

Area of Interest: Advanced Technology

## Computer Programming

Ontario College Diploma

Program Code: 0336X01FXA

2 Years

Ottawa Campus

### Our Program

Algonquin College has partnered with CDI College, a private career college located in the Greater Toronto Area to deliver this program to international students at their campus in Mississauga, Ontario.

Students who complete their Algonquin College program of study through CDI College will graduate with an Algonquin College credential.

The two-year Computer Programmer Ontario College Diploma program prepares you for a career in software development. The program also specializes in program development strategies (using object-oriented modelling), database design and database administration.

In your final semester, participate in a software development project working with external clients to gain real-world experience in the programming field.

Graduates may work in a variety of different fields, as almost all sectors of industry require programming and database skills. Fields may include:

- Private and public sectors
- Healthcare
- Education
- Commerce
- Science
- Finance
- Production
- Information services
- Service industry
- Human services

### SUCCESS FACTORS

This program is well-suited for students who:

- Enjoy, and are adept at, strategising solutions to problems.
- Are life-long learners ready to meet the challenges presented by rapidly changing technology.
- Enjoy working independently and with others as a member of a team.
- Are organized in their work and pay attention to detail.

### Employment

Graduates may find a variety of employment opportunities as applications programmers and systems analysts who can work independently and as part of a team to analyze, design, code, debug, test, implement and maintain application systems. Training in web programming, business programming, database design and database administration may also present job opportunities in those areas. Employment may be found in organizations of all sizes in both the public and private sectors.

## Learning Outcomes

The graduate has reliably demonstrated the ability to:

- Identify, analyze, develop, implement, verify and document the requirements for a computing environment.
- Contribute to the diagnostics, troubleshooting, documenting and monitoring of technical problems using appropriate methodologies and tools.
- Implement and maintain secure computing environments.
- Implement robust computing system solutions through validation testing that aligns with industry best practices.
- Communicate and collaborate with team members and stakeholders to ensure effective working relationships.
- Select and apply strategies for personal and professional development to enhance work performance.
- Apply project management principles and tools when working on projects within a computing environment.
- Adhere to ethical, legal, and regulatory requirements and/or principles in the development and management of computing solutions and systems.
- 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
CST8101Z	Computer Essentials	56.0
CST8116Z	Introduction to Computer Programming	70.0
CST8215Z	Introduction to Database	70.0
CST8300Z	Achieving Success in Changing Environments	42.0
ENL1813Z	Communications I	42.0
MAT8001Z	Technical Mathematics for Computer Science	56.0
Level: 02	Courses	Hours
CST2355Z	Database Systems	56.0
CST8102Z	Operating System Fundamentals (Gnu/Linux)	70.0
CST8284Z	Object Oriented Programming (Java)	70.0
CST8285Z	Web Programming	56.0
ENL2019Z	Technical Communication for Engineering Technologies	42.0

Choose one from equivalencies Courses		Hours
GED0336Z	General Education Elective	42.0
Level: 03	Courses	Hours
CST2234Z	Systems Analysis and Design	56.0
CST2335Z	Mobile Graphical Interface Programming	56.0
CST8109Z	Network Programming	70.0
CST8288Z	Object Oriented Programming with Design Patterns	70.0
Elective: choose 1	Courses	Hours
CST8283Z	Business Programming	56.0
CST8390Z	Business Intelligence and Data Analytics	56.0
Level: 04	Courses	Hours
CST8276Z	Advanced Database Topics	70.0
CST8277Z	Enterprise Application Programming	70.0
CST8333Z	Programming Language Research Project	56.0
CST8334Z	Software Development Project	56.0
Choose one from equivalencies Courses		Hours
GED0336Z	General Education Elective	42.0

## Fees for the 2023/2024 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.

Supplies can be purchased through CDI College.

## Admission Requirements for the 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
- 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 of \$50 (subject to change).

### Program Eligibility

- English, Grade 12 (ENG4C or equivalent).
- Mathematics, (Grade 12 MCT4C) or (Grade 11 MCR3U) or equivalent; or (Grade 12 MAP4C with a grade of 80% or higher) or (Grade 11 MCF3M with a grade of 70% or higher).
- 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.

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

Note: 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.

## **Admission Requirements for 2023/2024 Academic Year**

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## Application Information

### COMPUTER PROGRAMMING Program Code 0336X01FXA

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

## Additional Information

Program curriculum is reviewed annually to reflect evolving industry standards in the information technology field.

Several courses assist in the preparation for industry standard Java and Oracle certification examinations (CST2355Z, CST8276Z, CST8277Z, CST8284Z and CST8288Z).

For more information regarding this program, please email <mailto:ACsupport@cdicollge.ca>.

## Course Descriptions

### CST2234Z Systems Analysis and Design

Complex information technology systems require extensive planning and design. Guided by industry standard software engineering methodologies, students gain hands-on experience with case studies used to develop systems from inception through elaboration, construction and transition phases. Object-oriented design, modeling tools and techniques are used to produce system specifications. Project management principles are also used within team developed projects. Software methodologies discussed include the Systems Development Life Cycle (SDLC), agile approach, Rational Unified Process (RUP) and Rapid Application Development (RAD).

