

Graduate Studies in Computer Science Course Listing – Fall 2018

Course	Course Name	Professor	Schedule	Room
CP8101*	Research Methods for Doctoral Students	Dr. C. Ding	Wednesday 09:00-12:00	VIC-503
CP8205	Advanced Human-Computer Interaction	S. Quigley	Thursday 10:00-12:00 Friday 12:00-13:00	KHE-321A KHS-335
CP8207	Special Topics: Core of Computer Science - Program Analysis for Cyber Security	Dr. M. Alalfi	Tuesday 15:00-18:00	VIC-210
CP8210	Topics in Data Science	Dr. A. Abhari	Friday 09:00-12:00	VIC-302
CP8215*	Research Methods in Computer Science	Dr. C. Ding	Wednesday 09:00-12:00	VIC-503
CP8301	Secure Computing	Dr. A. Miri	Tuesday 09:00-12:00	VIC-300
CP8309 Section 1	Special Topics: Emerging Computer Science – Advanced Topics in Computer Vision	Dr. K. Derpanis	Wednesday 15:00-18:00	ILC-100
CP8309 Section 2	Special Topics: Emerging Computer Science – Neural Information Processing	Dr. N. Bruce	Friday 14:00-17:00	SHE-549
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
CP8315 Section 1	Special Doctoral Topics: AI & Robotics – Advanced Topics in Computer Vision	Dr. K. Derpanis	Wednesday 15:00-18:00	ILC-100
CP8315 Section 2	Special Doctoral Topics: AI & Robotics - Neural Information Processing	Dr. N. Bruce	Friday 14:00-17:00	SHE-549
CP8316	Special Doctoral Topics: Networks - Program Analysis for Cyber Security	Dr. M. Alalfi	Tuesday 15:00-18:00	VIC-210
CP8317	Performance Evaluation	Dr. J. Misic	Monday 09:00-12:00	POD-361
CP8318	Machine Learning	Dr. N. Bruce	Thursday 15:00-18:00	ENG-LG04
CP9102*	Doctoral Seminar	Dr. E. Harley	Monday 12:00-13:00	ENG-LG21

* Requires a Directed Studies / Restricted Courses Request Form for enrollment, available at www.ryerson.ca/science/programs/graduate/computerscience/

Notes:

- Fall classes begin Tuesday, September 4, 2018.
- Refer to the Significant Dates for course ADD and DROP deadlines:
<https://www.ryerson.ca/graduate/student-guide/academic-matters/important-dates/>
- See the Graduate Calendar for Program Curriculum and Course Descriptions: www.ryerson.ca/graduate/current-students/calendars/

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

CP8205 Advanced Human-Computer Interaction

Current trends in user interface technology; topics include alternative interaction devices, user interface tools, and interface modeling techniques. Usability testing and human factors. 1 Credit

CP8207 Special Topics: Core of Computer Science

This special topics course examines selected, advanced topics in areas related to the core areas of computer science series that are not covered by existing courses. The topic(s) will vary depending on the need and the instructor. 1 Credit

Topic for Fall 2018: **Program Analysis for Cyber Security:** Program Analysis for Cyber Security or Language-Based Security is the area of research that studies how to enforce application-level security using programming-language and program-analysis techniques. The purpose of this seminar course is to study techniques that are used to automate the detection/prevention of security vulnerabilities, such as access-control and information-flow vulnerabilities in software, due to coding malpractice or security-policy misconfigurations; to study the design and implementation of secure programming languages; and promote the correct usage of security Application Programming Interfaces (APIs).

CP8210 Topics in Data Science

This course presents concepts related to data science research activities including data management and analytics, data modeling, structured and unstructured data, regression models, social data analysis, web and data mining, information retrieval, text analysis and natural language processing. 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

CP8309 Special Topics: Emerging Computer Science

This special topics course examines selected, advanced topics in areas related to emerging areas of computer science that are not covered by existing courses. The topic(s) will vary depending on the need and the instructor. 1 Credit

Topics for Fall 2018:

Section 1: **Advanced Topics in Computer Vision:** Computer Vision is broadly defined as the study of recovering useful properties of the world from one or more images. In recent years, Deep Learning has emerged as a powerful tool for addressing computer vision tasks. This course will cover a range of foundational topics at the intersection of Deep Learning and Computer Vision.

Section 2: **Neural Information Processing:** Computational solutions to perception with a heavy emphasis on deep learning and vision. This includes solutions to achieving artificial vision in computer systems or robots, understanding human vision at a computational level of abstraction, and relationships between these topics. Other sensory modalities (e.g. audition) will receive some treatment at a coarse-grained level of specificity. The core of the course appeals to characteristics of neural information processing viewed through formalisms including information theory, compressive sensing and especially parallels between neural networks in artificial and biological nervous systems.

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

CP8315 Special Doctoral Topics: AI & Robotics

This special topics course will present material that is not currently part of the regular computer science doctoral program but are of interest to faculty and students in the field of Artificial Intelligence and Robotics. 1 Credit

Topics for Fall 2018:

Section 1: **Advanced Topics in Computer Vision:** Computer Vision is broadly defined as the study of recovering useful properties of the world from one or more images. In recent years, Deep Learning has emerged as a powerful tool for addressing computer vision tasks. This course will cover a range of foundational topics at the intersection of Deep Learning and Computer Vision.

Section 2: **Neural Information Processing:** Computational solutions to perception with a heavy emphasis on deep learning and vision. This includes solutions to achieving artificial vision in computer systems or robots, understanding human vision at a computational level of abstraction, and relationships between these topics. Other sensory modalities (e.g. audition) will receive some treatment at a coarse-grained level of specificity. The core of the course appeals to characteristics of neural information processing viewed through formalisms including information theory, compressive sensing and especially parallels between neural networks in artificial and biological nervous systems.

CP8316 Special Doctoral Topics: Networks

This special topics course will present material that is not currently part of the regular computer science doctoral program but are of interest to faculty and students in the field of Networking. 1 Credit

Topic for Fall 2018: **Program Analysis for Cyber Security:** Program Analysis for Cyber Security or Language-Based Security is the area of research that studies how to enforce application-level security using programming-language and program-analysis techniques. The purpose of this seminar course is to study techniques that are used to automate the detection/prevention of security vulnerabilities, such as access-control and information-flow vulnerabilities in software, due to coding malpractice or security-policy

misconfigurations; to study the design and implementation of secure programming languages; and promote the correct usage of security Application Programming Interfaces (APIs).

CP8317 Performance Evaluation

Probability Theory; Transforms of probability distributions; Branching processes; Discrete time Markov Chains; Continuous time Markov Chains; Birth-Death processes ; Intermediate queuing theory, M/G/1 queues ; Renewal theory; Gated and limited systems; Hidden Markov model. 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.

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.