

Area of Interest: Arts and Design

## Game - Development

Ontario College Advanced Diploma

Program Code: 3013X01FWO

3 Years

Ottawa Campus

### Our Program

**Apply your computer programming talent to launch a career creating games of strategy and skill.**

The three-year Game - Development Ontario College Advanced Diploma program prepares you to enter into the increasingly competitive profession of game development with confidence. This program provides you with hands-on learning and a team-oriented environment that simulates the work setting found in large game studios. Throughout the program, you learn the design and critical thinking skills needed to find employment in the game development industry.

As a student, you learn how to create games of strategy and skill in an applied setting. During your first year, you gain knowledge in basic programming syntax and game development software tools. You enhance your skills with courses in:

- game design and development
- traditional and digital imaging
- authoring
- animation
- programming

For your final project, you work with your classmates to conceptualize, design and implement a complete 3-D game title. After graduation, you have the skills to demonstrate you are ready to start your career in this highly competitive field.

There are numerous career opportunities for graduates from this program. The game development profession has increased in demand to now include industries such as entertainment, education, government and consumer products.

You may find employment as a:

- game developer
- game programmer
- software developer
- game play programmer
- game designer
- game artist
- asset modeler
- texture artist
- game animator

- indie game producer

Most opportunities in this industry exist outside of the Ottawa area.

## **SUCCESS FACTORS**

**This program is well-suited for students who:**

### **Employment**

Graduates may find employment as a game developer, game programmer, software designer, software developer, graphics programmer, game designer, game artist, character modeler, environment modeler, texture artist, game animator, game tester, project manager and level designer. Most opportunities in game development exist outside of the Ottawa region.

### **Learning Outcomes**

The graduate has reliably demonstrated the ability to:

- Analyze the differences in game genres in order to develop games that meet the needs of specific markets.
- Analyze the history of video games to compare various approaches to game development.
- Support the development of games by identifying and relating concepts from a range of industry roles-programming, design, and art.
- Contribute as an individual and a member of a game development team to the effective completion of a game development project.
- Develop strategies for ongoing personal and professional development to enhance work performance in the games industry.
- Perform all work in compliance with relevant statutes, regulations, legislation, industry standards and codes of ethics.
- Apply conceptual game design elements to support the ongoing iteration, creation, programming, design, and development of games.
- Apply practical game design elements to support the ongoing iteration, creation, programming, design and developing of unique gaming environments, levels, characters, assets and props.
- Apply programming principles and techniques to create operational games or game components.
- Apply artificial intelligence and/or network implementation strategies to support real-time game environments and simulations.
- Utilize game engine functionality at an advanced level to support real-time games and simulations.
- Create original game props, characters and assets based on the concepts and requirements outlined in game design documents.
- Contribute to world building and level design, including using a game engine.
- Conceive, prototype, develop, test and evaluate procedures for the creation, design, programming, production and testing of games in a group environment.
- Test, debug and correct game components to ensure efficient and appropriate game functionality.
- Identify and apply discipline-specific practices that contribute to the local and global community through social responsibility, economic commitment and environmental stewardship.

