CSC486/2502 Test 2

**When:** Friday December 8
12:10 – 1:00 pm (50 minutes duration)
Please arrive at **noon** so that we can start promptly at 12:10

**Where:** BA026 (here)

**What:** Chapters 10-15 inclusive
(i.e., everything after the last test, *excluding* Chapter 16)

**Restrictions:** Closed book. No aids.

**Rough Format:** 5-6 questions
- one question with definitions (1-2 lines)
- one question with short answers
- three (+) questions that are shorter to but similar to those we covered in assignments.

**Can I post old tests?** Sorry – no I cannot.
Like the assignments, the material is not mine to post.
Review

10. Inheritance
11. Defaults
12. Probability etc.
13. Abductive reasoning
14. Actions
15. Planning
Key Concepts

10. **Inheritance**

- Inheritance networks
- Strict vs. defeasible inheritance
- Strategies for defeasible inheritance
  - Shortest path heuristic (and its problems!)
  - Inferential distance
- A formal account (following Lynn Stein)
- Support and admissibility
  - Preemption, redundancy
  - Extensions (credulous, preferred)
Key Concepts

11. **Defaults** (Nonmonotonic Reasoning)
   - Generics vs. Universals
   - 4 types of nonmonotonic reasoning
   - 1) Closed-World Reasoning
     - Closed-World Assumption (CWA)
     - Query Evaluation
     - Consistency of CWA
     - Generalized Closed-World Assumption (GCWA) (weaker)
     - Quantifiers & Equality (domain closure, unique names)
   - 2) Circumscription
     - Minimal entailment
     - Fixed and variable predicates
Key Concepts (continued)

11. **Defaults** (Nonmonotonic Reasoning)
   - 3) Default Logic
     - Default Rules (normal default rules)
     - Default Extensions
     - Multiple Extensions
     - What to believe? (credulous, skeptical)
   - 4) Autoepistemic Logic
     - Stable sets and expansions
     - Enumerating stable expansions
12. **Probability etc.**

(Vagueness, Uncertainty and Degrees of Belief)

- Noncategorial reasoning
- 3 ways to make a universal statement less categorical
  1) Strengthen quantifier -- assertion about frequency
     (statistical interpretation/probabilistic sentences)
  2) Applicability of predicate
     (vague predicates/flexible membership)
  3) Degree of believe in whole sentence
     (uncertain knowledge/ subjective probability)

- Objective probability
  - Statistical (frequency) view of sentences
  - Does **not** depend on who is assessing the probability
  - Basic postulates (see the textbook rather than the notes)
Key Concepts

12. **Probability etc.** (continued)

- 2) Subjective probability
  - Degree of belief derived from statistical considerations
  - Basic Bayesian approach
  - Problem w/ approach (impractical for all but small problems)
  - Solution: exploit structure – Belief/Bayes Nets
  - Bayes Nets: how they work, why they work
  - Dempster-Shafer,

- 3) Vagueness
  - conjunction/disjunction, rules, Bayes reconstruction
Key Concepts

13. **Abductive reasoning**

(Explanation and Diagnosis)

- Abductive Reasoning
- Diagnosis
- Explanation (adequacy criteria, simplifications)
- Prime Implicates (what they are, how to compute them)
- Computing Explanations
- Abductive Diagnosis
- Consistency-Based Diagnosis
- Beyond the Basics (extensions and other applications)
Key Concepts

14. **Actions**
   - The Situation Calculus
     - Fluents
     - Preconditions and effect axioms
     - Frame axiom
   - Using the situation calculus
     - Projection task
     - Legality task
     - Planning task (in the next chapter)
   - What is the Frame Problem
   - Solving the Frame Problem
     - Explanation closure axioms
     - Successor state axioms
   - Limitations of Situation Calculus
   - Addressing one limitation: Complex Actions
     - Golog
     - The Do Formula and what it means
     - Using Golog (prolog)
15. **Planning**

- Planning in the Situation Calculus
  - Definitions: Goal, Plan, the planning task
  - Using Resolution to generate a plan (how, drawbacks)
- STRIPS Representation
  - Progressive Planning
  - Regressive Planning
- Planning as Reasoning
  - Avoiding Redundant Search
  - Application-Dependent Control (Golog)
- Beyond the Basics
  - Hierarchical Planning (ABSTRIPS)
  - Conditional Planning
  - Reactive Systems
- You are **not** responsible for SATPLAN, GRAPHPLAN, Model checking and heuristic search planning