

## COURSE LISTING – WINTER 2025

Course	Course Name	Professor	Schedule	Location
CP8204	Advanced Programming Languages	TBA	Tuesday 12:00 - 14:00 Wednesday 14:00 - 15:00	DSQ02  DSQ02
CP8207	Special Topics: Core Computer Science Topic: Human Robot Interaction <i>(FOR STUDENTS IN THE MSc PROGRAM)</i>	TBA	Tuesday 08:00 - 09:00 Thursday 12:00 - 14:00	KHW375  KHW375
CP8210	Topics in Data Science	Dr. A. Abhari	Tuesday 10:00 - 11:00 Friday 10:00 - 12:00	DSQ06  DSQ06
CP8309	Special Topics: Emerging Computer Science Topic: Introduction to Quantum Computing and Quantum Software Engineering <i>(FOR STUDENTS IN THE MSc PROGRAM)</i>	Dr. A. Miranskyy	Wednesday 15:00 - 18:00	ENGLG04
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	Advanced Artificial Intelligence	Dr. M. Soutchanski	Monday 14:00 - 16:00 Thursday 11:00 - 12:00	CAR08  EPH142
CP8315 Sec. 1	Special Doctoral Topics - AI & R Topic: Introduction to Quantum Computing and Quantum Software Engineering <i>(FOR STUDENTS IN THE PhD PROGRAM)</i>	Dr. A. Miranskyy	Wednesday 15:00 - 18:00	ENGLG04
CP8315 Sec. 2	Special Doctoral Topics - AI & R Topic: Human Robot Interaction <i>(FOR STUDENTS IN THE PhD PROGRAM)</i>	TBA	Tuesday 08:00 - 09:00 Thursday 12:00 - 14:00	KHW375  KHW375
CP8319	Reinforcement Learning	Dr. M. Soutchanski	Tuesday 15:00 - 17:00 Wednesday 10:00 - 11:00	EPH142  VIC203
CP8320	Program Analysis for Cyber Security	Dr. M. Alalfi	Wednesday 11:00 - 14:00	VIC500

CP8323	Advanced Natural Language Processing	Dr. V. Hu	Friday 13:00 - 16:00	KHW375
CP9102*	Doctoral Seminar	Dr. D. Mason	Thursday 10:00 - 11:00	ENGLG24

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

#### Notes:

1. Winter classes begin Friday, January 10, 2025.
2. Refer to the Significant Dates for course ADD and DROP deadlines:  
<https://www.torontomu.ca/graduate/calendar/significant-dates/>
3. See the Graduate Calendar for Program Curriculum and Course Descriptions:  
<https://www.torontomu.ca/graduate/calendar/programs-and-courses/>

## COURSE DESCRIPTIONS

### CP8204 Advanced Programming Languages

A study of the principles, concepts, and mechanisms of computer programming languages - their syntax, semantics, and pragmatics; the processing and interpretation of computer programs; programming paradigms; and language design. Additional topics will include language design principles and models of language implementation. 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: Human Robot Interaction

From the first time a human picked up a stick and attempted to knock down food from an unreachable branch we have attempted to use technology to extend our influence on the world. This course will examine physical robotic systems designed to extend human presence to remote locations. Topics may include Presence, Situational Awareness, Telerobotics and Agency. The course is designed to provide students with a practical introduction that will involve the design and construction of working robotic systems designed to interact with remote environments.

### 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

### 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

#### Topic: Introduction to Quantum Computing and Quantum Software Engineering

This course introduces students to the rapidly evolving quantum computing and quantum software engineering fields. Students will gain an understanding of quantum computing fundamentals, algorithms, post-quantum cryptography, and quantum software development practices.

### 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

**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.

**Section 1: Topic: Introduction to Quantum Computing and Quantum Software Engineering**

This course introduces students to the rapidly evolving quantum computing and quantum software engineering fields. Students will gain an understanding of quantum computing fundamentals, algorithms, post-quantum cryptography, and quantum software development practices.

**Section 2: Topic: Human Robot Interaction**

From the first time a human picked up a stick and attempted to knock down food from an unreachable branch we have attempted to use technology to extend our influence on the world. This course will examine physical robotic systems designed to extend human presence to remote locations. Topics may include Presence, Situational Awareness, Telerobotics and Agency. The course is designed to provide students with a practical introduction that will involve the design and construction of working robotic systems designed to interact with remote environments.

**CP8319 Reinforcement Learning**

This course focuses on topics related to reinforcement learning. The course will cover making multiple-stage decisions under uncertainty, heuristic search in planning, Markov decision processes, dynamic programming, temporal-difference learning including Q-learning, Monte Carlo reinforcement learning methods, function approximation methods, and the integration of learning and planning. 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

**CP8323 Advanced Natural Language Processing**

This course introduces students to the topics of Advanced Natural Language Processing. Topics include: introduction to NLP, statistics review, information extraction, annotating data, lexical semantics, text clustering, text classification, sentiment analysis, question answering, deep learning models and model interpretability. 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.