

Studying Computer Science at Dalhousie University

If you are studying in the BSc – Computer Science at The University of Auckland you will have the option to study overseas at Dalhousie University in Halifax, Canada, for one or two semesters in either the second or third year of your degree. Below is a full schedule of Computer Science courses available at Dalhousie University that can be credited towards your BSc – Computer Science. The courses may be offered in one or more semesters at Dalhousie, as shown in the schedule below. The required prerequisite courses from The University of Auckland are also listed.

Dalhousie is one of Canada’s most prestigious universities; a place where innovative thinking and a tradition of academic excellence blend seamlessly. Their reputation is respected internationally. Dalhousie’s Faculty of Computer Science bring the real world to the classroom and the classroom to the real world, through mutually-beneficial industry partnerships.

At Dalhousie you will:

- Gain the knowledge and skills for a rewarding and fun career in an industry that’s growing around the globe
- Work in small classes, experience hands-on labs and field trips
- Study and work alongside professors performing life-changing research in areas as diverse as Internet security, animation and robotics
- Prepare yourself for a leadership position in a booming industry

Notes:

- a) Course availability may change. For up-to-date details on when these courses are offered visit the Dalhousie Undergraduate Calendar at https://dalonline.dal.ca/PROD/fysktime.P_DisplaySchedule?s_term=201110,201120&s_subj=CSCI&format=1
- b) If you have not taken the appropriate prerequisite for a course at Dalhousie, or if you are looking to take courses outside of the subject Computer Science while on your exchange, you will need to obtain permission from the Heads of Department for these subjects.

Dalhousie semester structure:

A full semester at Dalhousie University comprises 5 courses.

Fall (F): 8 Sep 2011 – 7 Dec 2011 (equivalent to our Semester Two)

Winter (W): 4 Jan 2012 – 5 Apr 2012 (equivalent to our Semester One)

Summer (S): 1 May 2012 – 12 Jun 2012

Schedule of Dalhousie Computer Science courses	Semester Offered	University of Auckland Prerequisites
CSCI 2110 Computer Science III Comprehensive introduction to data structures and algorithms, including their design, analysis, and implementation. In discussing design and analysis there is a strong emphasis on abstraction. In discussing implementation, general approaches that are applicable in a wide range of procedural programming language are emphasized, in addition to a focus on the details of Java implementations. Topics include an introduction to asymptotic analysis and a review of basic data structures (stacks, queues, lists, vectors), trees, priority queues, dictionaries, hashing, search trees, sorting (MergeSort, QuickSort, RadixSort) and sets, and graphs (traversals, spanning trees, shortest paths).	F	COMPSCI 105
CSCI 2112 Discrete Structures I This class offers a survey of the following areas: set theory, mathematical induction, number theory, relations, functions, algebraic structures and introductory graph theory.	F, W	COMPSCI 225

