

H9AITB: Artificial Intelligence Technologies for Business

Module Code:	H9AITB
Long Title	Artificial Intelligence Technologies for Business APPROVED
Title	Artificial Intelligence Technologies for Business
Module Level:	LEVEL 9
EQF Level:	7
EHEA Level:	Second Cycle
Credits:	10
Module Coordinator:	CRISTINA HAVA MUNTEAN
Module Author:	Rejwanul Haque
Departments:	School of Computing
Specifications of the qualifications and experience required of staff	PhD/Master's degree in a computing or cognate discipline. May have industry experience also.
Learning Outcomes	
<i>On successful completion of this module the learner will be able to:</i>	
#	Learning Outcome Description
LO1	Comprehend and evaluate core AI technologies and the infrastructure required to implement them across different areas of the organisation.
LO2	Critically evaluate the nature and characteristics of data needed for AI in the context of business and the impacts of AI on fairness, trustworthiness, usability, and sustainability.
LO3	Design, evaluate, and communicate AI strategies and governance models in terms of business impact and technical feasibility.
LO4	Comprehend, analyse, and summarise the requirements for the adoption of an AI culture in an organisation.
LO5	Critically review the direction of AI adoption in various business domains addressing concerns and challenges of key stakeholders.
Dependencies	
Module Recommendations	
No recommendations listed	
Co-requisite Modules	
No Co-requisite modules listed	
Entry requirements	Applicants are required to hold a minimum of a Level 8 honours qualification (2.2 or higher) or equivalent on the National Qualifications Framework in either STEM (e.g., Information Management Systems, Information Technologies, Computer Science, Computer Engineer) or Business (e.g., Business Information Systems, Business Administration, Economics) discipline and a minimum of three years of relevant work experience in industry, ideally but not necessarily, in management. Previous numerical and computer proficiencies should be part of their work experience or formal training. Graduates from disciplines which do not have technical or mathematical problem-solving skills embedded in their programme will need to be able to demonstrate technical or mathematical problem-solving skills in addition to their level 8 programme qualifications (Certifications, Additional Qualifications, Certified Experience and Assessment Tests). All applicants for the programme must provide evidence that they have prior Mathematics and Computing module experience (e.g., via academic transcripts or recognised certification) as demonstrated in one mathematics/statistics module and one computing module or statement of purpose must specify numerical and computing work experience. NCI also operates a prior experiential learning policy where graduates with lower, or no formal qualifications, currently working in a relevant field, may be considered for the programme. Applicants must also be able to have their own laptop with the minimum required specification that will be communicated to each applicant through both the admissions and marketing departments.

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Module Content & Assessment			
Indicative Content			
Introduction to Artificial Intelligence History and background of AI • How AI has historically been applied to business What have the successes and concerns been?			
Understanding data for AI • Big data characteristics (e.g., five "V's" of data, labelled data importance) • Finding, generating, and managing data • Overview on data mining methodologies (e.g., KDD, CRISP-DM) • Dataexploration and visualisation			
Artificial Intelligence and Machine Learning • Types of machine learning (i.e., supervised, semisupervised, reinforcement, and unsupervised learning) • Demonstrate the importance of data preprocessing (cleaning, integration, reduction, and transformation)			
Machine Learning and Evaluation of AI models Basics of predictive modelling (classification, regression) • Model evaluation and the commonly used metrics • Understand the impact of underfitting and overfitting • Understand bias and variance			
Artificial Neural Networks and Deep Learning • Basic building blocks of artificial neural network (e.g., neurons, layers, weights, bias, activation functions, computation) • Introduction to deep learning • Pros and Cons of artificial neural network and deep learning • Main business use cases applying artificial neural network and deep learning • Different use-cases of artificial neural networks and deep learning on various business contexts such as image processing on quality control.			
Optimisation and Decision Making for AI Introduction to optimisation • Differences between optimisation and Case studies of optimisation techniques being applied to simulation (when and where to apply) • Optimisation applied for decision making • Importance of alternative approaches of data-driven models • Pros and cons of optimisation as an alternative approach for data-drive models and what should leaders be aware of.			
Infrastructure for AI models Infrastructure (e.g., hardware, software, platforms) requirements for building and deploying AI models • Steps from data to products; feasibility study for AI models (e.g., latency vs throughput vs scalability vs cost) • Deploying AI models in the cloud • Impact of AI models in business (economic) and in society / environment			
Facilitating fair, usable, trusted and green AI Bias awareness and mitigation • What AI fairness is and the key role it plays in developing AI solutions • Facilitating usable AI development • Facilitating trusted AI development • Emphasize reproducibility			
Driving AI for business How do you design a strategy? • What are the key components? • What is required in an AI Strategy? • How AI relates to the completion of tasks? • What should organisations think of when defining their AI strategy?			
AI Governance • Designing a Governance structure to support AI initiatives • Who is accountable for the AI program? • What does 'accountability' mean? • How are senior managers/the board involved?			
Culture to support AI • What is the culture of the organisation? • What is the culture required to support AI initiatives? • Does it have a culture of Innovation?			
Global perspective and the future of AI Review of some of the leading AI companies from China • The difference between Silicon Valley organisations and Chinese organisations • What does the future of AI look like? Few/Zero Shot Learning Handling lowresource scenarios (both computational and data) Auto ML. Future of deep learning. Quantum Computing			
Assessment Breakdown			%
Coursework			100.00%
Assessments			
Full Time			
Coursework			
Assessment Type:	Formative Assessment	% of total:	Non-Marked
Assessment Date:	n/a	Outcome addressed:	1,2,3,4,5
Non-Marked:	Yes		
Assessment Description: Formative assessment will be provided on the in-class individual or group activities. Feedback will be provided in written or oral format, or online through Moodle. In addition, in class discussions will be undertaken as part of the practical approach to learning.			
Assessment Type:	Project	% of total:	100
Assessment Date:	n/a	Outcome addressed:	1,2,3,4,5
Non-Marked:	No		
Assessment Description: First, learners are required to write a project proposal based on how AI can be applied to solve a particular problem in a specific business context. Next, learners will develop an AI strategy that is technically achievable and highly impactful (economic, societal, etc.) identifying the strengths and weaknesses of their strategy in terms of a variety of parameters (e.g., adaptability, robustness). Additionally, the learners should consider different operational issues including ethics, data governance, fairness, stakeholder implications, trustworthiness, costs in terms of business impact versus technical feasibility.			
No End of Module Assessment			
No Workplace Assessment			
Reassessment Requirement			
Coursework Only This module is reassessed solely on the basis of re-submitted coursework. There is no repeat written examination.			

