GRADUATE DIPLOMA
MODELLING AND ANIMATION
FOR COMPUTER GAMES
TECHNOLOGY

Summary
• Degree offered: Graduate Diploma
• Registration status options: Full-time; Part-time
  • Full-time students should expect to take evening courses.
• Language of instruction: English
• Program option (expected duration of the program):
  • with coursework (3 full-time terms; 12 consecutive months)
• Academic unit: Faculty of Engineering (http://
  engineering.uottawa.ca).

Program Description
Internet and Virtual Reality (VR) technologies are quickly becoming essential tools in our daily activities.

The Internet is used worldwide as an unlimited source of knowledge and information, as a vehicle for profitable trade and as a forum for discussion.

The economic significance of the Internet is tremendous. Billions of dollars in business transactions are conducted each year on websites such as E*TRADE, eBay and Dell.

The Internet has become the vehicle for integrated collaborative multimedia (voice/video/graphics/data) communications. It is absorbing within its standards and protocols other well established technologies such as: telephony, facsimile, text messaging, data and entertainment technologies.

Its fastest growing service, the World Wide Web, has created a true information revolution and is daily pushing the limits of current technologies to cope with its growth.

The diploma includes courses in both the basic theories and applications of collaborative multimedia technology and large scale modeling, as well as courses in the intricate world of Computer Animations (with applications in soft-images, simulation, multimedia teaching, e-training, computer games and many others).

Learning Outcomes
The objective of the Graduate Diploma in Modelling and Animation for Computer Games Technology is to educate high-technology professionals for the growing collaborative multimedia and VR technology standards, methods, techniques and applications markets.

Other Programs Offered Within the Same Discipline or in a Related Area
• Master of Computer Science (MCS)
• Master of Computer Science Specialization in Bioinformatics (MCS)
• Doctorate in Philosophy Computer Science (PhD)

Fees and Funding
• Program fees:

  The estimated amount for university fees (https://www.uottawa.ca/
  university-fees) associated with this program are available under the section Finance your studies (http://www.uottawa.ca/graduate-
  studies/programs-admission/finance-studies).

  International students enrolled in a French-language program of study may be eligible for a differential tuition fee exemption (https://www.uottawa.ca/university-fees/differential-tuition-fee-
  exemption).

  To learn about possibilities for financing your graduate studies, consult the Awards and financial support (https://www.uottawa.ca/
  graduate-studies/students/awards) section.

Notes
• Programs are governed by the general regulations (http://
  www.uottawa.ca/graduate-studies/students/general-regulations) in effect for graduate studies.
• In accordance with the University of Ottawa regulation, students have the right to complete their assignments, examinations, research papers, and theses in French or in English.
Program Contact Information
Graduate Studies Office,
Faculty of Engineering (http://engineering.uottawa.ca/about/programs/graduate)
161 Louis-Pasteur, Colonel By Hall, Room B111
Ottawa, Ontario, Canada
K1N 6N5

Tel.: 613-562-5800 x6700
Email: engineering.grad@uottawa.ca

Twitter | Faculty of Engineering (https://twitter.com/uOttawaGenie?lang=en)
Facebook | Faculty of Engineering (https://www.facebook.com/uottawa.engineering)

Admission Requirements
For the most accurate and up to date information on application deadlines, language tests and other admission requirements, please visit the specific requirements (http://www.uottawa.ca/graduate-studies/programs-admission/apply/specific-requirements) webpage.

To be eligible, candidates must:
- Have a four-year Bachelor’s degree with honours (or equivalent), with a minimum average of B+ (75%) in one of the following:
  - Electrical Engineering
  - Computer Engineering
  - Software Engineering
  - Computer Science

  Notes:
  - International candidates must check the admission equivalencies (https://www.uottawa.ca/graduate-studies/international/study-uottawa/admission-equivalencies) for the diploma they received in their country of origin.
  - The admissions committee may, however, also admit other candidates who satisfy the minimum admission requirements in effect for the graduate studies and have demonstrated relevant knowledge and/or experience. Candidates for whom a list of additional qualifying courses will be required may be considered on an exceptional basis. In this case, they must obtain a minimum grade of B+ in all their additional courses.
  - Pay the $100 (CDN non-refundable) application fee.

Language Requirements
Applicants must be able to understand and fluently speak the language of instruction (English) in the program to which they are applying. Proof of linguistic proficiency may be required.

Applicants whose first language is neither French nor English must provide proof of proficiency in the language of instruction.