The topics to be discussed are fundamental to most areas of Mathematics and have wide applicability to Computer Science.		
CSCI 2121 Computer Organization with Assembly Language Fundamentals of computer organization; assembly language is used as an aid to studying computer organization. Topics include digital logic, ALU and CPU design, object code, microprogramming, CISC, RISC, and parallel computers.	W	COMPSCI 105 Recommended corequisite: COMPSCI 215
CSCI 2132 Software Development Techniques for programming and software development in a procedural language. It reviews the basics of procedural programming and introduces students to source code management, testing strategies, debugging, and basic scripting techniques.	F	COMPSCI 101 and 105
CSCI 2140 Data and Knowledge Fundamentals Provides a holistic view of managing information and answering queries from the information. This class covers introductory topics in database systems and intelligent systems. Data fundamentals are introduced in terms of data models, relational and OO modelling and the use of SQL to both design databases and to answer queries that are founded in database systems. Knowledge fundamentals are introduced in the context of intelligent systems; in particular, search methods, predicate logic, automated inference and knowledge representation are addressed.	NOT OFFERED THIS YEAR	COMPSCI 101 and 105
CSCI 3110 Design and Analysis of Algorithms I Techniques for the design and analysis of efficient algorithms and data structures. Topics include asymptotic analysis, divide and conquer algorithms, greedy algorithms, dynamic programming, data structure design, optimization algorithms, and amortized analysis. The techniques are applied to problems such as sorting, searching, identifying graph structure, and manipulating sets.	F, S	COMPSCI 220 and 225 RECOMMENDED: STATS 125
CSCI 3120 Operating Systems Review of I/O and interrupt structures. Topics covered include dynamic procedure activation, system structure and evaluation, memory management, process management, process scheduling, recovery procedures, concurrency, deadlocks, resource allocation, protection, and operating systems implementation.	W, S	COMPSCI 210, 215, and 220
CSCI 3140 Database Management Systems An introduction to Database Management Systems (DBMSs). It covers various topics such as data models, relational algebra and calculus, SQL, DB design, query languages, query optimization, concurrency control and recovery. Assignments and projects will require use of a DBMS.	NOT OFFERED THIS YEAR	COMPSCI 220 and 225
CSCI 3160 User Interface Design Concepts and techniques underlying the design of interactive systems. Both human factors and the technical methods of user interface design are covered. Students will learn how to apply various techniques through the design, creation, and testing of a prototype system.	F	COMPSCI 220 and 230
CSCI 3171 Network Computing Foundation in computer networks. It presents a top-down view of the layered architectural elements of communication systems, focusing on the Internet and TCP/IP. Topics include client/server systems, packet switching, protocol stacks, queuing theory, application protocols, socket programming, remote service calls, reliable transport, UDP, TCP, and security.	W, S	COMPSCI 215, 220 and STATS 125
CSCI 4112 Theory of Computation Formal languages and computational models. Topics covered include finite automata, pushdown automata, Turing machines, undecidability and recursive and recursively enumerable functions. Some applications to computer science are also discussed such as compiler design and text processing.	F	COMPSCI 225 and 350
CSCI 4113 Analysis of Algorithms II Advanced techniques for the design and analysis of efficient algorithms. Problems are taken from a wide range of areas including combinatorics, numerical computation, graph algorithms, string matching, approximation algorithms, computational geometry, and NP-Completeness.	F	COMPSCI 320

