

Spring Semester, 2016
Instructor: Jeff Horty

PHIL 478:
Logics for Defeasible Reasoning
Syllabus Version #1
January 14, 2016

Description

Philosophy and artificial intelligence often rely on logical models of reasoning, yet standard logic, originally designed to systematize reasoning in mathematics, applies only in domains where information is certain. In many scientific fields, as well as in ordinary commonsense reasoning, both people and machines must reason on the basis of information that is uncertain, incomplete, or even inconsistent. This course is focused on logics—sometimes known as “defeasible” or “nonmonotonic” logics—designed for reasoning with information of this kind. Course prerequisites: PHIL 370 or equivalent work in formal logic or permission of the instructor.

Time and place

Thursday, 2:00 - 4:30, PLS 1164

Contact information

Office: Skinner Building, Room 1101. Office phone: I don't use my office phone. Cell phone: 301-408-8963 (you are welcome to call my cell). Email: horty@umiacs.umd.edu. Office hours: I'll let you know my exact office hours once they've sorted themselves out.

Course materials

I will make electronic copies of the readings available as the course progresses.

Course work and grades

Students will be required to turn in weekly homeworks. These will be checked but will not affect your course grade. The homeworks will be nuts and bolts, nothing tricky. Their main function, in fact, is to show me how well you're understanding the material.

Grades will be based on three short exams and a final—also nuts-and-bolts, and some or all of which may be take-home—each counting for roughly 25% of your grade. I cannot be sure exactly when the exams will be scheduled yet—this depends on how things go in class. But I will try to distribute them evenly over the term, will give you plenty of notice, and will be flexible if you run into conflicts with other work or with religious observances.

Details

You are not required to attend class, but I have no idea how you could learn the material we will cover if you don't. You must abide by the University's Honor Code. All disabilities will happily be accommodated in any way necessary, and we will maintain a classroom atmosphere that encourages the equitable participation of all students regardless of age, disability, ethnicity, gender, national origin, race, religion, or sexual orientation

Course topics

Here is a tentative, initial list. The list will be undergoing revision throughout the term (be sure to check the version number on the syllabus).

1. Default logic
 - (a) Background and motivation
Readings: Horty [8], Horty [9, Introduction], Reiter [31]
 - (b) Default logic
Readings: Horty [9, Chapters 1 and 2], Reiter [30]
 - (c) Alternative default logics
Readings: Delgrande, Schaub, and Jackson [5]
 - (d) Variable priorities and exclusion
Readings: Horty [9, Chapters 5 and 6]
Background and related material: Pollock [14], Raz [29, Chapter 1]
2. Pollock's work on defeasible reasoning
 - (a) Roots in epistemology
Readings: Pollock [14], Pollock [15, Chapters 1 and 2]
Background and related material: Pollock [21, Chapters 1 and 2], Pollock and Cruz [25]
 - (b) The 1987 theory
Readings: Pollock [16], Pollock [18], Pollock [19]
Background and related material: Prakken and Horty [27],
 - (c) Problems: self-defeat, lottery, preface
Readings: Pollock [17]
 - (d) The 1994/95 theory
Readings: Pollock [20], Pollock [21, Chapters 2, 3, and 4]
Background and related material: Prakken and Horty [27]
 - (e) Later work
Readings: Pollock [22], Pollock [23], Pollock [24]
3. Argument systems
 - (a) Abstract argumentation: basic definitions
Readings: Dung [6]
Background and related: Prakken and Vreeswijk [28]

- (b) Abstract argumentation: labelings, dialogue
Readings: Prakken and Vreeswijk [28]
 - (c) Argumentation and Pollock's theories
Readings: Dung [6]
Background and related: Jakobovits [10], Jakobovits and Vermeir [11],
 - (d) Argumentation and default logic
Readings: Dung [6]
 - (e) Structured argumentation
Readings: Prakken [26]
4. Prioritized default logics
- (a) Order of application theories
Readings: Baader and Hollunder [1], Brewka [2], Brewka [3]
 - (b) Rintanen
Readings: Rintanen [32]
 - (c) Brewka and Eiter
Readings: Brewka and Eiter [4]
 - (d) An inheritance based theory
Readings: Horty [9, Chapter 8]
 - (e) Hansen's approach
Readings: Hansen [7]
 - (f) Parent's approach
Readings: Parent [13]
 - (g) Tucker's approach
Readings: Tucker [33]
5. Possible additional topics, depending on student interest, readings to be supplied
- (a) Prioritization in argumentation
 - (b) The lottery and preface paradoxes
 - (c) Formalization of legal reasoning
 - (d) Some issues in lexical semantics
 - (e) Computation issues: Answer Set Programming

References

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- [3] Gerhard Brewka. Reasoning about priorities in default logic. In *Proceedings of the Twelfth National Conference on Artificial Intelligence (AAAI-94)*, pages 940–945. AAAI/MIT Press, 1994.
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- [5] James Delgrande, Torsten Schaub, and W. Ken Jackson. Alternative approaches to default logic. *Artificial Intelligence*, 70:167–237, 1994.
- [6] Phan Minh Dung. On the acceptability of arguments and its fundamental role in nonmonotonic reasoning, logic programming, and n -person games. *Artificial Intelligence*, 77:321–357, 1995.
- [7] Jörg Hansen. Prioritized conditional imperatives: problems and a new proposal. *Autonomous Agents and Multi-agent Systems*, pages 11–35, 2008.
- [8] John Horty. Nonmonotonic logic. In Lou Goble, editor, *The Blackwell Guide to Philosophical Logic*, pages 336–361. Basil Blackwell Publisher, 2001.
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- [10] Hadassah Jakobovits. *On the theory of argumentation frameworks*. PhD thesis, The Free University of Brussels, 2000.
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- [12] Sanjay Modgil and Henry Prakken. A general account of argumentation with preferences. Under review, 2012.
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- [28] Henry Prakken and Gerard Vreeswijk. Logical systems for defeasible argumentation. In Dov Gabbay and F. Guethner, editors, *Handbook of Philosophical Logic (Second Edition)*, pages 219–318. Kluwer Academic Publishers, 2002.
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