## Program of Study

| Level: 01          | Courses                                    | Hours |
|--------------------|--------------------------------------------|-------|
| DSN2100M           | Design Thinking                            | 42.0  |
| ENL1813M           | Communications I                           | 42.0  |
| GAM1507            | Digital Imaging I                          | 42.0  |
| GAM1510            | Game Design Foundations                    | 42.0  |
| GAM1545            | Programming Fundamentals I                 | 84.0  |
| MAT8001V           | Technical Mathematics for Game Development | 70.0  |
| Level: 02          | Courses                                    | Hours |
| ENL2013            | Communications II: Scriptwriting           | 42.0  |
| GAM1508            | Drawing Essentials                         | 42.0  |
| GAM1511            | Interface Design                           | 42.0  |
| GAM1530            | Psychology and Group Dynamics              | 42.0  |
| GAM1547            | Programming Fundamentals II                | 84.0  |
| Elective: choose 1 | Courses                                    | Hours |
| GAM1544            | Game and Graphics Programming I            | 42.0  |
| GAM1570            | Digital Imaging II                         | 42.0  |
| Level: 03          | Courses                                    | Hours |
| GAM1512            | Game Assets I                              | 42.0  |
| GAM1516            | High Level Development I                   | 84.0  |
| GAM1535            | Technical Drawing                          | 42.0  |
| GAM1539            | Level Design I                             | 42.0  |
| Elective: choose 1 | Courses                                    | Hours |
| GAM1571            | Game and Graphics Programming II           | 84.0  |
| GAM1572            | Scripting for Designers                    | 84.0  |
| Level: 04          | Courses                                    | Hours |
| GAM1528            | High Level Development II                  | 84.0  |
| GAM1574            | Game Algorithms                            | 42.0  |
| GAM1575            | Cinematics                                 | 84.0  |
| GAM1576            | Game Assets II                             | 42.0  |
| Elective: choose 1 | Courses                                    | Hours |
| GAM1541            | Level Design II                            | 84.0  |

|                                       |                                             |              |
|---------------------------------------|---------------------------------------------|--------------|
| GAM1573                               | Game and Graphics Programming III           | 84.0         |
| <b>Level: 05</b>                      | <b>Courses</b>                              | <b>Hours</b> |
| GAM1552                               | Capstone I: Project Management              | 42.0         |
| GAM1555                               | Capstone I: Game Assets                     | 42.0         |
| GAM1557                               | Capstone I: Game Programming                | 42.0         |
| GAM1558                               | Capstone I: Studio                          | 84.0         |
| <b>Elective: choose 1</b>             | <b>Courses</b>                              | <b>Hours</b> |
| GAM1556                               | Capstone I: Advanced Game Assets            | 42.0         |
| GAM1559                               | Capstone I: Advanced Game Programming       | 42.0         |
| <b>Level: 06</b>                      | <b>Courses</b>                              | <b>Hours</b> |
| ENL2014                               | Communications III: Business Communications | 42.0         |
| GAM1562                               | Capstone II: Project Management             | 42.0         |
| GAM1568                               | Capstone II: Studio                         | 84.0         |
| <b>Elective: choose 1</b>             | <b>Courses</b>                              | <b>Hours</b> |
| GAM1566                               | Capstone II: Advanced Game Assets           | 42.0         |
| GAM1569                               | Capstone II: Advanced Game Programming      | 42.0         |
| <b>Choose one from equivalencies:</b> | <b>Courses</b>                              | <b>Hours</b> |
| GED3013                               | General Education Elective                  | 42.0         |

## Fees for the 2024/2025 Academic Year

Tuition and related ancillary fees for this program can be viewed by using the Tuition and Fees Estimator tool at <https://www.algonquincollege.com/fee-estimator>.

Further information on fees can be found by visiting the Registrar's Office website at <https://www.algonquincollege.com/ro>.

Fees are subject to change.

Additional program related expenses include:

- Books, supplies and other expenses cost approximately:
- \$1,000 in the first year
- \$600 in the second year
- \$1,300 in the third year

## Admission Requirements for the 2025/2026 Academic Year

### College Eligibility

- Ontario Secondary School Diploma (OSSD) or equivalent. Applicants with an OSSD showing senior English and/or Mathematics courses at the Basic Level, or with Workplace or Open

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- Academic and Career Entrance (ACE) certificate; OR
- General Educational Development (GED) certificate; OR
- Mature Student status (19 years of age or older and without a high school diploma at the start of the program). Eligibility may be determined by academic achievement testing for which a fee will be charged.

