

COURSE LISTING – WINTER 2022

Course	Course Name	Professor	Schedule	Room
CP8202	Advanced Software Engineering	Dr. V. Misis	Monday 13:00 - 16:00	EPH-225
CP8204	Advanced Programming Languages	Dr. D. Mason	Wednesday 15:00 - 16:00 Thursday 10:00 - 12:00	DSQ-03 DSQ-09
CP8205	Advanced Human-Computer Interaction	TBD	Monday 09:00 - 10:00 Wednesday 10:00 - 12:00	DCC-208 DSQ-24
CP8207 Section 1	Special Topics: Core Computer Science Topic: Digital Image Processing <i>(FOR STUDENTS IN THE MSc PROGRAM)</i>	Dr. R. Wang	Tuesday 11:00 - 14:00	VIC-201
CP8207 Section 2	Special Topics: Core Computer Science Topic: Heuristic Search <i>(FOR STUDENTS IN THE MSc PROGRAM)</i>	Dr. R. Valenzano	Wednesday 12:00 - 15:00	KHE-220
CP8210	Topics in Data Science	Dr. A. Abhari	Tuesday 14:00 - 15:00 Friday 15:00 - 17:00	ENG-LG14 ENG-LG14
CP8309 Section 1	Special Topics: Emerging Computer Science Topic: Natural Language Processing <i>(FOR STUDENTS IN THE MSc PROGRAM)</i>	Dr. V. Hu	Thursday 14:00 - 17:00	VIC-103
CP8309 Section 2	Special Topics: Emerging Computer Science Topic: Model-Driven Engineering <i>(FOR STUDENTS IN THE MSc PROGRAM)</i>	Dr. S. Mustafiz	Friday 12:00 - 15:00	VIC-202
CP8309 Section 3	Special Topics: Emerging Computer Science Topic: Computational Geometry <i>(FOR STUDENTS IN THE MSc PROGRAM)</i>	Dr. Y. Bahoo	Tuesday 08:00 - 11:00	KHS-134
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 & R Topic: Digital Image Processing <i>(FOR STUDENTS IN THE PhD PROGRAM)</i>	Dr. R. Wang	Tuesday 11:00 - 14:00	VIC-201
CP8315 Section 2	Special Doctoral Topics - AI & R Topic: Heuristic Search <i>(FOR STUDENTS IN THE PhD PROGRAM)</i>	Dr. R. Valenzano	Wednesday 12:00 - 15:00	KHE-220
CP8315 Section 3	Special Doctoral Topics - AI & R Topic: Natural Language Processing <i>(FOR STUDENTS IN THE PhD PROGRAM)</i>	Dr. V. Hu	Thursday 14:00 - 17:00	VIC-103
CP8315 Section 4	Special Doctoral Topics - AI & R Topic: Computational Geometry <i>(FOR STUDENTS IN THE PhD PROGRAM)</i>	Dr. Y. Bahoo	Tuesday 08:00 - 11:00	KHS-134
CP8316	Special Doctoral Topics - Networks Topic: Model-Driven Engineering <i>(FOR STUDENTS IN THE PhD PROGRAM)</i>	Dr. S. Mustafiz	Friday 12:00 - 15:00	VIC-202

CP8319	Reinforcement Learning	Dr. N. Farsad	Friday 09:00 - 12:00	VIC-202
CP9102*	Doctoral Seminar	Dr. I. Woungang	Monday 12:00 - 13:00	ENG-LG21

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

Notes:

1. Winter classes begin Friday, January 14, 2022.
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

CP8202 Advanced Software Engineering

Modern approaches to software development are studied including requirements analysis, system design techniques, formal description techniques, implementation, testing, debugging, metrics, human factors, quality assurance, cost estimation, maintenance, and tools. 1 Credit

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

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

Section 1: Digital Image Processing

Digital image processing has been widely used in our daily lives, from entertainment, multimedia, remote sensing, to medicine. This course introduces the fundamentals and principles of digital image processing and its applications. Students will gain hands-on experience in using image processing techniques to solving practical problems. Topics include: image acquisition and digitization, image transformation, image filtering and enhancement, image restoration and reconstruction, color image processing, image compression, morphological image processing, as well as an introduction to advanced image processing topics like image classification, segmentation, and the latest development and applications in image processing.

