

Undergraduate Computer Science



At Ottawa University

"All the things I've learned here
I have implemented into my
work life...
What I like most is that all of
my classmates work in these
industries. You get the
opportunity to learn from them.
We have people working for
Google, Walmart...
They bring all of their
experiences, and you have the
opportunity to see how they
apply this knowledge to their
workplace."
- Agustin Escobar
Ottawa Graduate

The Computer Science major provides a path for students from diverse backgrounds to rapidly transition to computing and information system career paths by providing them with foundation and advanced undergraduate level courses in computing and information science. The program focuses on the science of computers, computing problems and programming solutions, and the design of computer systems and user interfaces from a technology perspective. The program includes instruction in computational science principles, computing theory; computer hardware design; computer technology development and programming; and applications to graphic user interface situations. Graduates of the program will gain the foundation, proficiency, and confidence in processes that handle and manipulate large amounts of information with applications in business, education, game theory, modeling, health, information security, life sciences, manufacturing, and other related careers.

Careers

The future business environment will be characterized by rapid technological changes, intense global competition, faster product life cycles, and more complex, specialized markets. As such, the computing and information needs of organizations are increasingly complex and rapidly changing. Individuals with computing and information systems expertise can design and develop computer and information technology products, design and build information systems, manage sophisticated information resources, work on interdisciplinary teams, and communicate effectively within the organization and other end-users.

Education and Qualifications

This degree prepares students to enter the workforce as a computer programming professional. The concentrations available: Artificial Intelligence, Cybersecurity, Game Design, and Information Technology Systems; provide additional opportunities for specialization and thus additional career pathways in the computer science and technology industry.

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Foundation Courses

MAT 21044 - Calculus I (4)

First in a series of three courses that offers an intuitive approach to the major concepts and techniques of single-variable calculus. Topics include limits, continuity, derivatives of elementary functions and their application, extrema, optimization, elementary integration applications, the Fundamental Theorem of Calculus, and l'Hospital's rule. Prerequisite: Score of 16 on math-track initial placement OR a "C" or better in MAT 11143 Precalculus.

MAT 21144 - Calculus II (4)

Second course in a series of three courses that offers an intuitive approach to the major concepts and techniques of single-variable calculus. Topics covered include techniques of integration, integration applications, first-order linear and first-order separable differential equations, sequences, series, convergence tests, power series, and the calculus of parametric and polar equations. Prerequisite: A "C" or better in MAT 21044 Calculus I (or equivalent).

ITS 20163 - Introduction to Databases (3)

Basic knowledge of how to collect, organize, and analyze data. An introduction to the concepts of querying, updating, and administration of databases. Topics covered include normalization, table structures, table relationships, and data integrity.

ITS 20263 - Introduction to Networking (3)

Identify basic networking concepts, distinguish between network transmission types and connectivity devices, understand TCP/ IP components, demonstrate knowledge of network hardware, cabling, and operating systems.

CST 20363 - Introduction to Computer Science (4)

This course is a survey of Computer Science's discipline and its interaction with other disciplines, incorporating historical development, theories, and computer science tools (algorithm design and programming). Topics include mechanical computers, digital computers, bioinformatics, microcontrollers, robotics, security, scientific computing, simulation, and web technologies.

CST/ITS 16163 - Introduction to Computer Programming (3)

A broad overview of programming techniques, programming rules, basic I/O techniques and programming methods. A variety of programming languages will be introduced, including but not limited to Visual Basic, SQL Reporting, and Object Oriented Programming.

Required Major Courses

EGR /CST 30003 - Microprocessors (3)

An introduction to the architecture, operation, and application of microprocessors. Topics include assembly language programming, addressing, system clock and timing, serial and parallel ports, input/output devices, and interrupts. Prerequisites: EGR 10000 Introduction to Engineering, EGR 20003 Circuits, and MAT 20043 Discrete Math.

CST 30004 - Cloud Computing Architecture (4)

This course is an introduction to the core concepts of Cloud Computing. The students will gain the foundational knowledge required to understand cloud computing from a technical, business perspective and become a Cloud practitioner. The most critical APIs used in the Amazon and Microsoft Cloud environments, including the techniques for building, deploying, and maintaining machine images and applications, will be examined. The students will learn about the various Cloud Service models (IaaS, PaaS, SaaS) and deployment models (Public, Private, Hybrid) and the critical components of Cloud infrastructure (VMs, Networking, Storage - File, Block, Object, CDN). Prerequisite: ITS 20263 Introduction to Networking.

CST 35500 - Special Topics Information Technology Systems (4)

Course provides student with the opportunity to develop professional and technical skills through project-based learning. Students will work collaboratively on a business project that encompasses many areas of technology, discovering in the process how each technical component contributes to the cohesive whole.

CST/ITS 35566 - Intermediate Programming Techniques (4)

This course provides the transition from Introduction to Computer Programming to the object-oriented paradigm. Proper formulation and abstraction of the problem domain in the programming process to build robust, flexible and extensible programs are emphasized. The student learns how design patterns help formulate and implement abstractions in an effective and sophisticated manner. The course covers data structures and algorithms to manipulate them from essential to programming, such as lists, stacks, queues, trees, and tables. Prerequisite: ITS/CST 16163 Introduction to Computer Programming.

CST /ITS 45566 - Advanced Programming Techniques (4)

The purpose of this course is to study the required concepts and techniques to write high-quality code using the object-oriented programming environment approach. The course covers GUI development, coding, decision-making, control structures, and modular design. Advanced topics include class creation and usage, exception handling, accessing databases, and creating web and console applications. Prerequisite: ITS 35566 Intermediate Programming Techniques.

CST/MIS 48163 - System Analysis and Design (4)

This course is an in-depth study of the systems development life cycle. The purpose of the course is to utilize a blend of traditional development and current techniques. Systems Analyst planning includes the methodology, economic analysis, and project management.

CST 49090 - Senior Research CAPSTONE Design (2)

Course prepares student for the individual Senior Capstone Project. Working in a multidisciplinary setting on selected and approved design projects, student will practice design methodology, completing a project feasibility study and preliminary design, including optimization, product reliability and liability, and Computer Science application.

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Required Major Courses (continued)

CST 49100 - Senior CAPSTONE Project (4)

Course consists of individual or group projects undertaken in collaboration with the instructor. Students demonstrate integrated knowledge of the computer science curriculum by implementing a significant software system. Prerequisite: CST 49090 Senior Research CAPSTONE Design

Technology Pathways

Cybersecurity

CST/DST 30006 - Cybersecurity(4)

CST/DST 40000- Information Forensics (4)

CST 45650 - Data Protection (4)

CST/ITS 47003 - Ethical Hacking and Intrusion Detection(4)

Game Design and Development

ART/COM/ITS 35505 - Production (4)

CST 37640 - 2D/3D Digital Modeling (4)

CST 46540 - Game Development Engine (4)

CST 47670 - Game Development: Programming and Practice (4)

Information Technology Systems

ITS 30044 - Advanced Database Systems (4)

ITS 33470 - Routing and Switching (4)

ITS/ART/COM 35505 - Production (4)

ITS 43000 - Information Technology Project Management (4)

Program requirements reflected herein are current at time of printing but are subject to change at the discretion of the university. Consult the catalog for any curriculum changes and additional requirements. Some required courses may be met through transfer credit as determined by the advisor in consultation with the registrar. www.ottawa.edu/coursecatalog