

Module aims

The module has three goals:

1. To equip students with a basic knowledge of computer science both as an academic discipline both in its own right and in regard to other disciplines -- e.g. mathematics, the physical and social sciences.
2. To illustrate how computer science interacts with traditional philosophical debates -- e.g.

What sort of physical processes count as computation? Can a computer be conscious or a moral agent?

3. To help students understand on this basis the increasing role of computation in daily life outside of academia -- e.g. encryption, privacy, surveillance, the role of algorithms in law, public policy, electoral systems, evolving practical ramifications of artificial intelligence.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

- Week 1: Introduction: Computer science and artificial intelligence as disciplines
- Week 2: Algorithms, programs, correctness
- Week 3: Complexity, intractability, and non-computability
- Week 4: Machines, computation, and physics
- Week 5: Computation and mathematics
- Week 7: Computation and society
- Week 8: Artificial intelligence I: History and the logical paradigm
- Week 9: Artificial intelligence II: Machine learning and the statistical paradigm
- Week 10: Artificial intelligence III: safety, ethics, existential risks, the future

Learning outcomes

By the end of the module, students should be able to:

- Demonstrate knowledge of central topics in the philosophy of computation and artificial intelligence. (Subject knowledge and understanding.)
- Understand the significance that questions in philosophy of computation and artificial intelligence have to wider issues in philosophy, mathematics, the sciences. (Cognitive skills)
- Articulate their own view of the relative merits of different theories and engage critically with the arguments put forward in support of them (key skills).
- Show an understanding of methodological issues in the philosophy of mathematics, and of questions of demarcation between philosophy and mathematics (subject-specific skills)

Indicative reading list

Readings will be drawn from a variety of sources including the following:

- Harel, D. Algorithmics: the spirit of computing. Addison-Wesley, Reading, Massachusetts, 2006.
- Moore, C., and Mertens, S. The Nature of Computation. Oxford University Press, 2011.
- Shagrir, O. The nature of physical computation. Oxford University Press, 2022.
- Russell, S. J., and Norvig, P. Artificial intelligence: a modern approach. Pearson, 2021.
- Hofstadter, D. R., and Dennett, D. C. The mind's I: Fantasies and reflections on self and soul. Bantam Books, 1981.
- Bostrom, N. Superintelligence: Paths, dangers, strategies. Oxford University Press, 2014.

- The Stanford Encyclopedia of Philosophy

Subject specific skills

Show an understanding of methodological issues in the philosophy of computation and artificial intelligence, and of questions of demarcation between philosophy and computer science.

Transferable skills

Understanding of how development in computer science and artificial intelligence bear on traditional topics in philosophy (e.g. the nature of the mind and consciousness), other academic disciplines (e.g. mathematics, the physical and social sciences) and contemporary debates outside of academia (e.g. in regard to privacy, the use of algorithms and machine learning in public policy, the workplace, surveillance, ethics, safety, and existential risk in regard to artificial intelligence).

Study

Study time

Type	Required
Lectures	9 sessions of 2 hours (12%)
Seminars	8 sessions of 1 hour (5%)
Private study	124 hours (83%)
Total	150 hours

Private study description

No private study requirements defined for this module.

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group A

	Weighting	Study time	Eligible for self-certification
Project	20%		No

The project may take the form of either a review of recent literature, a self-contained presentation of technical results or developments, or a computer-based implementation with accompanying textual description.

	Weighting	Study time	Eligible for self-certification
Essay	80%		Yes (extension)

Feedback on assessment

Written feedback on projects and essays.

Availability

Courses

This module is Optional for:

- UPHA-L1CA Undergraduate Economics, Psychology and Philosophy
  - Year 2 of L1CA Economics, Psychology and Philosophy
  - Year 2 of L1CC Economics, Psychology and Philosophy (Behavioural Economics Pathway)
  - Year 2 of L1CD Economics, Psychology and Philosophy (Economics with Philosophy Pathway)
  - Year 2 of L1CE Economics, Psychology and Philosophy (Philosophy and Psychology Pathway)
  - Year 3 of L1CA Economics, Psychology and Philosophy
  - Year 3 of L1CC Economics, Psychology and Philosophy (Behavioural Economics Pathway)
  - Year 3 of L1CD Economics, Psychology and Philosophy (Economics with Philosophy Pathway)
  - Year 3 of L1CE Economics, Psychology and Philosophy (Philosophy and Psychology Pathway)
- UPHA-L1CB Undergraduate Economics, Psychology and Philosophy (with Intercalated Year)
  - Year 4 of L1CG Economics, Psychology and Philosophy (Behavioural Economics Pathway) (with Intercalated Year)
  - Year 4 of L1CH Economics, Psychology and Philosophy (Economics with Philosophy Pathway) (with Intercalated Year)
  - Year 4 of L1CJ Economics, Psychology and Philosophy (Philosophy and Psychology Pathway) (with Intercalated Year)
  - Year 4 of L1CB Economics, Psychology and Philosophy (with Intercalated Year)
- UPHA-V700 Undergraduate Philosophy
  - Year 2 of V700 Philosophy
  - Year 3 of V700 Philosophy

- Year 4 of UPHA-V701 Undergraduate Philosophy (wiith Intercalated year)
- Year 4 of UPHA-V702 Undergraduate Philosophy (with Work Placement)
- Year 4 of UPHA-VL80 Undergraduate Philosophy with Psychology (with Work Placement)
- Year 2 of UPHA-V7ML Undergraduate Philosophy, Politics and Economics
- UPHA-V7MW Undergraduate Politics, Philosophy and Law
  - Year 2 of V7MW Politics, Philosophy and Law
  - Year 3 of V7MW Politics, Philosophy and Law
- Year 4 of UPHA-V7MX Undergraduate Politics, Philosophy and Law (with Intercalated Year)

This module is Core option list A for:

- Year 3 of UMAA-GV17 Undergraduate Mathematics and Philosophy
- Year 3 of UMAA-GV19 Undergraduate Mathematics and Philosophy with Specialism in Logic and Foundations

This module is Core option list B for:

- Year 2 of UMAA-GV17 Undergraduate Mathematics and Philosophy
- Year 2 of UMAA-GV19 Undergraduate Mathematics and Philosophy with Specialism in Logic and Foundations

This module is Core option list C for:

- Year 4 of UMAA-GV19 Undergraduate Mathematics and Philosophy with Specialism in Logic and Foundations

This module is Core option list F for:

- Year 4 of UMAA-GV18 Undergraduate Mathematics and Philosophy with Intercalated Year

This module is Option list A for:

- UPHA-VL78 BA in Philosophy with Psychology
  - Year 2 of VL78 Philosophy with Psychology
  - Year 3 of VL78 Philosophy with Psychology

This module is Option list B for:

- UPHA-VQ72 Undergraduate Philosophy and Literature
  - Year 2 of VQ72 Philosophy and Literature
  - Year 3 of VQ72 Philosophy and Literature
- Year 2 of UPHA-VQ52 Undergraduate Philosophy, Literature and Classics
- Year 2 of UPHA-V7ML Undergraduate Philosophy, Politics and Economics

This module is Option list C for:

- UPHA-V7ML Undergraduate Philosophy, Politics and Economics
  - Year 3 of V7MP Philosophy, Politics and Economics (Bipartite)
  - Year 3 of V7ML Philosophy, Politics and Economics (Tripartite)
- UPHA-V7MM Undergraduate Philosophy, Politics and Economics (with Intercalated year)

- Year 4 of V7MS Philosophy, Politics and Economics (Bipartite with Economics Major) (with Intercalated Year)
  - Year 4 of V7MQ Philosophy, Politics and Economics (Bipartite) with Intercalated Year
  - Year 4 of V7MM Philosophy, Politics and Economics (Tripartite) (with Intercalated year)

This module is Option list D for:

- UHIA-V1V5 Undergraduate History and Philosophy
  - Year 2 of V1V5 History and Philosophy
  - Year 3 of V1V5 History and Philosophy
- Year 4 of UHIA-V1V6 Undergraduate History and Philosophy (with Year Abroad)
- Year 2 of UHIA-V1V7 Undergraduate History and Philosophy (with a term in Venice)
- UPHA-V7ML Undergraduate Philosophy, Politics and Economics
  - Year 2 of V7MR Philosophy, Politics and Economics (Bipartite with Economics Major)
  - Year 3 of V7MR Philosophy, Politics and Economics (Bipartite with Economics Major)