Area of Interest: Advanced Technology

Geographic Information Systems (Co-op and Non Co-op Version)

Ontario College Graduate Certificate Program Code: 1588X03FWO

1 Year

Ottawa Campus

Our Program

Specialize your career path - Explore geographic science and information systems technology.

The one-year Geographic Information Systems Ontario College Graduate Certificate program provides you with knowledge and skills relating to geographic and cartographic science, with a focus on information systems technology.

In this program, you use both hands-on and theoretical approaches to explore topics such as:

- field data collection

- programming

- remote sensing

- enterprise geo-database design and management

- cloud-based services

- application development

- 2D and 3D cartographic design

- spatial analysis and project management

A key part of this program is the independent project that you begin in your first semester and complete throughout your studies. You identify an area of interest, develop a project proposal, and then implement and complete your project, all in collaboration with an industry or government sponsor.

Students also have the option to gain real-world experience through a paid co-operative education (co-op) work term (see Additional Information for more details). Please note that places in the co-op work term are subject to availability and academic eligibility. Please note admission to the co-op program does not guarantee a co-op placement.

The use of GIS in various business environments is growing. Graduates may find work in:

- utility/resource management companies

- survey/engineering/environmental companies

- software companies

- municipal, provincial or federal agencies

Graduates may also seek employment in jobs where GIS is a tool used within the discipline of their previous degree or diploma.

Employment

Graduates may find employment in organizations, such as utility/resource management companies, survey/engineering/environmental firms, software companies, or municipal, provincial or federal agencies. They may seek employment in jobs where GIS is a tool used within the discipline of their previous degree or diploma. Graduates may also find employment where information technology is the primary focus.

The implementation of GIS in various business environments is growing rapidly, enhancing employment opportunities for GIS graduates in this sector.

Learning Outcomes

The graduate has reliably demonstrated the ability to:

- Create digital geographic data sets and services to given specifications suitable for use in GIS applications and digital mapping.

- Use GIS software and applications in various situations to create required documents and applications.

Program of Study

Level: 01	Courses	Hours
GIS4107	Introduction to Programming	56.0
GIS4110	Gis Foundation Skills	84.0
GIS4111	Spatial Data and Data Collection	56.0
GIS4112	Statistics and Data Representation	42.0
GIS4113	Database Design and Management	56.0
Level: 02	Courses	Hours
GEP1001	Cooperative Education and Job Readiness	21.0
GIS4204	Introduction to Remote Sensing	56.0
GIS4205	Digital Map Compilation	56.0
GIS4207	Gis Programming 1	56.0
GIS4210	Cartographic Design and VIsualization	42.0
GIS4211	Geospatial Analytical Methods	56.0
GIS4212	Gis Applications and Project Planning	28.0
Level: 03	Courses	Hours
GEP2001	Co-Op Job Search 1	21.0
GIS4304	Remote Sensing 2	56.0
GIS4307	Gis Programming 2	56.0
GIS4308	Web Gis Applications	56.0
GIS4309	Gis Project	84.0
Co-op: 01	Courses	Hours
WKT8001	Work Term I	0.0

Fees for the 2025/2026 Academic Year

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

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

Fees are subject to change.

Additional program related expenses include:

Books and supplies cost approximately $2,096 for the program and can be purchased from the campus store. For more information visit
 http://www.algonquincollege.com/coursematerials

Admission Requirements for the 2026/2027 Academic Year

Program Eligibility

- Ontario College Diploma, Ontario College Advanced Diploma, Degree or equivalent in a related field, or equivalent with departmental approval

- 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 6.5 with a minimum of 6.0 in each band OR TOEFL-Internet-based (iBT)-overall 88, with a minimum of 22 in each component: Reading 22; Listening 22; Speaking 22; Writing 22 OR Duolingo English Test (DET) Overall 120, minimum of 120 in Literacy and no score below 105.

Programming experience is not a requirement for this program of study; however, applicants are encouraged to acquire basic programming experience prior to the start of the program of study.

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Application Information

GEOGRAPHIC INFORMATION SYSTEMS
Program Code 1588X03FWO

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

Applications are available online at http://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 applying from out-of-country can obtain the International Student Application Form at https://algonquincollege.my.site.com/myac360/s/self-registration-page or by contacting the Registrar's Office.

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

CO-OP INFORMATION
All applicants apply directly to the co-op version of this program through OntarioColleges.ca or our International Application Portal. Applicants not wishing to pursue the co-op version will have the opportunity to opt-out after being admitted to the program but prior to the first co-op work term.

Co-operative education (Co-op) allows students to integrate their classroom learning with a real-world experience through paid work terms. Two academic terms prior to the cooperative education work term, students are required to actively participate in and successfully complete the self-directed co-op course, readiness activities and workshops.

