



UNIVERSITY
OF
JOHANNESBURG

ADS
ACADEMIC DEVELOPMENT
AND SUPPORT

Artificial Intelligence in the 4IR

Short Learning Programme

Artificial Intelligence in the 4IR introduces you to artificial intelligence (AI), its applications, and its implications for society and the future of work in the Fourth Industrial Revolution (4IR).

The disruptive and profound effect of AI and automation on the world of work is set to intensify in the coming years. Those who are most prepared for the future will be best prepared for change, and best situated to lead change. Artificial Intelligence in the 4IR encourages you to reflect on your role in a world that is being transformed by AI-driven technologies.

COURSE OVERVIEW

Artificial Intelligence in the 4IR consists of 8 units aimed to help students develop a basic understanding of a world with AI. Completion of this short learning programme will enable students to:

- Develop an understanding of the 4IR and automation.
- Understand the evolution of AI.
- Discuss foundational concepts and techniques of AI and their application to real-life problems.
- Explore advances in AI research, application and commercialisation in the United States and the West.
- Explore advances in AI research, application and commercialisation in China.
- Unpack the implications of AI for the future of the world of work.
- Be aware of social and ethical considerations of AI technology.
- Reflect on the future of AI for society.

UNIT OVERVIEW

Unit 1 – 4IR and Automation

Unit 1 takes you back to the history of the industrial revolutions. Unit 1 will enable students to understand selected critical developments in automation and think about their implications for manufacturing and the organisation of work.

By the end of this unit, students will be able to:

- Identify the defining features of the industrial revolutions.
- Understand the differences between the 4IR and prior industrial revolutions.
- Understand selected critical developments in automation.

Unit 2 – Evolution of AI

Unit 2 defines AI and takes students through some of the major historical milestones in AI research. Unit 2 provides a background to the current surge in AI research and commercialisation by tracing how AI has evolved to its current state of technological capabilities over many decades.

By the end of this unit, students will be able to:

- Define artificial intelligence (AI).
- Identify critical milestones in the development of AI.
- Understand AI winters.
- Recognise the enablers of AI after long winters.

Unit 3 – AI Fundamentals

Unit 3 focuses on the basics of AI. Students will be introduced to important concepts and techniques used in AI to enable them to have functional awareness of AI. Unit 3 will broaden students' understanding of intelligence, artificial machine intelligence, machine learning and machine learning algorithms, which are the building blocks of AI.

By the end of this unit, students will be able to:

- Identify the difference between human intelligence and artificial intelligence.
- Understand the basics of machine learning.
- Distinguish between different types of machine learning.
- Identify the difference between AI, machine learning and deep learning.

Unit 4 – AI in the Real World: Global Overview

Unit 4 examines how AI is positively impacting humanity in many areas of life, such as manufacturing, business, supply chains, health, education, security, and so on. This unit tracks the emergence of Silicon Valley in relation to advances made by AI technology.


By the end of this unit, students will be able to:

- Understand the applications of AI in the world of business and society.
- Identify global corporate actors influencing AI research and development.
- Understand the potential of AI in solving human problems.

Unit 5 – AI in the Real World: China

Unit 5 examines how China is using AI to transform all sectors of the country's economy, including commerce, trade and manufacturing, at a fast pace. In China, the wave of AI is sweeping across society at the speed of lightning as all players race to adopt AI in all profit-making and social investment tasks. Unit 5 considers the role of the Chinese government, local government, large corporates, start-ups, and ordinary people in this seismic shift from "Made in China" to "Made intelligently in China".

By the end of this unit, students will be able to:

- Identify recent advances in AI research and commercialisation in China.
 - Understand selected case studies of important AI start-ups in China.
 - List the limits and failures of AI at present.
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Unit 6 – Future of the World of Work

AI will transform every industry in Africa in the next few years. AI-powered machines will perform a significant chunk of the work that humans perform now. Unit 6 encourages students to contemplate the future of work in an AI-driven economy by tracing the impact of automation throughout economic history, from the First Industrial Revolution to the Fourth Industrial Revolution (4IR).

By the end of this unit, students will be able to:

- Understand the impact of automation and autonomous machines on jobs from a historical perspective.
- Predict future job losses due to intelligent robots.
- Identify features of the future workforce.
- Recognise the nature of tasks and skills that will be replaced by AI-powered robots.

Unit 7 – Social and Ethical Considerations of AI

Unit 7 focuses on ethics – the field dealing with right vis-à-vis wrong and the moral obligations and duties of humans – as they relate to AI. The adoption of AI is occurring rapidly and on a large scale. However, AI is being adopted in societies with multiple differences along racial, gender and religious lines. AI will affect people differently depending on their individual and social group characteristics. AI is not neutral. AI can negatively affect the life chances of some groups in society, while promoting other social groups. Moreover, like any technology, AI can generate biased results. Unit 7 considers what humans can do to minimise or even eliminate the risks posed by AI.

By the end of this unit, students will be able to:

- Understand the importance of ethics in AI.
- Identify the implications of AI for individuals, organisations and society.
- Recognise the risks and challenges of AI in ethics.

Unit 8 – Speculations on the Future

Unit 8 explores the notion that human history is approaching a “technological singularity”, where artificial intelligent systems (computers, robots, and machines) or cognitively-enhanced biological intelligence, or both, have become “superior” to human intelligence. Unit 8 considers whether that stage in technological advancement will ever be reached. This unit also examines anxieties around the question of what would happen to the human race if AI were to achieve what is termed artificial superintelligence (ASI) where it is simply superior to natural intelligence. Will humans be able to control it? Unit 8 encourages students to reflect on the future of AI for society.



By the end of this unit, students will be able to:

- Define the concept of technological singularity.
- Identify the concerns with technological singularity.
- Understand utopian and dystopian thinking around AI.

WHAT WILL STUDENTS RECEIVE UPON COMPLETION?

A digital certificate will be issued on successful completion which may be viewed and shared with third parties or possible employers through the UJ Digital Certificate platform. Note: For currently-registered UJ students, this achievement will also appear on your academic record.

COST

Artificial Intelligence in the 4IR has no cost implications for students.

CLASSES OR TUTORIALS

The online nature of the programme means that students are not required to attend any lectures or tutorials. Rather, students are expected to read all the texts you are exposed to, answer multiple choice questions (MCQs), and participate in the online discussions. As a result, Artificial Intelligence in the 4IR does not clash with existing academic schedules of students.

STUDENT PARTICIPATION

The Division of Academic Development and Support (ADS) invites students to read and discuss the same book in a given period of time. ADS encourages a culture of reading by providing a basis for deep, meaningful conversations regarding AI and the 4IR.

The prescribed read is '**21 Lessons for the 21st Century**' by Yuval Noah Harari, which can be found online at all UJ campus libraries. Students who register for this programme receive access to download the book, for free, from the course reading material folder.

ASSESSMENTS

All assessments are in the form of multiple choice questions (MCQs). In order to proceed from one activity to the next, students are required to obtain at least 50%. An overall mark of 50% is required to pass the programme.

APPLICATION AND ACADEMIC ENQUIRIES

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