Introduction (1.1-1.3)

- What is AI? Thinking/Acting like Humans/Rationally
- Turing Test
- Rational Behavior
- Fields that influenced AI
- Kinds of early AI systems

Intelligent Agents (2.1-2.4)

- What is an Agent?
- Percept, Percept Sequence
- Agent Function, Agent Program
- Rational Agent
- Task Environment Specification and Properties
- General Structure of Agents
Search Problems (3.1-3.2)
- Formulating a search problem
  - State space, initial state, successor function, goal test, path cost
  - Validity and usefulness
- State space vs. search tree
- Assumptions in basic search
- Important parameters

Blind Search (3.3-3.4)
- Data structure of a search node
- Expanding a node
- The fringe of a search tree
- Search algorithm #1 and #2
- The search strategy
  - Breadth-First, Depth-First, Depth-Limited, Iterative Deepening, Uniform Cost
- Performance measures

Heuristic Search (4.1-4.2 ~4.3)
- Evaluation function and Best-First search
- Heuristic function
  - Admissible, consistent, accuracy
  - Finding an admissible heuristic
  - Some examples for 8-puzzle and robot navigation
- A* Search Algorithm
Constraint Satisfaction Probs. (5.1-5.2)
- Formulating a CSP
  - variables, domains and constraints
- Valid assignment, complete assignment
- CSP as a search problem
- Commutativity (why useful?)
- CSP Backtracking Algorithm
  - With Forward Checking
    - Pick what variable? Assign what value?

Adversarial Search (6.1-6.3)
- The specific setting for adversarial search or “game playing”
- Constructing an evaluation function
- Minimax Game Tree and Algorithm
- Alpha-beta Pruning and Algorithm

Propositional Logic (7.1-7.4 ~7.5)
- Representing the world, possible worlds
- PL Symbols, Syntax and Semantics
- Models, Knowledge Bases, Satisfiability, Entailment and Equivalence
- Inference, Modus Ponens, Modus Tolens
- Soundness and Completeness
First-Order Logic (8.1-8.3)
- Why FOL?
- Objects, Relations and Functions
- Constants, Predicates and Functions
- Atomic and Complex sentences
- Truth in FOL. Models and Interpretation
- Universal and Existential quantification
- Building a KB. Axioms vs. Theorems

Planning (11.1-11.2 ~11.4)
- STRIPS
  - Closed and Open world assumptions
- Goal, State and Action. Action schema
- Forward planning
  - Applicable action, consistent heuristic,
    planning graph, level cost of a goal
- Backward planning
  - Regression of a goal

Uncertainty (13.1-13.6)
- Sources of uncertainty
- Belief State
- Random Variables, Domains
- Atomic events
- Prior probability, probability distribution,
  full joint probability distribution
- Conditional / Posterior probability
- Bayes Rule
Bayesian Networks (14.1 ~14.2)
- Probabilistic Belief State
- Probabilistic Inference
- Conditional Probability
- Issues with inference using full joint probability distribution tables
- Independence and Bayesian networks
- Conditional Probability Tables (CPTs)

Machine Learning (slides)
- Supervised Learning
  - Approaches
    - Classification, Decision tree, Regression
    - Hypothesis, Overfitting / Underfitting
- Unsupervised Learning
  - Clustering (K-Means)
- Reinforcement Learning
  - Delayed reward

Embodied Conversational Agents (slides)
- Different uses of Embodied Conversational Agents (ECAs)
- Why is the visible behavior important as well as the AI “inside the box”?
- Two main aspects of conversational smarts: Propositional and Interactional
- Gandalf and REA