

Syllabus and Study guide for AI Final exam

Sources

- Russell & Norvig's textbook (AIMA)
- Slides available in the AIMA book website
- Slides posted via Google classroom

Study guide

- The exam is **cumulative**, i.e., everything taught in this course will be covered in the final exam. But I have trimmed some topics, as you will see in the table.
- Most of the content of the course was covered before the midterm. So, expect to see a lot of questions (**around half**) from the **pre-midterm** syllabus (shaded in the table)
- The style of question will be similar to the exams and quizzes. Study those exams carefully. Question patterns may be repeated.

Syllabus

Ch.	Subject	Topics/Skills required
2	Intelligent Agents	<ul style="list-style-type: none">• Understanding PEAS description• Understanding the characteristics of environments (static/dynamic, stochastic/deterministic, etc.)• Understanding different types of models (model-based, utility based, etc.)
3	Search	<ul style="list-style-type: none">• Understand all blind and heuristic search techniques (BFS, DFS, Greedy, A* etc.) and ability to solve mathematical problems related to these.
5	Adversarial Search	<ul style="list-style-type: none">• Understand minimax and alpha-beta pruning and ability to solve simple mathematical problems related to these.• Understand techniques to make game tree search faster (cut-off search, move ordering, etc.)
7,8	Logic	<ul style="list-style-type: none">• Translate to and from propositional logic and first order logic• Convert sentences to and from CNF and Horn form• Apply resolution, forward and backward chaining on propositional logic statements
13	Quantifying Uncertainty	<ul style="list-style-type: none">• Understanding basic notions of probability, conditional probability, independence, full joint distribution, Bayes' rule
14	Probabilistic Reasoning	<ul style="list-style-type: none">• Understanding conditional independence• Understanding the basic principle of Bayesian Networks• Ability to make inference given the topology and conditional probability tables of a given Bayesian network

15	Temporal Reasoning	<ul style="list-style-type: none"> • Understanding the basic principles of a Markov process • Ability to perform basic calculations given the transition table of a Markov process • Understanding the basic principles of a Hidden Markov Model (HMM) • Ability to make inference given the transition and emission probabilities of a Hidden Markov Model
18	Basic Machine Learning	<ul style="list-style-type: none"> • Understanding the basics of three major types of machine learning (supervised, unsupervised, reinforcement) • Understanding concepts related to supervised learning: training, testing, learning model, overfitting, underfitting • Understanding concepts related to evaluation of learning models, accuracy, precision, recall, train-test split, n-fold cross validation
18	Neural Networks	<ul style="list-style-type: none"> • Understanding the working principal of a perceptron, and its basic components. Ability to design a simple perceptron by hand (e.g., a perceptron to calculate the OR function) • Understanding the basics of an artificial neural network: input, output and hidden layers. • Understanding the basic concept of how a neural network works: gradient descent, error backpropagation, learning rate etc. (no calculation required, just basic knowledge)