Algoma University | Professional and Continuing Education

Graduate Certificate in Information Technology: VR and AR (GC.ITVR)

Real-time 3D (RT3D) is one of the most in-demand tech skills and has one of the highest forecasted growth rates — over 70% in the next 10 years. Algoma University's Graduate Certificate in Information Technology: VR, and AR (virtual reality and augmented reality) is a two-year certificate comprehensively designed for professionals or students who have neither XR experience or information technology background, but desire to enter this growing field. You can bring your creative vision to life and build the next generation of digital & web experiences.

This unique program builds the fundamentals for C#, Java, and database programming. Students will acquire the necessary technical knowledge and skills to participate in tomorrow's workforce through the design, development and testing of various engine applications. Students will build a strong portfolio of their own ideas through the development of VR/AR applications across six projects.

Our certificate is composed of courses that are rich in theory along with industry informed, application courses. Students will gradually build up programming skills with Java and C#, and then conduct advanced XR development projects. Upon completion of this program, students will receive a Graduate Certificate in Information Technology: VR, and AR from Professional and Continuing Education (PACE) at Algoma University. Moreover, students are eligible for the Unity User Certificate which will be awarded by Unity upon completion of an exam.

What graduates receive upon completion:

- A Graduate Certificate in IT: VR and AR Programming from PACE, Algoma University

Admission Requirements:

Applicants for this program must not have a post-graduate credential in the same or closely related field with a minimum of 60% average [C] for university students.

International applicants must provide documentation of language proficiency as per Algoma University's current language requirements.

Graduation Requirements:

Minimum grade of 60% in required introductory courses* and 60% overall average in all courses required for the certificate.

Program Learning Outcomes:

- Program with C#/Java proficiently
- Develop efficient augmented reality (AR) or virtual reality (VR) applications
- Analyze the feasibility of XR projects correctly
- Manage XR projects effectively
- Collaborate in teams developing useful XR-based applications

Course Map:

Term 1:

ITVR101 - Object Oriented Programming (3 Credits | Delivery: On Campus)

ITVR102 - Trends in VR/AR (3 Credits | Delivery: Online)

ITVR103 - Principles of User Experience and Interface Design (3 Credits | Delivery: Online)

ITVR104 - Thinking and Working Across Cultures (3 Credits | Delivery: On Campus)

Term 2:

ITVR201 - Introduction to Game Engines (3 Credits | Delivery: On Campus)

ITVR202 - Asset Production for XR (3 Credits | Delivery: On Campus)

ITVR203 - XR Fundamentals (3 Credits | Delivery: On Campus)

ITVR204 - Business Writing and Communication (3 Credits | Delivery: Online)

Term 3:

ITVR301 - Game Engines 2 (3 Credits | Delivery: On Campus)

ITVR302 - AR/VR (XR) Design and Prototyping (3 Credits | Delivery: On Campus)

ITVR303 - Turtle Island (3 Credits | Delivery: Online)

ITVR304 - Project Management in Development (3 Credits | Delivery: Online)

Term 4:

ITVR401 - Capstone Project (6 Credits | Delivery: On Campus)

ITVR402 - Social and Ethical Implications of AR/VR (3 Credits | Delivery: Online)

ITVR403 - Equity, Diversity, and Inclusion (3 Credits | Delivery: On Campus)

Course Descriptions

Term 1

Object Oriented Programming (3 Credits | Delivery: On Campus)
This course is an introduction to object-oriented programming (OOP) principles and the C# programming language. Students will learn the fundamentals of OOP concepts and how they can be applied to build software applications.

The course will cover the basics of C# programming, including data types, variables, control structures, functions, and classes. Students will learn how to design and implement object-oriented solutions to problems, and how to work with object-oriented design patterns.

Trends in VR/AR (3 Credits | Delivery: Online)
VR/AR technologies are rapidly transforming how we interact with the world around us. This course will explore the latest trends in VR/AR technology, examining how these emerging technologies are being used in various industries and applications.

Throughout the course, students will examine the real-world impact of VR/AR technologies, including their potential to transform industries such as agriculture, entertainment, healthcare, education, and manufacturing. They will analyze case studies of successful VR/AR implementations and discuss the ethical and social implications of these technologies.

Principles of User Experience and Interface Design (3 Credits | Delivery: Online)
This course is designed to provide an in-depth understanding of the principles of user experience (UX) and interface design with a focus on VR/AR technologies. The course will cover a wide range of topics, including the basics of UX and interface design, the differences between AR and VR, and the role of user research in AR/VR design. Students will learn how to design interfaces that enable users to navigate, interact, and manipulate 3D objects in AR and VR environments, and how to create immersive experiences that make users feel present in the virtual world.

Thinking and Working Across Cultures (3 Credits | Delivery: On Campus)
This course offers students the opportunity to deepen their learning about cross-cultural interactions and understanding in their lives, their studies, and their work. What does it mean to think and to work across cultures? Cross-cultural learning invites students to examine their knowledge of their own and other cultures, developing greater awareness of values and norms in their own and other cultures; they will deepen understanding and appreciation of different cultures and cultural differences, with particular attention to Indigenous cultures in Canada.

