

CERTIFICATE PROGRAM

ARTIFICIAL INTELLIGENCE

ARTIFICIAL INTELLIGENCE CERTIFICATE

DEVELOP THE SKILLS YOU NEED TO THRIVE IN A GROWING PROFESSION

Artificial intelligence is reshaping industries — and organizations are racing to secure talent who can build, deploy, and scale AI solutions responsibly. By 2030, 86% of employers expect AI and information processing technologies to transform their operations (World Economic Forum, 2024). In Canada, 97% of companies anticipate AI adoption will reshape their workforce needs, with demand growing for roles such as AI/ML Specialists, Security Management Specialists, and advanced Software Developers. Whether you're a software developer aiming to move into machine learning, or a data scientist looking to deepen your expertise in neural networks and MLOps, WatSPEED's AI certificate program provides a flexible, stackable pathway to power your next career move by providing you with:

- Deep technical grounding in how AI systems are designed, built, and deployed enabling you to advance your understanding and actively shape AI initiatives.
- Hands-on experience with industry-standard frameworks and tools, giving you the practical fluency that employers demand today.
- Broad relevance across industries, as organizations in fields from technology and finance to healthcare and government increasingly explore AI applications.
- Future-focused skills, aligned with the core AI capabilities that employers identify as critical for the next five years and beyond.

Developed in collaboration with leading industry partners, our hands-on certificates take you from foundational skills through advanced AI model development, preparing you to drive innovation with confidence.



PRICE

\$1,199 CAD + applicable taxes
per individual course



DURATION

30 weeks
(includes one 12-week
course and three 6-week
courses)



FORMAT

Online with live sessions

WHO SHOULD ENROL

- Software engineers, data scientists, DevOps engineers, and cloud engineers looking to deepen their technical AI expertise.
- Professionals aspiring to roles such as AI systems engineer, AI developer, ML engineer, NLP engineer, computer vision engineer, or deep learning engineer.
- Technical professionals and researchers who want to build, deploy, and maintain AI models in production environments.
- Professionals in adjacent technical fields who may not code daily but want to understand how AI systems are developed, integrated, and scaled.

MEET THE PROGRAM LEAD



LARRY SIMON, MBA

Founder and Managing Director, Inflection Group

Larry Simon is an entrepreneur, management consultant, and angel investor, specializing in IT strategy and data analytics. He has over 30 years of experience advising startups, global corporations, and government institutions. He is the founder and managing director of Inflection Group. Prior to this he was a partner with Ernst & Young Consulting, their CTO and national director of their strategy and delivery centres.

He has previously served on the faculty of the Rotman School of Management, as the head judge of the Canadian Information Productivity Awards (CIPA), and as a councillor of the Institute of Certified Management Consultants of Ontario. Larry holds an MBA from the University of Toronto and a B.Math (Computer Science) from the University of Waterloo.

KEY TAKEAWAYS



Learn from academic and industry leaders



Stack credentials that fit your journey



Experience applied, real-world AI



Flexible online learning for working professionals

WHAT YOU'LL LEARN

COURSE 1: Machine Learning

This course will equip you with the basic machine learning and artificial intelligence (AI) tools for mining datasets, and extracting insights for decision making. You will learn how to identify correlations and patterns in datasets, build more sophisticated predictive models using machine learning and deep learning software, and evaluate the performance of those models through individual and group based practical assignments.

What you'll learn

- Finding correlations between variables in a dataset
- Identifying clusters in data such as market segments
- Predicting future outcomes based on hidden relationships in historical data
- Using tools to classify events or observations by type
- Evaluating and combining models for best performance
- Demonstrating the basic skills required to prepare for subsequent courses in the certificate program

Prerequisite

- A degree in Engineering, Mathematics, or Computer Science is recommended, but not required
- Basic knowledge of programming and programming languages is strongly recommended

COURSE 2: Large Language Models (LLMs)

Large Language Models (LLMs) are transforming how we interact with technology; from powering chatbots and search engines to enabling advanced content generation and semantic understanding. This course provides a practical introduction into the architecture, functionality, and applications of LLMs, equipping learners with the skills to build, fine-tune, and deploy models for real-world tasks. Building on foundational machine learning concepts and prepares learners for advanced topics in generative AI and model deployment, you will explore the inner workings of LLMs, including tokenization, embeddings, attention mechanisms, and transformer architectures.

What you'll learn

- Core concepts and architecture of large language models
- Tokenization techniques and embedding strategies
- Transformer architecture and attention mechanisms
- Fine-tuning pre-trained LLMs for classification and instruction-following tasks
- Implementing semantic search and retrieval-augmented generation (RAG) using existing frameworks
- Working with multimodal models (vision+text, audio+text)

Prerequisite

- Completion of the Machine Learning course or equivalent prior knowledge

COURSE 3: Reinforcement Learning

This course introduces learners to the foundational principles and practical implementation of Reinforcement Learning (RL). You will explore key concepts such as Markov Decision Processes, value functions, policy optimization, and deep reinforcement learning techniques. Through hands-on assignments, including building a game-playing agent, you will gain experience applying RL algorithms to solve complex problems.

