EXPANDED COURSE DESCRIPTION
ELECTRICAL ENGINEERING AND COMPUTER SCIENCE
Lassonde School of Engineering
Electrical Engineering Computer Science
LE / EECS 3401 3.0 SECTION A
INTRODUCTION TO AI AND LOGIC PROGRAMMING
FALL 2019 / WINTER 2020

Last Modified Date: 07/26/2019

COURSE CALENDAR DESCRIPTION

Artificial Intelligence (AI) deals with how to build intelligent systems. In this course, we examine fundamental concepts in AI: knowledge representation and reasoning, search, constraint satisfaction, reasoning under uncertainty, etc. The course also introduces logic programming and Prolog. Prerequisites: cumulative GPA of 4.50 or better over all major EECS courses (without second digit "5"); LE/EECS 2030 3.00 or LE/EECS 1030 3.00; LE/EECS 2011 3.00; MATH 1090 3.00. Previously offered as: LE/CSE 3401 3.00. PRIOR TO FALL 2014: course credit exclusion: LE/CSE 3402 3.00. PRIOR TO SUMMER 2013: course credit exclusions: SC/CSE 3401 3.00, SC/CSE 3402 3.00.

"Artificial Intelligence (AI) deals with how to build systems that can operate in an intelligent fashion. In this course, we examine fundamental concepts in AI: knowledge representation and reasoning, search, constraint satisfaction, reasoning under uncertainty, etc. The course also introduces logic programming, a programming paradigm based on predicate logic, where one specifies problems in a declarative way and one can use the language to search for a solution. Students will learn how to develop programs in Prolog to solve AI problems. The course covers the following topics: 1) Introduction to Artificial Intelligence, intelligent agents. 2) Logical representations, first-order logic syntax and semantics, use in knowledge representation. 3) Basics of logic programming and Prolog, syntax, backchaining procedure. 4) Inference in first order logic, unification, resolution. 5) Reasoning with Horn theories, SLDNF resolution, Prolog control flow, backtracking, closed world assumption, negation as failure. 6) Prolog lists, arithmetic. 7) Uninformed search. 8) Informed search. 9) Constraint satisfaction and backtracking search. 10) Game/adversarial search. 11) Uncertain reasoning, Bayes Nets.

INSTRUCTOR(S)

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<th>Name</th>
<th>Section / Format / Term</th>
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<tr>
<td>Stachniak, Zbigniew</td>
<td>Sec. A / LECT / F</td>
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ADDITIONAL INFORMATION

Course description and Learning Outcomes

Artificial Intelligence (AI) is one of the oldest but also one of the most intriguing and stimulating areas of computer science. This course is the introductory exposition to AI. It covers, in some depth, the core subjects of current interest to AI: knowledge representation, reasoning, intelligent agents and their modeling, acting and planning, search, neural networks, and genetic algorithms. Other important subareas of AI, such as robotics or computer vision, and machine learning are discussed in depth in other courses.

Logic Programming (LP) in another thread of the course. There are two reasons for its inclusion in the course. First, LP is strongly related to the main AI subjects such as knowledge representation and reasoning. LP languages and their extensions are extensively studied in the context of intelligent agents and their modeling. Second, LP languages, such as Prolog, are used as programming tools by AI research community.

The course's learning objectives are to acquire a good understanding of the main AI research issues, problem solving methods, and techniques as well as to appreciate achievements of AI practitioners and to understand challenges faced by them in making AI practically feasible. Another learning objective is to introduce the
students to the logic programming paradigm and to acquire a good understanding of a special relationship between AI and LP.

**Course Readings**

The presentation of most of the topics covered in this course has been developed using multiple sources such as textbooks, research papers, and information about industrial applications of AI. Hence, it is strongly recommended that students take adequate notes during lectures. However, all fundamental issues concerning these topics are covered in texts such as:

- I. Bratko, *PROLOG Programming for Artificial Intelligence* Addison-Wesley (the 3rd edition is available from archive.org).

*which are recommend for independent studies.*

It is recommended that the SWI-PROLOG programming environment is used for programming assignments. Please consult the SWI-Prolog site for more information. SWI-PROLOG is EECS-supported (see manual pages for pl).

**ACADEMIC INTEGRITY LINKS**

- Senate Policy on Academic Honesty - [http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/](http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/)
- Academic Integrity - [http://lassonde.yorku.ca/academic-integrity](http://lassonde.yorku.ca/academic-integrity)

**STUDENT LINKS**

- Student Rights and Responsibilities - [http://oscr.students.uit.yorku.ca/student-conduct](http://oscr.students.uit.yorku.ca/student-conduct)
- Religious Observance - [https://w2prod.sis.yorku.ca/Apps/WebObjects/cdm.woa/wa/regobs](https://w2prod.sis.yorku.ca/Apps/WebObjects/cdm.woa/wa/regobs)
- Student Accessibility Services (SAS) - [https://accessibility.students.yorku.ca/](https://accessibility.students.yorku.ca/)
- York University’s Policies on Gender/LGBTQ*/Positive Space - [http://rights.info.yorku.ca/lgbtq/](http://rights.info.yorku.ca/lgbtq/)

**LAND ACKNOWLEDGEMENT**

- We acknowledge our presence on the traditional territory of many Indigenous Nations. The area known as Tkaronto has been care taken by the Anishinabek Nation, the Haudenosaunee Confederacy, the Huron-Wendat, and the Métis. It is now home to many Indigenous Peoples. We acknowledge the current treaty holders, the Mississaugas of the New Credit First Nation. This territory is subject of the Dish With One Spoon Wampum Belt Covenant, an agreement to peaceably share and care for the Great Lakes region.

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Many courses utilize Moodle, York University’s course website system. If your course is using Moodle, click here to access it.

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