Ryerson University
Graduate Programs
Computer Science

COURSE LISTING – FALL 2021

Course	Course Name	Professor	Schedule	Location
CP8101*	Research Methods for Doctoral Students	Dr. I. Woungang	Tuesday 15:00 - 18:00	Virtual
CP8201	Advanced Algorithms	Dr. J. Doliskani	Monday 09:00 - 12:00	Virtual
CP8215*	Research Methods in Computer Science	Dr. I. Woungang	Tuesday 15:00 - 18:00	Virtual
CP8301	Secure Computing	Dr. J. Misic	Wednesday 15:00 - 18:00	Virtual
CP8305	Knowledge Discovery	Dr. C. Ding	Tuesday 11:00 - 14:00	Virtual
CP8307	Introduction to Computer Vision	Dr. R. Wang	Monday 15:00 - 18:00	Virtual
CP8310*	Directed Studies in Computer Science	N/A	N/A	N/A
CP8312*	Directed Studies: Intelligence and Robotics	N/A	N/A	N/A
CP8313*	Directed Studies: Networks	N/A	N/A	N/A
CP8314	Adv. Artificial Intelligence	Dr. M. Soutchanski	Thursday 16:00 - 18:00 Friday 10:00 - 11:00	Virtual
CP8318	Machine Learning	Dr. N. Farsad	Monday 13:00 - 14:00 Thursday 08:00 - 10:00	Virtual
CP8320	Program Analysis for Cyber Security	Dr. M. Alalfi	Wednesday 10:00 - 13:00	Virtual
CP8321	Introduction to Deep Learning	Dr. A. Sadeghian	Friday 12:00 - 15:00	Virtual
CP9101	Method of Instruction	Dr. J. Foxe	Thursday 12:00 - 15:00	Virtual
CP9102*	Doctoral Seminar	Dr. I. Woungang	Monday 12:00 - 13:00	Virtual

* Requires a Directed Studies / Restricted Courses Request Form for enrollment, available at https://www.ryerson.ca/cs/graduate/forms-guidelines/

Notes:

1. Fall classes begin Tuesday, September 7, 2021.
2. Refer to the Significant Dates for course ADD and DROP deadlines:
https://www.ryerson.ca/graduate/calendar/significant-dates/
3. See the Graduate Calendar for Program Curriculum and Course Descriptions:
https://www.ryerson.ca/graduate/calendar/programs-and-courses/

COURSE DESCRIPTIONS

CP8101 Research Methods for Doctoral Students
This course is designed to assist students in developing skills necessary to design and execute a research protocol for their terminal degree. The course is intended to complement the specific research programs devised by the student and his/her advisors. The course covers the following topics: nature of scientific inquiry, library skills, formulation and testing of hypotheses, experimental design, statistical analysis of data, human subjects, use of humans and animals in research, and professional responsibility in research grants and funding for research. Pass/Fail

CP8201 Advanced Algorithms
This course covers advanced methods of algorithmic design and analysis with focus on efficiency and correctness of algorithms. The course reviews several popular algorithm design techniques and selected well-known algorithms. The final parts of the course include introduction to practical algorithms for computationally challenging problems, using heuristics, approximation algorithms and introduction to randomization algorithms. 1 Credit

CP8215 Research Methods in Computer Science
A transition to research-based learning for computer science students designed to assist them in developing a research protocol. The course complements specific research programs devised by the students and their supervisors. Topics may include: the nature of scientific inquiry; information gathering skills; formulation and testing of hypotheses; experimental design; planning; analysis of data; ethical and professional responsibility in research.1 Credit
Not available to Course option students. Only one of CP8310 and CP8215 may be taken for credit toward degree completion.

CP8301 Secure Computing
The importance of security for computer systems: protection, access control, distributed access control, Unix security, applied cryptography, network security, firewalls, secure coding practices, safe languages, mobile code. Computer and network forensics techniques. Computer security techniques. Legal and Ethical issues. Topics may include cryptographic protocols, privacy, anonymity, and/or other topics as time permits. 1 Credit

CP8305 Knowledge Discovery
Steps in the process of knowledge discovery: data preprocessing, data mining, post-processing and knowledge utilization. Preprocessing: data cleaning, integration, transformation and reduction. Data mining methods: association rules, classification and clustering. Post-processing: knowledge evaluation, interpretation, presentation and visualization. Knowledge discovery and data management. Possibly other selected topics in knowledge discovery. 1 Credit.