<p>CSCI 4115 Topics in Graph Theory Intended for math and computer science students. Items to be selected from the following topics: graphs and matrices, graphs and groups, network analysis, extremal graph theory, enumeration problems, and algebraic methods in graph theory.</p>	W	COMPSCI 320
<p>CSCI 4121 Advanced Computer Architecture Basic principles of computer architecture with an emphasis on quantitative analysis of the effect of architectural design decisions on system performance and the price/performance trade-offs necessary in real computer design. This includes instruction set design issues (CISC vs. RISC), instruction level parallelism, implementation methods, pipelining, pipeline hazards, interrupts, the relationship with compiler technology, and memory system design. Several representative architectures will be used as examples, with emphasis on modern RISC processors.</p>	NOT OFFERED THIS YEAR	COMPSCI 313
<p>CSCI 4134 Software Architecture Software Architecture is an important discipline for designers of software systems. It describes the abstractions, classifies the alternatives, enables tool support, and offers guidance about making choices appropriate to the software system design process. As software systems grow larger, good architectural design will play a major role in determining the success of a software system. This class covers four areas in software architectures: foundations of software architectures, tools for architectural design, analysis of software architectures, and "industry-rich" case studies.</p>	NOT OFFERED THIS YEAR	COMPSCI 340 and SOFTENG 306
<p>CSCI 4136 Software Testing and Quality Assurance This class addresses systematic testing for software defects. The purpose of this kind of testing is risk reduction. The course explores risks and techniques for reducing them. Topics include software testing processes in practice, including unit, integration and systems level testing as well as exploratory and regression testing; software testing methods and deliverables; software test tools; managing test technology; and other approaches to software quality assurance.</p> <p>OR</p> <p>CSCI 4137 Software Deployment, Maintenance, and Evolution This class addresses issues arising after the Factory Acceptance Test: deployment, field support, and upgrades. Commercial software products (especially product lines) are delivered to many sites in many versions and are subject to an ongoing schedule of enhancements. Enterprise applications with many users must evolve, may run at different sites, and may require different versions. Topics include technical challenges of rollout, technical challenges of maintenance and evolution, and technical challenges of upgrading fielded systems.</p> <p><i>These courses are recommended for students wanting to carry out postgraduate study as part of the Software Engineering Research Group at The University of Auckland.</i></p>	NOT OFFERED THIS YEAR	COMPSCI 230; then CSCI 3130
<p>CSCI 4144 Introduction to Data Mining and Data Warehousing Reviews main concepts in data mining and data warehouses including objectives, architectures, algorithms, implementations, and applications. The topics covered include operational information process, decision-oriented information process, data warehousing and On-Line Analytical Process (OLAP), characterization mining, association rule mining, classification and predication and clustering. Selected system tools for data mining and data warehousing are introduced.</p>	W	COMPSCI 351
<p>CSCI 4150 Introduction to Artificial Intelligence An introduction to the automation of intelligent capabilities, including knowledge representation and reasoning (search and logical inference), interpreting, behavior modelling and learning.</p>	NOT OFFERED THIS YEAR	COMPSCI 215, 225, 320, STATS 125, MATHS 250
<p>CSCI 4160 Computer Graphics The theory and mathematical algorithms required to develop and build a graphics package. Emphasis is on either two or three dimensions and the transformations and manipulations necessary to lead to animation. The design platform and language are left as a student choice to ensure immediate familiarity and future development advantages.</p>	W	COMPSCI 215, 220, 230 and 280. RECOMMENDED: Statistics
<p>CSCI 4171 Networks and Communication</p>	F	COMPSCI 215 and 314

Comprehensive understanding and specialized knowledge in the field of computer networks and communications. Teaching via systems approach to networks by examining the hardware and protocol components that comprise a network. The class also examines the interactions and interdependencies between protocols. Topics covered in this class include network principles and concepts, transmission principles, network architecture, routers and routing protocols, direct link networks, wireless networks, internetworking, and emerging network technologies.		RECOMMENDED: COMPSCI 340
CSCI 4175 Distributed Systems Extends the notions of control, synchronization, and coordination of resources to multiple hosts across a network. Presents the challenges associated with distributed systems, reviews mechanisms such as naming, interprocess communication, RPC/RMI, and coordination mechanisms that are used to offer distributed services, and discusses the operation of existing distributed services.	NOT OFFERED THIS YEAR	COMPSCI 314 and 340
CSCI 4180 Introduction to Computational Biology and Bioinformatics Introduces biology-related applications of computer science. No background in biology is assumed. The topics covered include the following: introductory molecular biology and evolution, genomics, similarity and homology, multiple sequence alignments, phylogenetics, structural bioinformatics and gene expression. The emphasis is on the applications of computer science to biology.	NOT OFFERED THIS YEAR	COMPSCI 215 and STATS 125
CSCI 4181 Bioinformatics Algorithms The discipline of bioinformatics applies sophisticated computational and statistical techniques to problems in the biological domain. This course will focus on a few biosequence-related challenges in depth, examining the complexity and efficiency of different approaches, the relationship between statistical optimality and biological reality, and the consistency (or lack thereof) among methods.	W	COMPSCI 320

If you would like to study for a semester or two abroad at Dalhousie University, you will need to fill in the application form below, including the courses you propose to take. This will be assessed by Admissions. ([attach AS-15 here](#)).

For more information on the application process, please contact Admissions:

Email: admission@auckland.ac.nz

Phone: 0800 61 62 63

Or visit the **Student Information Centre**, open: Monday to Friday 8am–6pm, Saturdays 9am to 12noon

Room 112

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