### **Program Eligibility**

- English, Grade 12 (ENG4C or equivalent).
- Mathematics, Grade 12 (MAP4C or equivalent).
- Mathematics, Grade 12 (MCT4C is highly recommended).
- A senior credit in physics is recommended.
- Applicants with international transcripts must provide proof of the subject-specific requirements noted above and may be required to provide proof of language proficiency. Domestic applicants with international transcripts must be evaluated through the International Credential Assessment Service of Canada (ICAS) or World Education Services (WES).
- IELTS-International English Language Testing Service (Academic) Overall band of 6.0 with a minimum of 5.5 in each band; OR TOEFL-Internet-based (iBT) Overall 80, with a minimum of 20 in each component: Reading 20; Listening 20; Speaking 20; Writing 20; OR Duolingo English Test (DET) Overall 110, minimum of 110 in Literacy and no score below 95.

Not sure if you meet all of the requirements? Academic Upgrading may be able to help with that: <https://www.algonquincollege.com/access/> .

Should the number of qualified applicants exceed the number of available places, applicants are selected on the basis of their proficiency in English and mathematics.

Applicants should have basic computer skills such as keyboard proficiency, Internet browsing and searching, and proficiency with an office software suite (word processing, spreadsheets, etc.) prior to the start of the program. While programming experience is not a requirement to enter the program, aptitude for programming is necessary and would include strong language, problem solving and logic skills. This is often demonstrated by skill and enjoyment in solving word problems in math.

Applicants who have been out of school for a period of time are encouraged to take a refresher course in mathematics, prior to the start of classes. Refresher/upgrading courses are available through Academic Upgrading courses, AC Online and through local school boards.

## **Admission Requirements for 2024/2025 Academic Year**

### **College Eligibility**

- Ontario Secondary School Diploma (OSSD) or equivalent. Applicants with an OSSD showing senior English and/or Mathematics courses at the Basic Level, or with Workplace or Open courses, will be tested to determine their eligibility for admission; OR
- Academic and Career Entrance (ACE) certificate; OR
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- Mature Student status (19 years of age or older and without a high school diploma at the start of the program). Eligibility may be determined by academic achievement testing for which a fee of \$50 (subject to change) will be charged.

### **Program Eligibility**

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## Application Information

### GAME-DEVELOPMENT

#### Program Code 3013X01FWO

Applications to full-time day programs must be submitted with official transcripts showing completion of the academic admission requirements through:

ontariocolleges.ca  
60 Corporate Court  
Guelph, Ontario N1G 5J3  
1-888-892-2228

Students currently enrolled in an Ontario secondary school should notify their Guidance Office prior to their online application at <https://www.ontariocolleges.ca/>.

Applications for Fall Term and Winter Term admission received by February 1 will be given equal consideration. Applications received after February 1 will be processed on a first-come, first-served basis as long as places are available.

International applicants please visit this link for application process information: <https://algonquincollege.force.com/myACint/>.

For further information on the admissions process, contact:

Registrar's Office  
Algonquin College  
1385 Woodroffe Ave  
Ottawa, ON K2G 1V8  
Telephone: 613-727-0002  
Toll-free: 1-800-565-4723  
TTY: 613-727-7766

Fax: 613-727-7632

Contact: <https://www.algonquincollege.com/ro>

## Additional Information

Successful game developers require a strong foundation in mathematics. If you feel that you need to upgrade your math skills, visit the Academic Access Centre Webpage on the College website for guidance: <https://www.algonquincollege.com/access>.

## Contact Information

### Program Coordinator(s)

- Konstantin Titov, <mailto:titovk@algonquincollege.com>, 613-727-4723, ext. 2412
- Dushan Horvat, <mailto:horvatd@algonquincollege.com>, 613-727-4723, ext. 5516
- Jodi Tilley, <mailto:tilleyj@algonquincollege.com>, 613-727-4723, ext. 5120
- Bradley Flood, <mailto:floodb@algonquincollege.com>, 613-727-4723, ext. 6533

## Course Descriptions

### DSN2100M Design Thinking

Human-centered approaches are among the best methods of generating innovative solutions for people at work, at home or within your community. Design thinking is a user-centered method of creative problem solving applicable any time you need to generate new ideas. It is about embracing mindset shifts and tackling problems from the user's perspective. Students learn the five-step process while involving the user each step of the way. Through research discussions and analysis, students work, first independently, then with a team, to emphasize with their users, define a problem, and then ideate, prototype and test an original solution that places people at the heart of a challenge.

