

## MODULE SPECIFICATION

<b>Name of Module</b>		Artificial Intelligence					
<b>Parent School/Dept</b>		Computer Science					
<b>Programme(s) where module is offered</b>		BSc Computer Science with Electrical Engineering; BSc Computer Science with Economics; BSc Computer Science with Business; BSc Computer Science with International Relations; BSc Computer Science with Political Science;					
<b>Status</b> (core, option, free choice)		Core		<b>Pre-Requisite Modules or Qualifications</b>		MATH260, CS280, CS250	
<b>FHEQ Level</b>	6	<b>Unit Value</b>	6 ECTS	<b>Module Code</b>	CS460	<b>Module coordinator</b>	Ajla Kulagic
<b>Term taught</b>		Spring		<b>Applicable From</b>		2016	

### Educational Aims of the Module

This main goal of the module is to equip students with the tools to tackle new Artificial Intelligence (AI) problems they might encounter in life. This module will be a survey of the field of Artificial Intelligence and students are not expected to have any prior knowledge on the topic, but they are expected to have good programming skills. We will not attempt to cover the entire range of AI sub-areas in detail, but will survey several key themes. Throughout the semester, students will work on a project where they will need to develop an AI application and therefore excel their programming skills. Throughout the project and module itself, they will learn to identify and apply AI algorithms on a concrete problems.

### Module Outline/Syllabus

- Introduction to AI
- Uninformed search
- A\* search and Heuristics
- Constraint Satisfaction Problems
- Game Trees
- Markov Decision Processes
- Reinforcement Learning
- Logic
- Probability
- Markov Models
- Bayes' Nets
- Decision Diagrams
- Advanced Applications: NLP, Games, Cars, Robotics, Computer Vision
- Advanced topics

### Student Engagement Hours

Type	Number per Term	Duration	Total Time
Lectures	30	2 hours	60 hours
Laboratory sessions	15	2 hours	30 hours
Total Guided/Independent Learning Hours			<b>60</b>
Total Contact Hours			<b>90</b>
<b>Total Engagement Hours</b>			<b>150</b>

### Assessment Method Summary

Type	Number Required	Duration / Length	Weighting	Timing/Submission Deadline
Assignment	3	1,000 words	15%	Throughout semester
Mid-term Exam	1	90 minutes	20%	Week 8
Project	1	2,500 words	15%	Week 14
Final Exam	1	180 minutes	50%	End of semester

## Module Outcomes

<p><b><u>Intended Learning Outcomes:</u></b></p> <ol style="list-style-type: none"> <li>1. Demonstrate a systematic understanding of the core concepts and principles of AI</li> <li>2. Critically Analyze the structure of a given problem in a way that they can choose an appropriate paradigm in which to frame that problem.</li> <li>3. Critically evaluate the significance of efficient algorithms</li> <li>4. Independent learning and algorithm implementation</li> </ol>	<p>→</p>	<p><b><u>Teaching and Learning Strategy:</u></b></p> <ol style="list-style-type: none"> <li>1. The planned lectures provide an overview of the technical material, and guide the acquisition of material available in the text. (ILO: 1-4)</li> <li>2. Laboratory sessions, discussions and laboratory time are used to work through formal exercises and problems. (ILO:1-4)</li> <li>3. Independent study is based on the recommended text (ILO: 1-4)</li> <li>4. Project enables students to develop communication skills and apply what they have learnt in the module to a practical problem (ILO: 2 - 4)</li> </ol>
<p><b><u>Practical Skills</u></b></p> <ol style="list-style-type: none"> <li>1. Understand and be able to recognize and apply AI algorithms in a real-world application</li> <li>2. Design and build intelligent artifacts.</li> <li>3. Develop an AI application (e.g., game)</li> <li>4. Advanced coding of optimization algorithms</li> </ol>	<p>→</p>	<p><b><u>Teaching and Learning Strategy:</u></b></p> <ol style="list-style-type: none"> <li>1. Laboratory sessions (PS:2-4)</li> <li>2. Use of midterm to test student subject knowledge (PS:1-2)</li> <li>3. Project (PS:1-4)</li> <li>4. Assignments (PS:1-4)</li> </ol>
<p><b><u>Transferable Skills</u></b></p> <ol style="list-style-type: none"> <li>1. Problem-solving skills</li> <li>2. Oral and written presentation skills</li> <li>3. Team work</li> <li>4. Critical thinking</li> </ol>	<p>→</p>	<p><b><u>Teaching and Learning Strategy:</u></b></p> <ol style="list-style-type: none"> <li>1. Laboratory sessions (TS:1-4)</li> <li>2. Assignment (TS:1-4)</li> <li>3. Lectures (TS:1-4)</li> </ol>
	<p>→</p>	<p><b><u>Assessment Strategy</u></b></p> <ol style="list-style-type: none"> <li>1. Final Exam (ILO:1-3)</li> <li>2. Mid-term exam (ILO:1, 2)</li> <li>3. Assignment (ILO: 1-4)</li> <li>4. Project (ILO: 1-4)</li> </ol>
	<p>→</p>	<p><b><u>Assessment Strategy</u></b></p> <ol style="list-style-type: none"> <li>1. Project (PS:1-4)</li> <li>2. Assignment (PS:1-4)</li> </ol>
	<p>→</p>	<p><b><u>Assessment Strategy</u></b></p> <ol style="list-style-type: none"> <li>1. Mid-term exam (TS:1, 4)</li> <li>2. Final exam (TS:1, 4)</li> <li>3. Assignment (TS:1-4)</li> <li>4. Project (TS:1-4)</li> </ol>

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### Key Texts and/or other learning materials

**Set Text**

- Russel, S., Norvig P., (2014), Artificial Intelligence: A Modern Approach, 3rd Edition. Pearson

**Supplementary Materials**

- Warwick, K. (2011), Artificial Intelligence: The Basics. Routledge

**Please note:** This specification provides a concise summary of the main features of the module and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each module and programme can be found in the departmental or programme handbook. The accuracy of the information contained in this document is reviewed annually by the University of Buckingham and may be checked by the Quality Assurance Agency.

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