Prerequisite(s): CST8215Z and CST8284Z and ENL2019Z

Corequisite(s):none

### CST2335Z Mobile Graphical Interface Programming

Mobile devices play an instrumental part of everyday life, thus requiring knowledge of mobile graphical user interface development. Students explore graphical user interface programming in a mobile Android environment. Students learn how to program applications using the latest Android development tools. Topics include application architecture, interface design, network communication, and database integration.

Prerequisite(s): CST8215Z and CST8284Z

Corequisite(s):none

### CST2355Z Database Systems

Database systems can automate data processing tasks as well as tie into the security of information technology systems. Students acquire practical experience using market-leading object-relational database management systems like Oracle and MySQL. Students obtain hands-on experience with advanced engineering modeling tools along with SQL, SQL scripts and programming with Oracle's PL/SQL blocks. Database concepts covered include advanced SQL, case structures, rollup and cube operations, metadata manipulation, data storage and retrieval, security and transaction control and data warehousing.

Prerequisite(s): CST8215Z

Corequisite(s):none

**CST8101Z Computer Essentials**

The essentials of computer software, hardware, and laptop management form the foundation for building further technical programming skills. Learn to configure your laptop environment, basic PC and troubleshoot problems. Students create backups, install virus protection, and manage files through a basic understanding of the Windows Operating System. Students also install and configure the Windows Operating System, and a virtual machine environment and explore computer organization including basic numerical systems, functional hardware and software components needed to run programs

Prerequisite(s): none

Corerequisite(s):none

**CST8102Z Operating System Fundamentals (Gnu/Linux)**

Operating systems form the backbone of information technology systems coordinating the interaction between hardware and software. Students explore the basic concepts and components of Operating Systems (OS), and how they function and interact with hardware and software components. Students examine the details of operating system structures, process management, storage management, installation, configuration, and administration both in theory and through practical assignments based on the GNU/Linux operating system. Lab work is designed to implement the theory by developing skills using the powerful GNU/Linux command-line tools and utilities.

Prerequisite(s): CST8116Z and CST8118Z

Corerequisite(s):none

**CST8109Z Network Programming**

Software programming in today's environment requires detailed knowledge of the underlying network topology, its implementation and programming support functions. Gaining an appreciation and perspective of this technology is imperative to developing good network programming applications. Students explore topics including the basic structure, design and layered communications models, with an emphasis on data communications, TCP/IP protocol suite, socket programming and multi-threading concepts. Labs include practical exercises in basic networking and using socket programming, along with multi-threading, in an environment rich with common networking tools for diagnosing and troubleshooting typical network programming problems.

Prerequisite(s): CST8116Z and MAT8001Z

Corerequisite(s):none

**CST8116Z Introduction to Computer Programming**

Possessing the fundamentals of logic, problem-solving and programming language structure provides a solid foundation for further study in the field. Students develop introductory knowledge of computer programming with emphasis on problem analysis and design, using algorithms, pseudocode, flowcharts, UML Class Diagrams and testing, with the Java programming language used as a means to implement problem solution designs. Through an introduction to the Java programming language students use sequential structures, selection structures, repetition structures, variables, constants, methods, constructors, one-dimensional arrays, object-oriented programming, classes, objects, abstraction, encapsulation, inputs, outputs, coding conventions and documentation. Theory is reinforced with application by means of practical laboratory assessments.

Prerequisite(s): none

Corerequisite(s):none

**CST8215Z Introduction to Database**

Databases are used to store data and are a core component of many information technology systems. Students learn the fundamentals of relational databases design using Entity Relation Diagrams (ERDs), and use Structured Query Language (SQL) to create, modify and query a database. Students design and create databases that are maintainable, secure and adaptable to change in business requirements, using normalization. Students become familiar with the functions



of a Database Management System (DBMS) and its components in comparison with legacy systems and alternative information storage mechanisms.

Prerequisite(s): none

Corerequisite(s):none

### **CST8276Z Advanced Database Topics**

Database administration is an important role, in particular for deployed information technology systems. Teams and individuals explore advanced database topics including database administration (using Oracle), data governance, globalization, security and advances in database technology. Topic coverage includes business intelligence, data warehouses, data visualization, big data, NoSQL and graph databases. Database administration tasks requiring knowledge of database architecture are examined: relational vs. non-relational models, security, performance, database distribution, database sharing, backup and recovery.

Prerequisite(s): CST2355Z and CST8109Z

Corerequisite(s):none

### **CST8277Z Enterprise Application Programming**

Enterprise applications connect clients to services that are based on data stored in database management systems. With a focus on the IT Enterprise, students examine the application enterprise environment using and extending the technologies learned in previous courses. Students examine the commonly used enterprise systems development technologies such as Java/Jakarta Enterprise Edition, cloud computing, security and the corporate database repository.

Prerequisite(s): CST8109Z and CST8288Z

Corerequisite(s):none

### **CST8283Z Business Programming**

Information systems built using the COBOL programming language support important institutions such as government services and the banking sectors. Students create COBOL programs in a business environment using structured methodology in the latest visual programming environment. Topics include output design, logic design tools, structured, top-down and modular coding, testing and debugging, and documentation. Students examine interactive, file-based, and database processing of data related to business problems. Arrays, indexed files, database access and sub-programs are explored.