CP8307 Introduction to Computer Vision
This course describes foundational concepts of computer vision. In particular, the course covers the image formation process, image representation, feature extraction, model fitting, motion analysis, 3D parameter estimation and applications. 1 Credit

CP8310 Directed Studies in Computer Science
This course is for Master's students who wish to gain knowledge in a specific area for which no graduate level classes are offered. Students wishing to take the class would be assigned a suitable class advisor most familiar with the specific area of interest. Students are required to present the work of one term (not less than 90 hours in the form of directed research, tutorials and individual study) in an organized format. 1 Credit
Not available to Course option students. Only one of CP8310 and CP8215 may be taken for credit toward degree completion.

CP8312 Directed Studies: Intelligence and Robotics
This course explores theoretical, practical and experimental (if applicable) problems in great depth in the areas of intelligence and robotics with emphasis on the aspects of Intelligence and Robotics and their application related to the discipline of Computer Science. Doctoral students must present their findings in a formal report. 1 Credit.

CP8313 Directed Studies: Networks
This course explores theoretical, practical and experimental (if applicable) problems in great depth in areas of computer and communication networks with emphasis on the aspects of computer networking and its application related to the discipline of Computer Science. Doctoral students must present the findings in a formal report. 1 Credit

CP8314 Advanced Artificial Intelligence
The course will focus on the theory and implementation of dynamical systems from the perspective of artificial intelligence. The emphasis will be on the compromises involved in providing useful logical representations that allow reasoning about actions to remain tractable. The course will show how these research issues are relevant for many applications beyond the traditional area of artificial intelligence. 1 Credit

CP8318 Machine Learning
Machine learning is the study of algorithms that learn to perform a task from prior experience. Machine learning has a broad range of applicability, including computer vision, robotics, medical diagnosis, bioinformatics and natural language processing. This course will cover the underlying theory and practical applications of machine learning. 1 Credit.

CP8320 Program Analysis for Cyber Security
This course will focus on Language-Based Security, an area of research that studies how to enforce application-level security using program analysis techniques. This includes techniques used to automate the detection\prevention of security vulnerabilities caused by coding malpractice or security-policy misconfigurations; the study of the design and implementation of secure programming languages; and techniques used to enforce correct usage of security Application Programming Interfaces. 1 Credit

CP8321 Introduction to Deep Learning
This course is an introduction to deep learning and its applications. The main topics discussed in the course include feedforward/recurrent neural networks, backpropagation learning algorithm, Convolutional Neural Networks (CNN), Long Short Term Memory (LSTM), and Autoencoders. 1 Credit

CP9101 Method of Instruction

Students will learn to select appropriate teaching methods; establish goals and performance objectives and construct lesson plans. Students will be shown classroom management and presentation techniques. In addition, students will be introduced to the principles of learning and instruction. Student will learn to formulate questions and employ good questioning technique. Each student will be given opportunities to prepare and present short lessons. Each student will be required to prepare and present at least two five-minutes lessons based on computer science related topics. Student lessons will be evaluated by the student, class members and the instructor. 1 Credit

CP9102 Doctoral Seminar

The purpose of the Doctoral Seminar is to provide students exposure to the latest research, issues and findings related to the discipline of Computer Science. The seminar will consist of invited guests and talks by experts from industry, academia and graduate students themselves. Students will have an opportunity to improve their writing and critical thinking skills through assigned work associated with the seminar topics. All students are required to attend and actively participate in seminars every semester for a total of six semesters. A doctoral candidate must give two publicly announced research seminars on his/her thesis research. The student's supervisor(s) and at least one other member of the student's Dissertation Supervisory Committee must attend this seminar. The quality of the student's presentation will be graded on a Pass/Fail basis. Each student will be required to pass each research seminar presentation. Pass/Fail.