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Module Workload

Module Target Workload Hours 0 Hours

Module Resources	
Recommended Book Resources	
Thomas H. Davenport. (2019), The AI Advantage, MIT Press, p.244, [ISBN: 978-0262538008]. Marco Iansiti, Karim R. Lakhani. Competing in the Age of AI, [ISBN: 978-1633697621].	
Supplementary Book Resources	
David Spiegelhalter. (2019), The Art of Statistics, Basic Books, p.320, [ISBN: 978-1541618510]. Kai-Fu Lee. (2018), AI Superpowers, Houghton Mifflin, p.272, [ISBN: 978-1328546395]. Bernard Marr. (2019), Artificial Intelligence in Practice, John Wiley & Sons, p.352, [ISBN: 978-1119548980].	
Recommended Article/Paper Resources	
Schaffrik, B.. (2021), The Forrester Wave™: Robotic Process Automation, Q1 2021, https://file.rpazj.com/The%20Forrester%20Wave%E2%84%A2_%20Robotic%20Process%20Automation%2C%20Q1%202021.pdf. The Forrester Wave™: Robotic Process Automation, Q1 2021. (2018), Robotic Process Automation: A Gateway Drug to AI and Digital Transformation., https://www.forbes.com/sites/tomdavenport/2018/10/29/robotic-process-automation-a-gateway-drug-to-ai-and-digital-transformation/?sh=77bba833a70. (2019), High-Level Expert Group on Artificial Intelligence, https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai. Davenport, T. H.. (2019), What does an AI ethicist do?, MIT Sloan Management Review, https://sloanreview.mit.edu/article/what-does-an-ai-ethicist-do/ Mayika, J., Silberg, J., & Presten, B.. (2019), What do we do about the biases in AI?, What do we do about the biases in AI?, http://Mayika, J., Silberg, J., & Presten, B Wladawsky-Berger, I.. (2019), The state of AI in the enterprise., The Wall Street Journal., https://www.wsj.com/articles/the-state-of-ai-in-the-enterprise-01568404116. McCarthy, B. & Saleh, T.. (2019), Building the AI-powered organization., Harvard Business Review, http://Harvard Business Review Mahidar, V. & Davenport, T. H.. (2018), Why companies that wait to adopt AI may never catch up. Harvard Business Review., Harvard Business Review., https://hbr.org/2018/12/why-companies-that-wait-to-adopt-ai-may-never-catch-up. Davenport, T. H.. (2019), How to tame “Automation Sprawl”, Harvard Business Review, http://Harvard Business Review Merrill, D.. (2019), What boards need to know about AI., Harvard Business Review, https://hbr.org/2019/05/what-boards-need-to-know-about-ai Pisano, P. (2019), The hard truth about innovative cultures., Harvard Business Review, https://hbr.org/2019/01/the-hard-truth-about-innovative-cultures. Davenport, T. H.. (2019), Building a culture that embraces data and AI., Harvard Business Review, http://Harvard Business Review Sanders, N. R. & Wood, J. D. (2020), The secret to AI is people, Harvard Business Review, https://hbr.org/2020/08/the-secret-to-ai-is-people Engelbert, C. & Hagel, J.. (2017), Fulfilling the promise of AI requires rethinking the nature of work itself., Harvard Business Review., https://hbr.org/2017/12/fulfilling-the-promise-of-ai-requires-rethinking-the-nature-of-work-itself. Metz, C. (2019), What on Earth is Quantum Computing, The New York Times, https://www.nytimes.com/2019/12/06/technology/what-is-quantum-computer.html.	
Supplementary Article/Paper Resources	
Porter, M. E.. (1996), What is strategy?, Harvard Business Review., https://hbr.org/1996/11/what-is-strategy. Goffee, R. & Jones, G.. (2000), Why should anyone be led by you?, Harvard Business Review, https://hbr.org/2000/09/why-should-anyone-be-led-by-you. Bezos, J.. (1997), 1997 Letter to shareholders, Amazon, https://www.sec.gov/Archives/edgar/data/1018724/000119312517120198/d373368dex991.htm	
This module does not have any other resources	
Discussion Note:	