Prerequisite(s): CST8116Z

Corerequisite(s):none

### **CST8284Z Object Oriented Programming (Java)**

Working in the field of information technology as a programmer requires a firm understanding of Object-Oriented Programming (OOP) concepts. Students explore object-oriented programming methodology using the Java programming language. Object oriented concepts, such as encapsulation, inheritance, abstraction and polymorphism are covered and reinforced with practical applications. Students explore the basics of data structures and algorithms as well as basic Graphical User Interface (GUI) programming.

Prerequisite(s): CST8116Z

Corerequisite(s):none

### **CST8285Z Web Programming**

The World Wide Web (WWW) has become an integrated part of everyday life. Students develop basic skills of web programming, website design and implementation. JavaScript, HTML5, and PHP are used to explore web-based solutions to problems of increasing interactivity and complexity. Lectures are reinforced by practical assignments that encourage students to construct and maintain their own websites.

Prerequisite(s): CST8116Z

Corerequisite(s):none

**CST8288Z Object Oriented Programming with Design Patterns**

Design patterns are programming architecture solutions to common challenges faced in software implementation. Students implement best practices of object-oriented program development with software design patterns. Students also apply Unified Modeling Language (UML) program specifications in the Java programming language. SQL through JDBC technology is used embedded for developing and using "data access objects". Course topics include refactoring, domain modelling, JDBC and multithreaded servlet programming. Students develop proficiency in creating, testing, debugging, deploying and documenting programs and servlets through practical application.

Prerequisite(s): CST8215Z and CST8284Z

Corerequisite(s):none

**CST8300Z Achieving Success in Changing Environments**

Rapid changes in technology have created personal and employment choices that challenge each of us to find our place as contributing citizens in the emerging society. Life in the 21st century presents significant opportunities, but it also creates potential hazards and ethical problems that demand responsible solutions. Students explore the possibilities ahead, assess their own aptitudes and strengths, and apply critical thinking and decision-making tools to help resolve some of the important issues in our complex society with its competing interests.

Prerequisite(s): none

Corerequisite(s):none

**CST8333Z Programming Language Research Project**

Learning a new programming language or framework on your own is a challenge faced by programmers on the job as part of their career. Students explore this process of self-study by applying project planning, applied research, testing, and implementation of basic and advanced concepts appropriate to the language or framework under study. Students develop major milestones and deliverables culminating in a project and reflective summary submission.

Prerequisite(s): CST8284Z

Corerequisite(s):none

**CST8334Z Software Development Project**

Industry recognizes the value of graduates possessing real-world software development experience. Following the agile software engineering methodology, teams work with clients to analyze business needs, determine computer system requirements, model system designs, build prototypes, test code and deliver final products. Project management techniques are used to monitor progress and organize tasks. Students participate in interviews, technical reviews, presentations and the preparation of technical reports. The culmination of the course is a final presentation and technical review, followed by the delivery of the finished product.

Prerequisite(s): CST2234Z and CST2335Z and CST8109Z and CST8285Z and CST8288Z and ENL2019Z

Corerequisite(s):none

**CST8390Z Business Intelligence and Data Analytics**

Business Intelligence (BI) can be broadly defined as a set of applications, infrastructure, and best practices that integrate and transform raw data into actionable information used for planning, monitoring and analyzing processes. The foundation underlying this process is the Data Analytics that explore the data, identify the relationships and patterns in a meaningful way. Students examine the components and best practices of BI technology, and how it guides operational to strategic business decisions in the context of real-world applications. Data analytics techniques are used to derive insight using statistical software to provide insight into patterns and trends not



immediately obvious in the raw data.

Prerequisite(s): CST8116Z and CST8215Z and CST8285Z and MAT8001Z or CST8238

Corerequisite(s):none

### **ENL1813Z 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

### **ENL2019Z Technical Communication for Engineering Technologies**

The ability to communicate effectively in a technically-oriented interdisciplinary workplace is a foundational skill in an innovation-driven economy. Students are exposed to exercises and assignments designed to foster independent and collaborative critical thinking, research, writing, visual communication and presentation skills related to technical topics.

Prerequisite(s): ENL1813Z

Corerequisite(s):none

### **GED0336Z General Education Elective**

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

Prerequisite(s): none

Corerequisite(s):none

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

Prerequisite(s): none

Corerequisite(s):none

### **MAT8001Z Technical Mathematics for Computer Science**

The study of algebraic and transcendental functions is an essential prerequisite to Calculus. Students manipulate algebraic expressions, solve algebraic equations and linear systems and learn the properties of and graph algebraic and transcendental functions. Students investigate computer number systems in addition to Boolean algebra and logic to help solve problems involving computer systems. Students also study the addition and subtraction of vectors using vector components. Delivered in a modular format, this course is equivalent to the completion of all of the following math modules MAT8100 - A, B, C, D, E, F, and L.

Prerequisite(s): none

Corerequisite(s):none