CMPT 721 - G100 Knowledge Representation and Reasoning

Instructor(s): Jim Delgrande

Calendar Objective/Description:
Knowledge representation is the area of Artificial Intelligence concerned with how knowledge can be represented symbolically and manipulated by reasoning programs. This course addresses problems dealing with the design of languages for representing knowledge, the formal interpretation of these languages and the design of computational mechanisms for making inferences. Since much of Artificial Intelligence requires the specification of a large body of domain-specific knowledge, this area lies at the core of AI. Prerequisites: CMPT 310/710 recommended. Cross-listed course with CMPT 411.

Instructor’s Objectives:
The area of Knowledge Representation and Reasoning is primarily concerned with encoding general world knowledge symbolically, in a form suitable for automated reasoning. This course will focus on central KRR methodologies, giving equal time to representational issues and reasoning issues.

Prerequisites:
None

Topics:
- Introduction: What do we mean by knowledge representation and why is it interesting?
- Logic: expressing knowledge, first-order logic, Horn clause logic
- Production systems (rule-based systems)
- Description Logics
- Defaults
- Probabilities and uncertain reasoning
- Diagnosis and abductive explanation
- Reasoning about action
- Planning
- Expressiveness and tractability

Grading:
The exact marking scheme will be decided in the first week of class in consultation with students in the course. Tentatively, four assignments and a midterm test and a final exam.

Students must attain an overall passing grade on the weighted average of exams in the course in order to obtain a clear pass (C- or better).

Recommended Books:
Knowledge Representation and Reasoning, R. Brachman and H. Levesque, Elsevier Science, 2004, 9781558609327, This text is available online. As well, it is between “required” and “recommended”

Reference Books:
Academic Honesty Statement:

Academic honesty plays a key role in our efforts to maintain a high standard of academic excellence and integrity. Students are advised that ALL acts of intellectual dishonesty will be handled in accordance with the SFU Academic Honesty and Student Conduct Policies (http://www.sfu.ca/policies/gazette/student.html).