Prerequisite(s): none

Corerequisite(s):none

### ENL1813M Communications I

Communication remains an essential skill sought by employers, regardless of discipline or field of study. Using a practical, vocation-oriented approach, students focus on meeting the requirements of effective communication. Through a combination of lectures, exercises, and independent learning, students practise writing, speaking, reading, listening, locating and documenting information, and using technology to communicate professionally. Students develop and strengthen communication skills that contribute to success in both educational and workplace environments.

Prerequisite(s): none

Corerequisite(s):none

### ENL2013 Communications II: Scriptwriting

Storytelling and the components of story are introduced. Students develop storytelling skills and an understanding of what story form is. Students learn to apply scripting techniques to develop game scripts. Students also learn what makes characters "come alive" and the role a "good story" has in the development of a video game.

Prerequisite(s): none

Corerequisite(s):none

### ENL2014 Communications III: Business Communications

Students learn to create professional documentation for the purposes of the gaming industry. Extensive instruction is provided on resume and cover letter writing, portfolio development, email

etiquette, telephone skills, memos and self-promotions.

Prerequisite(s): none

Corerequisite(s):none

### **GAM1507 Digital Imaging I**

Students are introduced to concepts and tools used in the creation of digital images. A variety of software tools and techniques are introduced to enhance and alter existing images, as well as graphic creation. The focus is to support all the 2-D assets which consist of all image requirements in game design. Emphasis is placed on creating texture atlases, sprite sheets, fonts and concept art. Package design and promotional art are also covered.

Prerequisite(s): none

Corerequisite(s):none

### **GAM1508 Drawing Essentials**

Through a specialized series of drawing exercises, students learn how to apply techniques in order to conceptualize, plan and communicate visually. These basic skills lead to the development of properly proportioned male and female characters that show facial expressions and body language. Students will learn to develop a short storyboard for a video game by applying their unique style of visual expression and combining conceptual art such as props, background elements and characters. Their storyboard will be complete with composition, direction, dialogue, sound effects and camera moves.

Prerequisite(s): none

Corerequisite(s):none

### **GAM1510 Game Design Foundations**

Students develop a foundation in the theory and practice of game design. Topics include game characteristics, game mechanics, game theory, documentation and play testing. Students spend the majority of their time working in a group while applying these principles in the form of a board game using the iterative process. The culmination of this work is a fully playable board game and professionally produced prototype.

Prerequisite(s): none

Corerequisite(s):none

### **GAM1511 Interface Design**

Design, layout, type, readability, colour theory and interaction are the subject focus. Students learn to create interfaces for games that follow standard principles of human-computer interaction. Topics include interactive theory, psychology of interface design, art aesthetics and navigation controls, diegetic and non-diegetic interfaces. Students evaluate the effectiveness of user interface designs. Students produce intuitive user interfaces that enhance the game players' experience.

Prerequisite(s): GAM1507

Corerequisite(s):none

### **GAM1512 Game Assets I**

Game assets consist of all the virtual objects that make up the interesting and compelling visuals that are part of a modern 3-D video game. These virtual objects include characters, vehicles, buildings and landscapes which are all needed to create a vibrant world. Students are introduced to how game assets are created in a professional game development pipeline by learning how to use sophisticated asset modelling and manipulation software. Topics include the fundamentals of game asset creation, such as polygon modelling, texturing, lighting and exporting assets to game engines. Strong emphasis is placed on the game development pipeline, workflow and best practices.

Prerequisite(s): none

Corerequisite(s):none

**GAM1516 High Level Development I**

Combined with knowledge of object-oriented design and object oriented programming, students integrate game play mechanics, non-player character artificial intelligence, goal seeking, collision detection and response, game physics, graphical effects, game shell and user interface. Strong emphasis is placed on the game development pipeline, workflow, best practices, group work, and presentations to peers, constructive peer review and learning relevant applicable technologies. Students work in groups to build a video game.