Language tests recognized by the University of Ottawa:
- TOEFL: 580 (paper-based) or 92-93 (internet-based); or
- IELTS: Overall 6.5 – Individual 6.0 (paper-based) or Overall 7.0 – Individual 6.0 (internet-based); or
- An equivalent language test (http://www.uottawa.ca/graduate-studies/programs-admission/apply/required-documents).

Note: Candidates are responsible for any fees associated with the language tests.

Notes
- The admission requirements listed above are minimum requirements and do not guarantee admission to the program.
- Admissions are governed by the general regulations (http://www.uottawa.ca/graduate-studies/students/general-regulations) in effect for graduate studies.
- A maximum of three units in equivalencies or advanced standing may be granted. To be eligible, the units in question must not have counted towards the requirements of a previous diploma or degree. Candidates who have already successfully completed some of the compulsory units may be allowed to replace those units with elective units. For details, consult section B.2.7. of the general regulations in effect for graduate studies.

Documents Required for Admission
In addition to the documents required (http://www.uottawa.ca/graduate-studies/programs-admission/apply/required-documents) for graduate and postdoctoral studies, candidates must submit the following documents:
- A resume
- A letter of intent
  - Letter outlining your professional goals and proposed research area.
- Two confidential letters of recommendation from professors who have known the applicant and are familiar with their work.
  - You are strongly encouraged to contact your referee(s) prior to submitting your application in order to confirm their email address and their availability to complete your letter of recommendation.
- Transcripts from all universities attended:
  - You must submit official transcripts from all the universities you have attended.
  - This applies to all courses and programs at any university you attended, including regular programs (completed or not),

exchanges, letters of permission, online or correspondence courses, courses taken as a special student or visiting student, etc.

- If the transcript and degree certificate are not in English or French, a certified translation (signed and stamped/sealed) must be submitted.

Note: Documents that are not required for admission will not be consulted, conserved or returned to the student. These documents will be destroyed according to our administrative procedures.

Information about how to apply to this program is available under the Apply Now (http://www.uottawa.ca/graduate-studies/programs-admission/apply/#apply-now) section.

Students should complete and submit their online application with supporting documentation (if applicable) by the deadline indicated above.

## Program Requirements
### Graduate Diploma

Students must meet the following requirements:

#### Compulsory Courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELG 5124</td>
<td>Virtual Environments</td>
<td>3</td>
</tr>
</tbody>
</table>

12 optional course units from: 12 Units

- CSI 5122 Software Usability
- CSI 5140 Selected Topics in Computer Systems (Category S)
- CSI 5161 Principles of Distributed Simulation
- CSI 5180 Topics in Artificial Intelligence
- ELG 5121 Multimedia Communications
- ELG 5191 Design of Distributed System Software
- ELG 5196 Automata and Neural Networks
- ELG 5378 Image Processing and Image Communications
- ELG 7113 Topics in Systems and Control I: Linear and Nonlinear Filtering
- ELG 7186 Topics in Computers I
- ELG 7187 Topics in Computers II

### Fast-Track from the Diploma to the Master's

Students enrolled in the graduate diploma program can request to transfer to the Master of Applied Science degree (MASc) or to the Master of Engineering degree (MEng) in accordance with section A.7.1 of the general regulations in effect for graduate studies.

On completion of the diploma, qualified students meeting admission requirements for the master’s programs in computer science or electrical engineering (MCS, MEng, MASc), could apply to one of those programs, and upon admission, complete their requirements with units granted for relevant courses already completed in the diploma. The number of units remaining would be assessed individually, at the time of admission, with relation to the student's chosen master's program. The regulation governing the articulation between graduate diplomas and related master’s programs can be found in the general regulations in effect for graduate studies (section A.7).

### Minimum Requirements

The passing grade in all courses is B.

A student who fails 6 units must withdraw from the program.

### Research

#### Research Fields & Facilities

Located in the heart of Canada’s capital, a few steps away from Parliament Hill, the University of Ottawa is among Canada’s top 10 research universities.

uOttawa focuses research strengths and efforts in four Strategic Areas of Development in Research (SADRs):

- Canada and the World
- Health
- e-Society
- Molecular and Environmental Sciences

With cutting-edge research, our graduate students, researchers and educators strongly influence national and international priorities.

#### Research at the Faculty of Engineering

Areas of research:

- Chemical and Biological Engineering
- Civil Engineering
- Electrical Engineering and Computer Science
- Mechanical Engineering

For more information, refer to the list of faculty members and their research fields on Unifiweb.

IMPORTANT: Candidates and students looking for professors to supervise their thesis or research project can also consult the website of the faculty or department (https://www.uottawa.ca/graduate-studies/students/academic-unit-contact-information) of their program of choice. Unifiweb does not list all professors authorized to supervise research projects at the University of Ottawa.

