# **CS 188** | Introduction to Artificial Intelligence
## Fall 2018

Lecture: Tu/Th 2:00-3:30 pm, Wheeler 150


## Description

This course will introduce the basic ideas and techniques underlying the design of intelligent computer systems. A specific emphasis will be on the statistical and decision-theoretic modeling paradigm.

By the end of this course, you will have built autonomous agents that efficiently make decisions in fully informed, partially observable and adversarial settings. Your agents will draw inferences in uncertain environments and optimize actions for arbitrary reward structures. Your machine learning algorithms will classify handwritten digits and photographs. The techniques you learn in this course apply to a wide variety of artificial intelligence problems and will serve as the foundation for further study in any application area you choose to pursue.

See the syllabus for slides, deadlines, and the lecture schedule.

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## Syllabus

**The links below to electronic homework will only work for students who were registered in the Berkeley offering. If you are working through these materials on your own, make an account at Gradescope and enroll using this code: 93PWD8**
**Then onwards, this link should work: https://www.gradescope.com/courses/33660**

**ZIP files of course materials: PDF lectures (2.1 GB) · PPTX lectures (819 MB) · Homework (4.3 MB) · Sections (6.3 MB)**

| Wk | Date | Lecture Topic | Readings | Section | Homework | Project |
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|---|---|---|---|---|---|---|
| 0 | 8/23 Th | Intro to AI (Slides: 1PP · 2PP · 4PP · 6PP · video) | Ch. 1, 2 Note 1 | No Section | HW0 Math Diagnostic | P0 Tutorial |
| 1 | 8/28 Tu | Uninformed Search (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video · step-by-step) | Ch. 3.1-4 | Section 1 (without solutions) | HW1 Search [Electronic+ Written] (Both due 9/4 11:59pm) [Written solutions] | |
| | 8/30 Th | A* Search and Heuristics (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video · step-by-step) | Ch. 3.5-6 | | | |
| 2 | 9/4 Tu | CSPs I (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video) | Ch. 6.1 Note 2 | Section 2 (without solutions) | HW2 CSPs [Electronic+ Written] (Both due 9/10 11:59pm) [Written solutions] | P1 Search (Due 9/7 4pm) Mini-Contest 1 (Due 9/16 11:59pm) |
| | 9/6 Th | CSPs II (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video) | Ch. 6.2-5 | | | |
| 3 | 9/11 Tu | Game Trees: Minimax (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video · step-by-step) | Ch. 5.2-5 Note 3 | Section 3 (without solutions) | HW3 Games [Electronic+ Written] (Both due 9/17 11:59pm) [Written solutions] | |
| | 9/13 Th | Game Trees: Expectimax, Utilities (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video) | Ch. 5.2-5, 16.1-16.3 | | | |
| 4 | 9/18 | MDPs I | Ch. 17.1-3 | Section 4 | HW4 MDPs | P2 Games |

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| | Tu | (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video) | Note 4 | (without solutions) | [Electronic+ Written] (Both due 9/24 11:59pm) [Written solutions] | (Due 9/21 4pm)<br><br>Mini-Contest 2 (Due 9/30 11:59pm) |
| | 9/20 Th | MDPs II (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video) | Ch. 17.1-3, Sutton and Barto Ch. 3-4 | | | |
| 5 | 9/25 Tu | RL I (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video) | Ch. 21, Sutton and Barto Ch. 6.1,2,5 Note 5 | Section 5 (without solutions) | HW5 RL [Electronic+ Written] (Both due 10/01 11:59pm) [Written solutions] | |
| | 9/27 Th | RL II (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video) | Ch. 21 | | | |
| 6 | 10/2 Tu | Probability (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video) | Ch. 13.1-5 | MT1 review (without solutions) | Practice MT1 (Due 10/6 11:59pm) [Solutions] | P3 RL (Due 10/5 4pm) |
| | 10/4 Th | BNs: Representation (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video) | Ch. 14.1-2,4 Note 6 | | | |
| 7 | 10/9 Tu | Midterm 1 (7:30 - 9:30 pm) (Midterm 1 Prep) No lecture (Blank Exam) (Solutions) | | No Section | HW6 [Electronic+ Written] (Both due 10/15 11:59pm) [Written solutions] | |
| | 10/11 Th | BNs: Independence (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video · step-by-step) | Ch. 14.3, Jordan 2.1 | | | |

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| 8 | 10/16 Tu | BNs: Inference (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video · step-by-step I · step-by-step II) | Ch. 14.4 | Section 6 (without solutions) | HW7 [Electronic+ Written] (Both due 10/22 11:59pm) [Written solutions] | |
| | 10/18 Th | BNs: Sampling (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video · step-by-step) | Ch. 14.4-5 | | | |
| 9 | 10/23 Tu | Decision Networks / VPI (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video) | Ch. 16.5-6 Note 7 | Section 7 (without solutions) | HW8 [Electronic+ Written] (Both due 10/29 11:59pm) [Written solutions] | |
| | 10/25 Th | HMMs (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video) | Ch. 15.2,5 Note 8 | | | |
| 10 | 10/30 Tu | Particle Filtering and Apps of HMMs (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video) | Ch. 15.2,6 | Section 8 (without solutions) | HW9 [Electronic+ Written] (Both due 11/5 11:59pm) [Written solutions] | |
| | 11/1 Th | ML: Naive Bayes (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video · step-by-step I · step-by-step II) | Ch. 20.1-20.2.2 Note 9 | | | |
| 11 | 11/6 Tu | ML: Perceptrons and Logistic Regression (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video · | Ch. 18.6.3 | Section 9 (without solutions) | HW10 [Electronic+ Written] (Both due 11/13 11:59pm) | P4 Ghostbusters (Due 11/9 4pm) |

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| | | step-by-step) | | | [Written solutions] | |
| | 11/8 Th | ML: Optimization and Neural Networks (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video) | Ch. 18.8 Note 10 | | | |
| 12 | 11/13 Tu | ML: Neural Networks II and Decision Trees (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video) | - | MT2 review (without solutions) | Practice MT2 (Due 11/13 11:59pm) [Solutions] | |
| | 11/15 Th | Midterm 2 (7:30 - 9:30 pm) (Midterm 2 Prep) No lecture | - | | | |
| 13 | 11/20 Tu | No Lecture (Air Quality / Thanksgiving) | - | Section 11 | HW11 [Electronic+ Written] (Due 11/26) [Written solutions] | |
| | 11/22 Th | Thanksgiving | - | | | |
| 14 | 11/27 Tu | Robotics / Language / Vision (Slides: 1PP · 2PP · 4PP · 6PP · PPTX · video) | - | Section 12 (without solutions) | - | Final Contest (Due 11/27 11:59pm) |
| | 11/29 Th | Advanced Topics and Final Contest (Slides: 1PP · 2PP · 4PP · 6PP · video) | - | | | |
| 15 | 12/4 Tu | Dead Week | - | Final review | Practice Final (Due | P5 Machine Learning |

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| | 12/6 Th | Dead Week | - | (without solutions) | 12/8 11:59pm) [Solutions] | (Due 12/3 4pm) |
| 16 | 12/11 Tu | Final Exam (8 - 11 am) (Final Exam Prep) (Blank Exam) (Solutions) | - | - | - | |