Prerequisite(s): GAM1547

Corerequisite(s):none

**GAM1528 High Level Development II**

Students continue to explore and apply aspects learned in High Level Development I. Focus is on leveraging that knowledge to create complex game designs, as well as creating an implementation in the genre of multiplayer games through rapid prototyping. In addition, the design of the Internet, third-party networking tiers and how they relate to game programming are also covered.

Prerequisite(s): GAM1516

Corerequisite(s):none

**GAM1530 Psychology and Group Dynamics**

Students examine some of the basic concepts of psychology, such as learning, motivation, perception, sensation, information processing, emotions, stress and relaxation and are able to effectively contribute as members of a team.

Prerequisite(s): none

Corerequisite(s):none

**GAM1535 Technical Drawing**

Students address the architectural context and functional requirements of interior spaces, as well as details of furnishing and decoration. Students learn how to structure interior spaces in three dimensions using a variety of drafting techniques, such as orthographic projections, dimensioning, sectional views, reference photography and technical drawings. Vehicles and prop design are also covered. Skills learned enable the student to demonstrate their ability to plan their designs in a detailed and structured manner which is then used in the creation of 3-D objects and environments.

Prerequisite(s): none

Corerequisite(s):none

**GAM1539 Level Design I**

The fundamentals of level design for video games are introduced. Topics include genre analysis, game play styles and limitations, game play mechanics, level construction and architecture techniques, design principles and scripting. Students are introduced to industry-standard tools to build levels, and learn how the use of these tools integrates into a workflow. They learn how levels are created using an iterative process, from design concept to production and play test. Theories and principles from a variety of disciplines are integrated to develop the fundamental skills for a level designer, which can then be applied to various projects across many platforms.

Prerequisite(s): none

Corerequisite(s):none

**GAM1541 Level Design II**

Students enhance their knowledge of level design. Topics include genre analysis, game play styles

and limitations, game play mechanics, level construction and architecture techniques, design principles and scripting. Students continue to practise using industry standard tools to build levels, and integrate these tools into a workflow. Emphasis is continued on practising using an iterative process, from design concept through to production and play test. Students create a complete 3-D level, with lighting, backstory and scripting.

Prerequisite(s): GAM1539  
Corerequisite(s):none

### **GAM1544 Game and Graphics Programming I**

Students apply foundational mathematics required in game development. The programmatic manipulation of: algebraic expressions, solving linear equations and literal formulae. Application of trigonometry of right triangles and solve trigonometric problems involving both acute and obtuse angles in standard position. Students study vectors and vector components to normalize vectors and to determine the scalar product and cross product of two vectors. Students study matrix algebra and use matrices to scale, rotate or translate graphics, change coordinate systems and transform points. Students acquire the knowledge to work with numerical systems and internal machine representations; binary/hex/octal/decimal math; and Boolean logic and truth tables, bitwise operators.

Prerequisite(s): GAM1545  
Corerequisite(s):none

### **GAM1545 Programming Fundamentals I**

C++ is a mainstay object-oriented (OO) programming language and is a foundation language of the game development industry. Best practices, such as programming with an integrated development environment (IDE), using a debugger, and writing programs with appropriate naming conventions and style are learned and practised. Students receive a comprehensive, in-depth overview of the C++ language, including syntax, data types, logical operators, as well as object class structure.

Prerequisite(s): none  
Corerequisite(s):none

### **GAM1547 Programming Fundamentals II**

Students enhance and reinforce their acquired knowledge by implementing basic algorithms and data structures using the C++ language. Topics include use of, classes, functions, pointers, memory management, inheritance and polymorphism. Emphasis is placed on debugging techniques where students gain a thorough understanding of stack and heap memory and how to find and fix memory leaks. Upon successful completion students are able to effectively debug a complex game program that implements pointers, memory management, inheritance and polymorphism.