### Courses

#### CSI 5122 Software Usability (3 units)

Design principles and metrics for usability. Qualitative and quantitative methods for the evaluation of software system usability: Heuristic evaluation, usability testing, usability inspections and walkthroughs, cognitive walkthroughs, formal usability experimentation. Ethical concerns when performing studies with test users. Economics of usability. Integration of usability engineering into the software engineering lifecycle. This course is equivalent to COMP 5301 at Carleton University.

**Course Component:** Lecture
CSI 5140 Selected Topics in Computer Systems (Category S) (3 units)
Selected topics in Computer Systems (Category S), not covered by other graduate courses. Details will be available from the School at the time of registration. This course is equivalent to COMP 5900 at Carleton University.
Course Component: Lecture

CSI 5161 Principles of Distributed Simulation (3 units)
Distributed simulation principles and practices. Synchronization protocols: Optimistic vs Conservative, Deadlock detection in conservative simulations, Time warp simulation. Distributed interactive simulation: Data distribution management, Interest management, High Level Architectures (HLA), Run Time Infrastructure (RTI). Distributed web-based simulation. Distributed agent based simulation. Real time applications of distributed simulation. Distributed and collaborative virtual simulations. This course is equivalent to COMP 5606 at Carleton University.
Course Component: Lecture

CSI 5180 Topics in Artificial Intelligence (3 units)
Selected topics in Artificial Intelligence (A.I.), could include A.I. programming techniques, pattern matching systems, natural language systems, rule-based systems, constraint systems, machine learning systems, and cognitive systems. Applications could include areas in Finance, Medicine, Manufacturing, Smart Cities, Semantic Web, Healthcare, Fraud Detection, Intrusion Detection, Autonomous Vehicles, Opinion mining, Sentiment Analysis or similar areas. Assignments will be both (a) programming-oriented, requiring implementation and/or extensions of prototypes in Lisp and/or Prolog and (b) research-oriented, requiring readings of special topics in current A.I. journals. This course is equivalent to COMP 5100 at Carleton University.
Course Component: Lecture

ELG 5121 Multimedia Communications (3 units)
Course Component: Lecture

ELG 5124 Virtual Environments (3 units)
Basic concepts. Virtual worlds. Hardware and software support. World modeling. Geometric modeling. Light modeling. Kinematic and dynamic models. Other physical modeling modalities. Multisensor data fusion, anthropomorphic avatars. Animation: modeling languages, scripts, real-time computer architectures. VE interfaces. Case studies. This course is equivalent to EACJ 5204 at Carleton University.
Course Component: Lecture

ELG 5191 Design of Distributed System Software (3 units)
Distributed systems design and programming issues; distributed computing. Basics of object oriented technology for distributed computing. Distributed objects technologies. Object oriented models for distributed programming. Distributed computing architecture design. Component based distributed software design. Scalability, interoperability, portability and distributed services. Distributed applications design. This course is equivalent to EACJ 5203 at Carleton University.
Course Component: Lecture
Prerequisite: An undergraduate education in Computer Engineering, or Computer Science, or practical experience in system software design.

ELG 5196 Automata and Neural Networks (3 units)
Automata and neural networks: historical review, cellular automata, parallel distributed processing, multilayered networks and recurrent networks. Learning algorithms: linear learning, competitive learning, backward error propagation algorithm and training algorithm used in Boltzmann machines. Applications: pattern recognition, vector quantization, temporal pattern recognition, optimization, associative memory and control of dynamical systems. Hardware realization: implementation issues, analogue and digital VLSI implementations, and silicon models of early visual processing. Courses ELG 5196, ELG 6161 (SYSC 5601) cannot be combined for units. This course is equivalent to EACJ 5709 at Carleton University.
Course Component: Lecture
Exclusion: SYSC 5601, ELG 6161.

ELG 5378 Image Processing and Image Communications (3 units)
Course Component: Lecture
Prerequisite: Probability and Signal Processing at undergraduate or graduate level. This course is equivalent to EACJ 5509 at Carleton University.

ELG 7113 Topics in Systems and Control I: Linear and Nonlinear Filtering (3 units)
Current topics in the field, including linear semigroup theory and optimal feedback control. This course is equivalent to EACJ 5209 at Carleton University.
Course Component: Lecture

ELG 7186 Topics in Computers I (3 units)
This course is equivalent to EACJ 5807 at Carleton University.
Course Component: Lecture

ELG 7187 Topics in Computers II (3 units)
This course is equivalent to EACJ 5808 at Carleton University.
Course Component: Lecture