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EDUCATION

Artificial Intelligence

ACADEMIC INSIGHTS 16-18 YEAR OLDS

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About Immerse

Immerse Education is an award-winning academic summer school provider offering programmes for 16-18 year olds in centres of academic prestige.

The aim of these introductory programmes is to provide participants with academically challenging content in a classroom environment based on the university style of learning. Through 40 hours of academic sessions, the programmes also offer young students unique and valuable insights into what it would be like to study their chosen subject at an advanced level.

This Syllabus Overview provides a summary of the topics and subject areas that participants can encounter during their studies with Immerse. It has been carefully created by our expert tutors who are current members of world-leading universities, and who have experience in teaching undergraduate students.

Academic Sessions

The academic sessions at Immerse are arranged into modules to enable participants to explore a broad range of topics over the course of two weeks. The modules included in this syllabus overview are indicative but not prescriptive.

Tutors are encouraged to include their own specialisms and also focus on any particular areas of interest expressed by participants within the class. They may choose to provide further detail on a specific topic, or they may include new material and information that builds on the knowledge already developed during the programme.

Personal Project

Each programme includes an element of individual work, generally termed the 'Personal Project'. This can take many forms but is commonly an essay or presentation delivered on the final day of the programme. Participants will receive feedback on this work which may also be mentioned in the participant evaluation which is provided in writing by the tutor once the programmes have ended.

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Preparatory work

Some tutors may ask participants to complete some preparatory work, such as reading or a series of exercises in advance of the programme. Participants are strongly encouraged to complete this work since it will be included in the opening sessions of the programme. Any preparatory tasks will be provided in advance of the programme directly to the participant.

Academic Difficulty

As all of our programmes are designed to provide a unique introduction to advanced material, the syllabus will be academically challenging at times.

This is something to be excited about and all of our tutors will encourage and support participants throughout the programme. Immerse Education aims to develop every participant regardless of ability, and our tutors will adapt their teaching to individual needs.

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Aim of the Artificial Intelligence Programme

The Immerse Education Artificial Intelligence programme is designed to build upon the foundation of critical analysis skills that participants have already gained in a traditional classroom environment and highlight how this can be used to inspire further study at university. Participants are encouraged to explore new material in-depth and to form independent and considered opinions and ideas based on sound research and analysis of others' ideas. By the end of the programme, participants will have a good understanding, not only of university- level content, but also the variety of degree programmes available in subjects related to AI. Beyond this, participants will also explore the career opportunities available to graduates in this field.

Introduction to AI

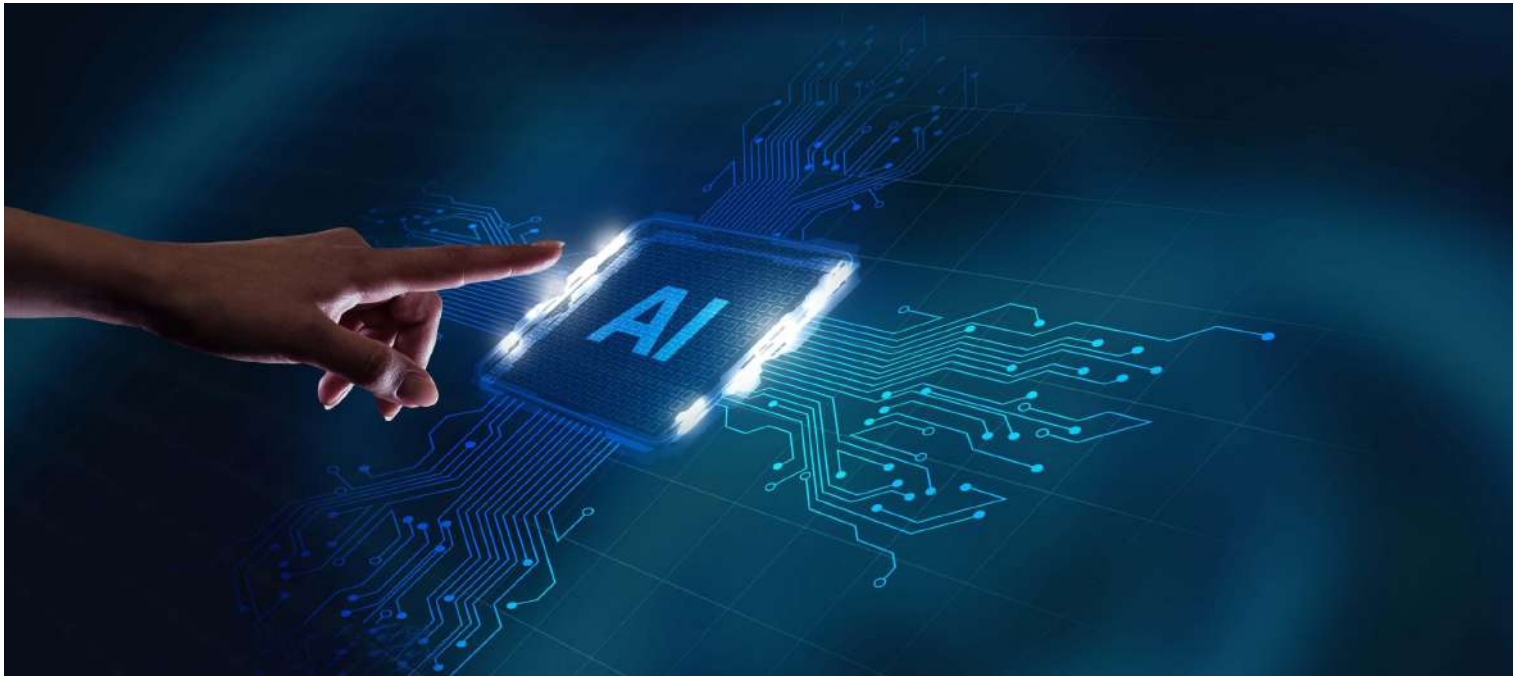
This interdisciplinary subject has many definitions that have surfaced over the past couple of decades and more recently can be defined as the making of intelligent machines, especially intelligent computer programmes. In this module you will be introduced to the history of Artificial Intelligence and learn more about the types of AI as well as its subfields.