Term 2

Introduction to Game Engines (3 Credits | Delivery: On Campus)
This course provides a comprehensive introduction to creating AR/VR applications. Students will learn how to create and deploy VR/AR applications using the Unity editor. The course will also cover topics such as design principles, scripting in C#, physics simulation, and performance optimization.

Asset Production for XR (3 Credits | Delivery: On Campus)
This course is designed to equip students with the skills needed to create high-quality assets for use in AR/VR applications. The course will cover various aspects of asset production, including modeling, texturing, rigging, and animation. Students will also learn about optimization techniques for real-time rendering, as well as best practices for asset integration in AR/VR environments.

In the course, students will work on a series of projects that will provide them with practical experience in asset production for AR/VR. These projects will cover a range of asset types, including characters, environments, and props.

XR Fundamentals (3 Credits | Delivery: On Campus)
This course is designed to introduce students to the fundamental concepts and principles of AR/VR technologies. Students will gain an understanding of the underlying technology that makes AR and VR possible, including the hardware, software, and algorithms used to create immersive experiences.

During the course, students will be introduced to a range of AR and VR technologies, including head-mounted displays, spatial computing, and interactive digital environments. They will also explore the different types of content that can be created for these technologies, including simulations, and training applications.

Business Writing and Communication (3 Credits | Delivery: Online)
Students learn how to effectively communicate in a business setting characterized by rapidly changing technologies and an increasingly diverse workforce. The course emphasizes oral and written communication across a number of mediums and business applications. Students develop skills in business writing and presentations; and learn how to effectively communicate in business settings including the following: delivering good and bad news, applying persuasive business writing and presentation techniques; preparing business reports; communicating for teamwork and meetings with cross-cultural considerations. In preparation for subsequent courses, students will also receive an introduction to academic writing, distinguishing the difference between academic and business writing.

Term 3

Game Engines 2 (3 Credits | Delivery: On Campus)
This course is designed to build upon the skills and knowledge gained in the Introduction to Game Engines course. Students will learn advanced concepts and techniques for creating immersive AR/VR experiences.

Throughout the course, students will work on hands-on projects that will enable them to create more complex and interactive AR/VR experiences. They will learn how to use advanced 3D modeling software to create detailed and realistic assets, how to optimize their experiences for performance, and how to add sophisticated animations and physics interactions to their projects.

AR/VR (XR) Design and Prototyping (3 Credits | Delivery: On Campus)
The course will provide a comprehensive overview of AR/VR design principles and focus on the practical application of these principles in designing and prototyping immersive experiences. This course will cover considerations unique to AR/VR, such as spatial design, interaction

design, and visual design. Students will also learn about prototyping techniques such as rapid prototyping and user testing to help students iterate and refine their designs.

Turtle Island (3 Credits | Delivery: Online)
This course provides students with an introduction to the story of Turtle Island/Canada prior to and after first contact between Indigenous peoples and colonizers. Students will explore the lifeways of Indigenous peoples, periods of European colonization and conflict, ongoing migrations to Canada to the present day, and Canada's connections to and place in the world in the 21st century.

Project Management in Development (3 Credits | Delivery: Online)
This course is designed to provide an in-depth understanding of project management practices in the development industry. Students will learn how to plan, execute, and manage development projects in various contexts. The course will provide an overview of project management principles, including scope, time, cost, and quality management.

Students will learn how to initiate, plan, execute, monitor, control, and close a project effectively. The course will also cover the role of project managers, project teams, and stakeholders in the development process as well as introduce agile project management methodologies, such as Scrum and Kanban.

Term 4

Capstone Project (6 Credits | Delivery: On Campus)
The AR/VR Capstone Project is the culminating course of the AR/VR graduate certificate program. In this course, students will apply the knowledge and skills they have gained throughout the program to design and develop an AR/VR project from start to finish.

Throughout the course, students will receive support and guidance from their instructor to help them refine their ideas and ensure they are on track to deliver a successful project. The course will conclude with a final project presentation and demonstration, where students will showcase their AR/VR project to their peers and instructors.

Social and Ethical Implications of AR/VR (3 Credits | Delivery: Online)
This course provides an overview of the ethical and social implications that arise from the use AR/VR technologies. The course covers ethics topics such as privacy, data protection, and digital manipulation, as well as social implications such as creating new forms of social interaction and socialization. This course also explores the legal and regulatory frameworks

governing the use of AR/VR, including intellectual property rights, consumer protection, and liability issues.

Equity, Diversity, and Inclusion (3 Credits | Delivery: On Campus)
This course offers students the opportunity to learn about the values and principles of equity, diversity and inclusion and how they must inform and guide our interactions with others.

- *"Equity" means the removal of systemic barriers and biases, to enable all individuals to have equal opportunities.*
- *"Diversity" means differences such as race, colour, place of origin, religion, immigrant and newcomer status, ethnic origin, ability, sexual orientation, age and gender identity, among others. A diversity of perspectives and experiences is essential to successful outcomes in any field.*
- *"Inclusion" means ensuring that all individuals are valued and respected for their contributions and are equally supported.*

Understanding and embracing these values allow everyone to engage with and respond to local, national, and global challenges.