

Artificial Intelligence Techniques A

1st year undergraduate degrees with AI

<http://www.cs.bham.ac.uk/~jxb/aita.html>

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Module Administration and Organisation

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Outline

This module provides a general introduction to artificial intelligence and its techniques. An overview on the main sub-fields of artificial intelligence will be given. The main focus of the module will be on the common underlying ideas, such as knowledge representation, search, rule based systems, and learning.

Aims

The aims of this module are to:

1. Provide a general introduction to artificial intelligence and its techniques
2. Give an overview of the key ideas such as knowledge representation, search, rule based systems, and learning that underlie the main sub-fields of artificial intelligence
3. Demonstrate the need for different approaches for different problems

Learning Outcomes

On completion of this module, the student should be able to:

1. Structure the field of artificial intelligence into its main subfields, and outline the important features of AI systems
2. Explain some of the most important knowledge representation formalisms and understand why there are different ones, discuss their advantages and drawbacks, and represent knowledge in unseen easy examples in any of them
3. Apply simple uniformed search algorithms
4. Understand the processes involved in Expert Systems and in building such systems
5. Discuss the importance of learning for intelligent systems
6. Provide examples of different types of AI systems, and explain their differences, common techniques, and limitations

Assessment

There are two components to the assessment of this module:

80% by Written Examination

This will be in the form of half of a three hour examination paper (the other half will come from the Second Semester *AI Techniques B* module).

20% by Continuous Assessment

This will be in the form of an essay which must be handed in at the beginning of Spring Term. This will be described in detail in a few weeks time.

There is a single combined *AI Techniques* mark – you either pass both or fail both.

N.B. Should you fail, the resit will be by examination only.

Syllabus

1. [Introduction to the AI Programme](#)
2. The Roots, Goals, and Subfields of AI
3. [Evolutionary Computation](#)
4. Biological Intelligence and Neural Networks
5. [Brain Modelling](#)
6. Building Intelligent Agents
7. [Behaviourism and Cognitivism](#)
8. [Cognitivism and Robotics](#)
9. Knowledge Representation
10. Semantic Networks
11. Frame Based Systems
12. Production Systems
13. [Vision](#)
14. Uninformed Search
15. [Natural Language Processing](#)
16. Expert Systems
17. Treatment of Uncertainty
18. Machine Learning
19. [Computer Chess](#)
20. Limitations and Misconceptions of AI
21. [Philosophical Issues](#)

Lecture Plan

Week	Session 1 Mondays 10:00-11:00	Session 2 Tuesdays 9:00-10:00	Session 3 Tuesdays 14:00-15:00
1	–	Introduction to the AI Programme (John Bullinaria)	–
2	Course overview - session types, syllabus, assessment, books, etc.	The Roots, Goals and Subfields of AI	Evolutionary Computation (Thorsten Schnier)
3	Biological Intelligence and Neural Networks	Exercise Session 1	Brain Modelling (John Bullinaria)
4	Building Intelligent Agents	Exercise Session 2	Behaviourism and Cognitivism (Jeremy Wyatt)
5	Knowledge Representation	Exercise Session 3	Cognitivism and Robotics (Jeremy Wyatt)
6	Semantic Networks	Exercise Session 4	Frame Based Systems
7	Production Systems	Exercise Session 5 (Including Discussion of Continuous Assessment Assignment)	Vision (Ela Claridge)
8	Uninformed Search	Exercise Session 6	Natural Language Processing (Mark Lee)
9	Expert Systems	Exercise Session 7	Treatment of Uncertainty
10	Machine Learning	Exercise Session 8	Computer Chess (Colin Frayn)
11	Limitations and Misconceptions of AI	Exercise Session 9	Philosophical Issues (Aaron Sloman)

Colour coding: Black = Regular Lecture, Blue = Guest Lecture, Green = Interactive Session.

Recommended Books

Title	Author(s)	Publisher, Year	Comments
Artificial Intelligence: A Modern Approach	Stuart Russell & Peter Norvig	Prentice Hall, 2003	This is the book that ties in most closely with the module
Artificial Intelligence (2nd ed.)	Elaine Rich & Kevin Knight	McGraw Hill, 1991	A good second book
Artificial Intelligence: A New Synthesis	Nils Nilsson	Morgan Kaufmann, 1998	A good modern book
Artificial Intelligence (3rd ed.)	Patrick Winston	Addison Wesley, 1992	A classic
Artificial Intelligence	Michael Negnevitsky	Addison Wesley, 2002	A good modern book
Artificial Intelligence	Rob Callan	Palgrave Macmillan, 2003	A good modern book
Artificial Intelligence (4th ed.)	George Luger	Addison Wesley, 2002	Some students may prefer this one
Introduction to Expert Systems (3rd ed.)	Peter Jackson	Addison Wesley, 1999	The best book on Expert Systems

If you can only afford to buy one book for this module, I recommend Russell & Norvig.