Students must actively conduct a guided, self-directed job search and are responsible for securing approved program-related paid co-op employment. Students compete for co-op positions alongside students from Algonquin College and other Canadian and international colleges and universities. Algonquin College's Co-op Department provides assistance in developing co-op job opportunities and guides the overall process, but does not guarantee that a student will obtain employment in a co-op work term. Co-op students may be required to relocate to take part in the co-op employment opportunities available in their industry and must cover all associated expenses; e.g., travel, work permits, visa applications, accommodation and all other incurred expenses.

Co-op work terms are typically 14 weeks in duration and are completed during a term when students are not taking courses. For more information on your program's co-op level(s), visit the courses tab on your program's webpage.

International students enrolled in a co-op program are required by Immigration, Refugees and Citizenship Canada (IRCC) to have a valid Co-op/Internship Work Permit prior to commencing their work term. Without this document International students are not legally eligible to engage in work in Canada that is part of an academic program. The Co-op/Internship Work Permit does not authorize international students to work outside the requirements of their academic program.

For more information on co-op programs, the co-op work/study schedule, as well as general and program-specific co-op eligibility criteria, please visit http://www.algonquincollege.com/coop .

Contact Information

Program Coordinator(s)

- Jose Dimayuga, mailto:dimayuj@algonquincollege.com , 613-727-4723, ext. 3458

Course Descriptions

GEP1001 Cooperative Education and Job Readiness

Students are guided through a series of activities that prepare them to conduct a professional job search and succeed in the workplace. Through a detailed orientation students learn the cooperative education program policies and procedures related to searching and securing a work term opportunity. Students identify their strengths and transferable skills and participate in workshop-style sessions that focus on cover letter and resume development, interview techniques and job search strategies. Students learn how to navigate a web-based resource centre, which is used to post employment and cooperative education job opportunities. Students reflect on workplace success, ethics and responsibilities.

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

GEP2001 Co-Op Job Search 1

Students are guided through a self-directed co-op job search using Algonquin's web-based resource centre, HireAC, as well as independent resources. Students will access information on key job search processes, including Co-op and Career Centre job search procedures and how to declare a self-developed job that meets co-op guidelines. Students will apply and further develop their knowledge on networking, interview techniques and job search strategies to improve their chances of success in securing co-op employment through a competitive job search process. Additional support is provided through individual coaching and group sessions, including job application reviews, mock interviews and assistance for students experiencing unique employment challenges.

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

GIS4107 Introduction to Programming

Programming skills are required to customize GIS software and to automate geoprocessing. Students explore programming fundamentals including data types (strings, numbers, lists and dictionaries), flow control structures (looping and branching), file access and program design concepts (breaking larger programs into separate code modules and functions). Students code, test and debug using industry standard integrated development environments (IDEs).

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

GIS4110 Gis Foundation Skills

Students learn and develop foundation skills using desktop and online GIS software. They learn to select suitable formats for storage of spatial information including geo-relational vector data models, raster data models and specialized data models. Students access and explore open data sources, and examine the linkage between spatial entities and attribute tables. They organize and access data using local, network and internet service architectures. Students create spatial and attribute-based queries, including spatial and attribute-based joins. Students execute basic geoprocessing through a variety of approaches, and develop basic data editing skills.

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

GIS4111 Spatial Data and Data Collection

Knowledge of map interpretation, projections and coordinate systems is essential in GIS. Students examine global geometry and coordinate systems, ellipsoids, horizontal and vertical datums. Students examine the properties and classes of map projections, and develop skills in projection selection. Students examine means of collecting geographic data including GPS and develop data

collection protocols for data verification and field checking. Students also explore a variety of methods for data conditioning and preparation. They work in teams to collect data in the field. Students investigate various sources of online geographic data and map services, and create web-based reports using HTML and CSS.

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

GIS4112 Statistics and Data Representation

An understanding of data characteristics is required to create effective geographic representations and analyses. Students explore the relationship between statistics and geographic data. Students also explore various data measurement classes. Students investigate basic bivariate, multivariate and spatial statistics commonly used with spatial data. The focus is on appropriate usage of techniques rather than mathematical derivation. Topics and techniques include spatial/nonspatial summary measures, and basic regression analysis. Students explore the concept of spatial autocorrelation, and apply basic statistical techniques to geographic data sets using appropriate software. Students explore basic cartographic design using their understanding of data statistics. Colour theory and symbology are also explored.

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

GIS4113 Database Design and Management

Database design and management is an integral part of GIS. Students are introduced to database design and management concepts. Students gain experience in data modelling, database design, and database management along with database access, integrity and security. Students program database queries using database manipulation languages. The links between conventional databases and spatial databases used in GIS are examined. Students gain experience with open source and commercial database management software including multi-user client-server architectures.