Application of AI

Learn the implications and applications of AI in different industries, from medicine to the social sciences and humanities. Is the current progression of AI innovation experiencing an overenthusiasm that is doomed to fall into disillusionment or will it soon bring a new era of relevance in our day-to-day lives? Which industries benefited most and what are the future jobs that AI will create? Here you will learn what impact AI will have on the development of humanity in the near future.

Ethics of AI

This module will discuss the ethical questions that are currently debated with the rise of AI and its growing reliance in the modern world. AI systems are created by humans, so cannot always be trusted to be fair and neutral. How can we eliminate the bias in AI and make it a catalyst for positive change? You will apply moral concepts – such as inequality, fairness, and transparency – to real-world situations to better understand and resolve ethical dilemmas. Here you will focus on developing a practical skill set as you engage in this topical, integral discussion.



AI and Machine Learning

The two terms are often used interchangeably and are very much related, however they are not quite the same thing. You will explore the fascinating history of AI research and the initial experiments that seemed promising but ultimately turned out to be dead ends. Then, you'll turn to the probabilistic basis of machine learning and neural networks, demystifying this arcane-sounding technique and its many variations.

Deep Learning vs Machine Learning

There are nuances to deep learning and machine learning though both tend to be used interchangeably. Whereas deep learning and machine learning are sub-fields of artificial intelligence, deep learning is actually a sub-field of machine learning. You will learn how each algorithm learns depending on the learning type based on real life examples, like virtual assistant, facial and speech recognition and others.

AI and Games

In the 1990's IBM successfully defeated chess grandmaster Gary Kasperov, a feat which shocked the world. IBM's machine, deep blue employed artificial intelligence to defeat Kasparov. But what is artificial intelligence? What does it mean to be rational? And how does this tie in with playing games? Further, why do we need artificial intelligence, and what does it provide us with? A commonly misunderstood question. In this topic, you will consider algorithms such as MiniMax, simulated annealing, genetic algorithms, and monte carlo methods, and how they can be used for optimisation problems.

Research Techniques

The typical example of this topic is the problem of navigating a road map with a known layout. You will be introduced to basic AI search techniques, such as depth-first, breadth-first, and iterative deepening search, and will discuss heuristic techniques such as A* search that improves efficiency by pruning the search space. You will then move to learning about constraint satisfaction problems (CSPs) and search techniques such as backtracking and constraint propagation that can efficiently solve many CSP problems in practice.

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Artificial General Intelligence (AGI)

Many experts believe that the restriction of the current so-called narrow AI, where machines perform highly specialised tasks, is very temporary. By mid-century, we may have artificial general intelligence (AGI) – machines that are capable of human-level performance on the full range of tasks that we ourselves can tackle. These AGIs will have the responsibility to find ways to improve our current lives and steer us in the right direction. There are two major hindrances with this vision at the moment - how will we tell the machines what they are looking for with sufficient clarity and if what the machines find will be to our benefit?

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