Section 2: Heuristic Search

Heuristic search is a popular Artificial Intelligence approach that has been used in a variety of applications including robotics, combinatorial optimization, route pathfinding, and automated planning. In this course, we will investigate algorithms for solving single-agent search problems, and introduce methods for automatically generating heuristic functions. Topics will include optimal algorithms, abstraction and graph embedding-based methods for generating heuristic functions, bounded suboptimal algorithms, and Monte Carlo Tree Search-based algorithms.

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

Section 1: Natural Language Processing

Natural Language Processing addresses fundamental questions at the intersection of human languages and computer science. How can computers acquire, comprehend and produce human languages? How can computational methods give us insight into observed human language phenomena? In this advanced NLP course, the students will learn how computers can deal with human languages. This course will prepare students for graduate-level research in advanced natural language processing, and give them the background to qualify for job opportunities in this field in industry. It will also be useful for students interested in working in other fields (i.e. Artificial Intelligence, Data Mining, Information Retrieval) from a computational science perspective.

Section 2: Model-Driven Engineering

This course is designed to introduce students to the field of model-driven engineering (MDE). MDE is a software development methodology in which software models are treated as first-class citizens in the engineering process. Topics to be discussed include modelling languages, domain-specific modelling, model transformation, model management, modelling and simulation, and model analysis.

Section 3: Computational Geometry

In this course the students learn the design of algorithms for the geometric problems. These problems include but not limited to the following topics: convex hull; Voronoi diagram; triangulation; point location; visibility and Art Gallery; arrangement of lines; geometric data structures; and geometric duality.

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.

Section 1: Digital Image Processing

Digital image processing has been widely used in our daily lives, from entertainment, multimedia, remote sensing, to medicine. This course introduces the fundamentals and principles of digital image processing and its applications. Students will gain hands-on experience in using image processing techniques to solving practical problems. Topics include: image acquisition and digitization, image transformation, image filtering and enhancement, image restoration and reconstruction, color image processing, image compression, morphological image processing, as well as an introduction to advanced image processing topics like image classification, segmentation, and the latest development and applications in image processing.

Section 2: Heuristic Search

Heuristic search is a popular Artificial Intelligence approach that has been used in a variety of applications including robotics, combinatorial optimization, route pathfinding, and automated planning. In this course, we will investigate algorithms for solving single-agent search problems, and introduce methods for automatically generating heuristic functions. Topics will include optimal algorithms, abstraction and graph embedding-based methods for generating heuristic functions, bounded suboptimal algorithms, and Monte Carlo Tree Search-based algorithms.

Section 3: Natural Language Processing

Natural Language Processing addresses fundamental questions at the intersection of human languages and computer science. How can computers acquire, comprehend and produce human languages? How can computational methods give us insight into observed human language phenomena? In this advanced NLP course, the students will learn how computers can deal with human languages. This course will prepare students for graduate-level research in advanced natural language processing, and give them the background to qualify for job opportunities in this field in industry. It will also be useful for students interested in working in other fields (i.e. Artificial Intelligence, Data Mining, Information Retrieval) from a computational science perspective.

Section 4: Computational Geometry

In this course the students learn the design of algorithms for the geometric problems. These

problems include includes but not limited to the following topics: convex hull; Voronoi diagram; triangulation; point location; visibility and Art Gallery; arrangement of lines; geometric data structures; and geometric duality.

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: Model-Driven Engineering

This course is designed to introduce students to the field of model-driven engineering (MDE). MDE is a software development methodology in which software models are treated as first-class citizens in the engineering process. Topics to be discussed include modelling languages, domain-specific modelling, model transformation, model management, modelling and simulation, and model analysis.

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.

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