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

GIS4204 Introduction to Remote Sensing

Remote sensing is a major component of GIS. Students explore the principles of image acquisition from airborne and space sensors. Topics include the characteristics of the electromagnetic spectrum, geometric and radiometric correction, image interpretation and image classification. Students gain experience using remote sensing software.

Prerequisite(s): GIS4111 and GIS4112
Corerequisite(s):none

GIS4205 Digital Map Compilation

Awareness of the characteristics of CAD data formats is important when working in the GIS field. Using CAD software, students construct, manipulate and edit graphic elements suitable for mapping and GIS applications. They work to mapping specifications for optimal feature representation and positional accuracy. Students transform CAD data into various GIS data formats and work in teams for some assignments. Students gain awareness of conventional survey methods.

Prerequisite(s): GIS4110 and GIS4111
Corerequisite(s):none

GIS4207 Gis Programming 1

Programming skills are required to customize GIS software and to automate geoprocessing. Students automate geoprocessing tasks and build custom GIS tools using industry standard application frameworks and class libraries. Students use object-oriented, event-driven

programming concepts to modify GIS application GUIs and to integrate their own application extensions. They explore more complex application architecture using advanced integrated development environments (IDEs).

Prerequisite(s): GIS4107 and GIS4110 and GIS4113
Corerequisite(s):none

GIS4210 Cartographic Design and VIsualization

Knowledge of design principles is integral to the presentation of geographic information. Students investigate design issues in thematic mapping. They apply generic design concepts to cartography. Thematic mapping topics explored include classification, simplification and generalization. Students select and design cartographic representations most appropriate to the data. Students explore various approaches to visualization. They create dynamic web displays of cartographic information. Students also explore the history of cartography.

Prerequisite(s): GIS4110 and GIS4111 and GIS4112
Corerequisite(s):none

GIS4211 Geospatial Analytical Methods

Students examine various analytical principles and techniques for spatial problem solving. Students transform spatial data using various approaches. Multi-criteria analysis is explored. 3D analysis is explored, including DEM derivation from LiDAR and other sources, as well as interactive display of 3D visualization. Temporal analysis and interactive display options are introduced. Students use GIS network analysis to model transportation scenarios. The use of scripts and models to document analytical methods is emphasized.

Prerequisite(s): GIS4110 and GIS4111
Corerequisite(s):none

GIS4212 Gis Applications and Project Planning

Awareness of the various approaches to GIS project design and applications of GIS technology helps students prepare for their own independent project. Students investigate various GIS case studies in order to explore a range of GIS applications. Students discuss solutions to GIS problems and scenarios, and prepare for their GIS Project by exploring project management concepts and creating a written and oral project proposal.

Prerequisite(s): GIS4110 and GIS4111 and GIS4112
Corerequisite(s):none

GIS4304 Remote Sensing 2

Remote sensing is a major component of GIS. Students investigate advanced classification procedures, texture measures, change detection, colour space transforms and principal component analysis. They examine the detailed characteristics of images from specialized sensors including LiDAR and Synthetic Aperture Radar. Students explore the integration of Remote Sensing and GIS. The integration of advanced statistical tools with imagery datasets is explored.

Prerequisite(s): GIS4204 and GIS4211
Corerequisite(s):none

GIS4307 Gis Programming 2

Programming skills are required to customize GIS software and to automate geoprocessing. Students develop geospatial analysis methodologies using programming languages and extensions, large data sets and web services. Tools for Machine Learning within a GIS context are explored. Application deployment is also covered.

Prerequisite(s): GIS4207
Corerequisite(s):none

GIS4308 Web Gis Applications

The web is an increasingly important platform for analyzing and viewing geographic data. Students learn to serve geographic information using the Internet and are introduced to web architecture, protocols and the request-response cycle. Students develop web applications using HTML, JavaScript and extensions, server-side scripting and a web server, as well as web applications that access databases and integrate tabular data into web applications. Open-source and commercial map server technology are introduced and students also develop dynamic map services that are integrated within web applications. Cloud-based GIS-content management systems and templates are also introduced. Issues explored include accessibility, standards and geographic communication using web GIS applications.

Prerequisite(s): GIS4207 and GIS4210
Corerequisite(s):none

GIS4309 Gis Project

Executing an independent GIS project builds soft skills and provides students with an opportunity to showcase their abilities to the wider GIS community. Students carry out an independent GIS project in consultation with external project sponsors. Evaluation is based on project organization and scheduling throughout the term, as well as the final products. Students give oral presentations about the project and produce a variety of project deliverables, documentation and presentation materials.

Prerequisite(s): GIS4211 and GIS4212
Corerequisite(s):none

WKT8001 Work Term I

Students complete a cooperative work term, and submit a written report which documents the location of employment and the duties performed.

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