Prerequisite(s): GAM1545  
Corerequisite(s):none

### **GAM1552 Capstone I: Project Management**

The Capstone Project which is a multi-discipline team-based project simulates the entire industry life cycle of a video game in development from concept to completion with a focus on teamwork. Students focus on their preferred discipline of design, art, programming and/or management. Students complete the concept and pre-production phases of game development. Students are guided through concept formation and concept pitch presentation. Pre-production starts with planning for game design, documentation, and implementation and ultimately results in a playable demo of their game. Agile methodologies are introduced and projects are developed using an iterative approach. Continuous Quality Assurance and play testing workflows are put in place. Scoping and risk analysis are also covered. Focus is on best practices required for building a high quality game, group work, meeting tight deadlines, peer evaluation and giving and receiving constructive criticism.

Prerequisite(s): none  
Corerequisite(s):none

**GAM1555 Capstone I: Game Assets**

The Capstone Project is a multi-discipline team-based project. The Capstone Project simulates the entire industry life cycle of a video game in development from concept to completion with a focus on teamwork. Students focus on their preferred discipline of design, art, programming and/or management. Students build on the concepts learned and applied in 3-D Game Assets I. Game assets are the virtual objects that make up the interesting and compelling visuals that are part of a modern 3-D video game. These virtual objects include characters, vehicles, buildings and landscapes which are all needed to create a vibrant world for their Capstone group project. Students continue to refine their skills in 3-D game asset creation including modelling, rigging, skinning and animation in a professional game development pipeline. Emerging technologies such as Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) are explored. Strong emphasis is placed on the game development pipeline, workflow and best practices in a highly collaborative atmosphere.

Prerequisite(s): GAM1576

Corerequisite(s):none

**GAM1556 Capstone I: Advanced Game Assets**

The Capstone Project which is a multi-discipline team-based project simulates the entire industry life cycle of a video game in development from concept to completion with a focus on teamwork. Students focus on their preferred discipline of design, art, programming and/or management. Students create complex objects including characters, vehicles, buildings and landscapes which are all needed to create a vibrant world for their Capstone group project. Focus is placed on advanced 3-D modelling, texturing, sculpting and painting techniques. Strong emphasis is placed on the game development pipeline, workflow and best practices in a highly collaborative atmosphere

Prerequisite(s): GAM1541 and GAM1576

Corerequisite(s):none

**GAM1557 Capstone I: Game Programming**

The Capstone Project which is a multi-discipline team-based project simulates the entire industry life cycle of a video game in development from concept to completion with a focus on teamwork. Students focus on their preferred discipline of design, art, programming and/or management. Focus is on exploring, developing and testing game mechanics, prototyping controls, non-playable character AI and experimenting with physics. Before going into full production, many aspects of video game playability are researched and explored. Consideration is also given to network programming, multiplatform constraints and game state management. Emerging technologies such as Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) are explored. Students focus on best practices required for building, a high-quality game, group work, meeting tight deadlines, peer evaluation, and giving and receiving constructive criticism.

Prerequisite(s): GAM1528 and GAM1574

Corerequisite(s):none

**GAM1558 Capstone I: Studio**

The Capstone Project is a multi-discipline team-based project. The Capstone Project simulates the entire industry life cycle of a video game in development from concept to completion with a focus on teamwork. Students focus on their preferred discipline of design, art, programming and/or management. Students are mentored by faculty and industry topic experts to experiment and implement game mechanics and ideas in Pre-production. Strong emphasis is placed on the game development pipeline, workflow, best practices, group work, presentations to peers, constructive peer review and other applicable technologies. The Capstone Studio gives the student teams unregimented access to state of the art equipment to work on the development of their Capstone projects. Students consistently exhibit the ability to work as an effective team player and consistently meet milestone deliverables.