What you'll learn

- Core concepts of reinforcement learning and agent-based problem solving
- Markov Decision Processes and environment modeling
- Value and policy functions (V and Q functions)
- Implementing temporal-difference learning and Q-learning in simple environments
- Exploring deep RL techniques (DQN, PPO, Actor-Critic) using existing frameworks
- Conceptual understanding of Reinforcement Learning for language models, including RLHF and GSPO

Prerequisite

- Completion of the Machine Learning course or equivalent experience

COURSE 4: Agentic AI

Agentic AI is the next frontier in artificial intelligence where models move beyond passive responses to become autonomous, goal-driven entities capable of reasoning, planning, and acting. This course explores the design and deployment of intelligent agents powered by LLMs, equipping learners to construct AI systems that can operate independently, collaborate with other agents, and assist users in complex tasks. You will work with leading frameworks like LangChain and Model Context Protocol, experiment with advanced prompting techniques, and build a personalized agentic AI assistant capable of task execution.

What you'll learn

- Core concepts and frameworks for building and using LLM-powered agents
- Using context engineering for agent performance and reliability
- Function calling to enable the agent to execute tasks
- Designing autonomous and multi-agent systems using tools like AutoGen
- Understanding agent memory types using vector stores, episodic memory, and RAG and their role in agent behaviour
- Strategies for memory and knowledge compression

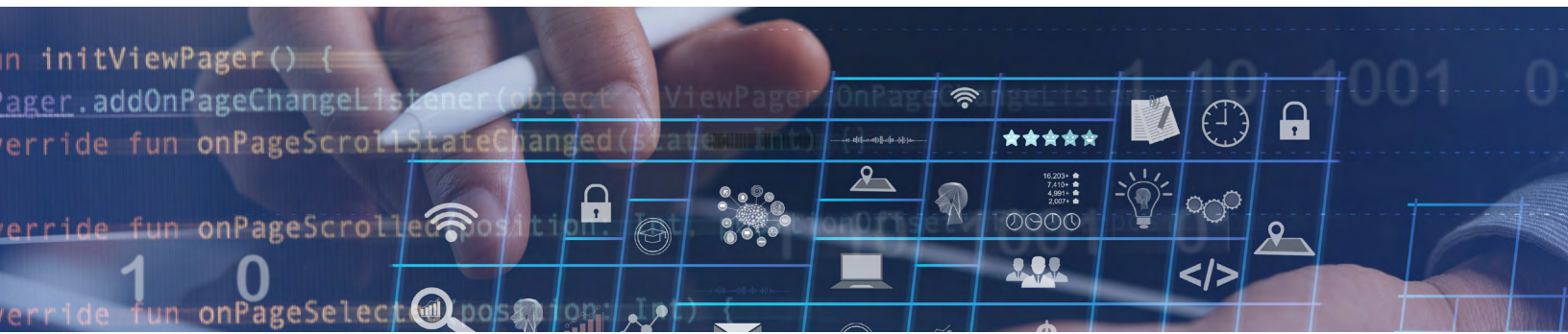
Prerequisite

- Completion of Machine Learning and Large Language Models courses or equivalent experience with LLMs is strongly recommended
- Familiarity with Python is required

COURSE STRUCTURE AND PROJECTS

COMBINATION OF LIVE SESSIONS AND INDEPENDENT LEARNING

- Courses are delivered through a mix of live, instructor-led sessions and flexible self-paced study to accommodate working professionals.
- Weekly webinars review key concepts and provide opportunities for live interaction and Q&A with instructors. Recordings are available for later viewing.
- Learners complete hands-on exercises and applied project work using AI tools and frameworks.



DESIGNED FOR YOU AND YOUR ORGANIZATION

- Ideal for professionals who want hands-on experience building and deploying AI systems in real-world environments.
- Assignments are built around real-world applications, enabling participants to immediately apply new AI skills within their work or organization.

ASSESSMENTS AND PROJECTS

- Each course includes individual and group projects designed to reinforce technical and strategic understanding of AI.
- Learners gain hands-on experience using frameworks such as TensorFlow, PyTorch, Hugging Face Transformers, and LangChain.
- Projects include building a text classification system, a game-playing reinforcement learning agent, and a personalized agentic AI assistant capable of autonomous task execution.

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CONTACT US

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WATSPEED

AT THE UNIVERSITY OF WATERLOO

In a complex and rapidly evolving world, WatSPEED at the University of Waterloo is professional education that's designed to be different. Positioned at the intersection of technology and business and rooted in experiential education, we will support the workforce of the future in continuously evolving to outpace major technological, societal, environmental, and economic disruption. WatSPEED delivers education that will help you rapidly adapt, compete, and thrive through change. If you are interested in learning more, please email us at watspeed@uwaterloo.ca.



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