Prerequisite(s): none

Corerequisite(s):none

**GAM1559 Capstone I: Advanced Game Programming**

The Capstone Project which is a multi-discipline team-based project simulates the entire industry life cycle of a video game in development from concept to completion with a focus on teamwork. Students focus on their preferred discipline of design, art, programming and/or management. Game engine designs are analyzed to include the main game loop, rendering engine, physics engine artificial intelligence, middleware, as well as database schema design and functionality. Students research and implement special visual effects for their Capstone group project. Advanced shaders, sophisticated cameras, GPU issues relating to performance optimizations, and advanced rendering techniques are studied and implemented.

Prerequisite(s): GAM1573  
Corerequisite(s):none

**GAM1562 Capstone II: Project Management**

The Capstone Project which is a multi-discipline team-based project simulates the entire industry life cycle of a video game in development from concept to completion with a focus on teamwork. Students focus on their preferred discipline of design, art, programming and/or management. Students continue into production for their group based projects. Students use the processes, pipelines, art and technology they created in Pre-production to move into full production. Focus is on project management and being an effective and active participant of a team. The development is managed using Agile methodologies tailored to a production environment. Business and legal issues for game development are also covered, such as company start-ups and funding options, IP ownership, licensing, contracts, marketing and financial analysis. Game development budgets are examined. Students focus on best practices required for building a high quality game, group work, meeting tight deadlines, peer evaluation and giving and receiving constructive criticism.

Prerequisite(s): GAM1552  
Corerequisite(s):none

**GAM1566 Capstone II: Advanced Game Assets**

The Capstone Project which is a multi-discipline team-based project simulates the entire industry life cycle of a video game in development from concept to completion with a focus on teamwork. Students focus on their preferred discipline of design, art, programming and/or management. Increased emphasis is placed on the polishing and refinement of game assets for their Capstone group project. Students are also taught refined animation techniques that are used to simulate life in finished game assets. Students continue to research and implement complex special visual effects for their Capstone group project. Emerging technologies such as Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) are explored. Game development pipeline, workflow, best practices, group work, presentations to peers, constructive peer review and other applicable technologies are strongly emphasized.

Prerequisite(s): GAM1556  
Corerequisite(s):none

**GAM1568 Capstone II: Studio**

The Capstone Project which is a multi-discipline team-based project simulates the entire industry life cycle of a video game in development from concept to completion with a focus on teamwork. Students focus on their preferred discipline of design, art, programming and/or management. Students continue to be mentored by faculty and industry topic experts to implement and verify game mechanics through play testing while in production. The Capstone group projects then proceed to Post-production where their titles are polished for release. Culmination of the Capstone project results in a release of a high-quality video game. Game development pipeline, workflow, best practices, group work, presentations to peers, constructive peer review and other applicable technologies are strongly emphasized. Students exhibit the ability to work as an effective team player and consistently meet milestone deliverables.

Prerequisite(s): none  
Corerequisite(s):none

**GAM1569 Capstone II: Advanced Game Programming**

The Capstone Project which is a multi-discipline team-based project simulates the entire industry life cycle of a video game in development from concept to completion with a focus on teamwork. Students focus on their preferred discipline of design, art, programming and/or management. Emphasis is placed on topics such as character animation, transition control, advanced peripherals, porting to multiple platforms, performance optimization, stress testing, unit testing, bug reporting and bug fixing. Emerging technologies such as Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) are explored. Emphasis is placed on the game development pipeline, workflow, best practices, group work, constructive peer review and other applicable technologies.

Prerequisite(s): GAM1559

Corerequisite(s):none

**GAM1570 Digital Imaging II**

Students build on concepts presented in Digital Imaging I. A variety of software tools and techniques are introduced to enhance and alter existing images, as well as graphic creation. The focus is to support all the 2-D as well as 3-D assets that consist of all image requirements in game design. Emphasis is placed on creating texture atlases, sprite sheets, fonts and concept art.

Prerequisite(s): GAM1507

Corerequisite(s):none

**GAM1571 Game and Graphics Programming II**

Artificial intelligence (AI) is a foundation cornerstone of game play that enhances the user experience. Students learn to analyze and formulate simulated behaviours for various non-player character classes found in typical video games. Creating conceptual behaviour designs and implementing each is practiced through the use of industry standard programming languages. Students create dynamic AI systems required for the game industry. Students are also introduced to the design of modern Graphics Processing Units (GPU) hardware and learn the feature set by which each GPU is evaluated and compared. Focus is on games, which are implemented in 2-D, such as side scrolling and top-down games. Topics include, but are not limited to data structures, vector manipulation, matrix transformations, vertex shaders, fragment shaders, texturing, game flow and memory management.

Prerequisite(s): GAM1547

Corerequisite(s):none

**GAM1572 Scripting for Designers**

Game designers use scripting languages in game creation to automate events, tune parameters, and create interaction between the player and game worlds. Students learn industry standard scripting languages used in game development environments. They learn how to create and modify scripts in the context of developing a game.

Prerequisite(s): GAM1545

Corerequisite(s):none

**GAM1573 Game and Graphics Programming III**

There is an ever-increasing demand for engaging gaming products that rests on the capabilities of those responsible for the development itself. Topics covered deal with advanced programming concepts, such as design patterns, internationalization, creating quality and sustainable documentation. Students learn techniques to optimize code for speed, memory use and re-usability. Students also focus on 3-D game computations which are required for determining object translations, object rotations, viewing volumes and projections, collision detection and game logic required in all 3-D games. Advanced shaders, sophisticated cameras, GPU issues relating to multi-platform development, and advanced rendering techniques are studied and implemented.

Prerequisite(s): GAM1571

Corerequisite(s):none

**GAM1574 Game Algorithms**

Students learn how to deconstruct familiar game elements and formulate these elements into concepts and finally reconstruct these concepts into original programmable game mechanics. Emphasis is on pseudo code, object analysis, object design, object-oriented programming concepts, class hierarchies and creating algorithms as they relate to computer games.

Prerequisite(s): GAM1547

Corerequisite(s):none

**GAM1575 Cinematics**

Students learn how to apply professional filmmaking techniques, rules and formulas in a video game environment using a full range of tools and assets. Areas of film production covered include cinematography, lighting, set design, casting, editing, storyboards and special effects. Students develop the skills needed to plan and produce engaging cinematic, cut scenes and game trailers. Students also learn the fundamentals of sound design and how to integrate professional quality audio into game cut scenes and game trailers.

Prerequisite(s): none

Corerequisite(s):none

**GAM1576 Game Assets II**

3D Game Assets II builds on the knowledge learned and applied in Game Assets I. Increased emphasis is placed on the polishing and refinement of game assets. Students are also taught the fundamentals of animation techniques that are used to simulate life to finished game assets. Strong emphasis is placed on the game development pipeline, workflow, best practices, and other applicable technologies.

Prerequisite(s): GAM1512

Corerequisite(s):none

**GED3013 General Education Elective**

Students choose one course, from a group of general education electives, which meets one of the following five theme requirements: Arts in Society, Civic Life, Social and Cultural Understanding, Personal Understanding, and Science and Technology.

Prerequisite(s): none

Corerequisite(s):none

**MAT8001V Technical Mathematics for Game Development**

Students learn foundational mathematics required in game development. Students manipulate algebraic expressions and solve linear equations and literal formulae. Students study the trigonometry of right triangles and solve trigonometric problems involving both acute and obtuse angles in standard position. Students study vectors and vector components to normalize vectors and to determine the scalar product and cross product of two 3-D vectors. Students study matrix algebra and use matrices to scale, rotate or translate graphics, change coordinate systems and transform points. Students acquire the knowledge to work with numerical systems and internal machine representations; binary/hex/octal/decimal math; and Boolean logic and truth tables. Delivered in a modular format, this course is equivalent to the completion of all of the following math modules MAT8100 - A, B, L, M, O, Q, and R.

Prerequisite(s): none

Corerequisite(s):none