

# Lecture 1 - CS486 Introduction

Jesse Hoey  
School of Computer Science  
University of Waterloo

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Readings: Poole & Mackworth 1.1

- People:
  - ▶ Jesse Hoey (Instructor)
  - ▶ TAs:
    - ▶ Kai Ma
    - ▶ Zheng Ma
    - ▶ Kelechi Ogueji
    - ▶ Kyle Tilbury
    - ▶ Mojtaba Valipour
    - ▶ Blake Vanberlo
    - ▶ Ji Xin
    - ▶ Dake Zhang
- Lectures:
  - ▶ Section 002: T/Th 1:00pm-2:20pm in RCH-302
  - ▶ Section 001: T/Th 2:30pm-3:50pm in RCH-302
- Office hours: TBA (online)
- Office hours (TA): near assignment due dates

- CS486 (undergrad students)
  - ▶ 4 Assignments (40%: 10% each) (approx deadlines: May 29th, Jun 15, Jun 29, Jul 20)
  - ▶ 1 midterm exam (15%) (June 8th, 7:00pm-8:50pm in M3-1006)
  - ▶ 1 final exam (45%) (must pass to pass course)
  - ▶ optional project (5% bonus, proposal due at midterm)
- CS686 (grad students)
  - ▶ 4 Assignments (25%: 6.25% each) (approx deadlines: May 29th, Jun 15, Jun 29, Jul 20)
  - ▶ 1 midterm exam (10%) (June 8th, 7pm-8:50pm in M3-1006)
  - ▶ 1 final exam (35%)
  - ▶ 1 project report (30%, proposal due at midterm)
- Students wishing to write a project (and all CS686 students) **must** submit a project proposal.
- the Final is cumulative (covers all course material) with a focus on the post-midterm material.x

# Projects

- Optional for CS486 students (5% bonus)
- Mandatory for CS686 students (30% of grade)
- you **must** submit a correctly constructed and formatted proposal by the midterm - will be pass/fail with **no mark**
- Final project due before the final exam
- Individual project (CS686)
- Group project (up to 3 members, CS486):
  - ▶ **must be substantially** more involved than individual projects,
  - ▶ each team members contributions **must be clearly and specifically described**
  - ▶ there must be more papers referenced and discussed for team projects (3 more per team member)
- <https://cs.uwaterloo.ca/~jhoey/teaching/cs486/projects.html>

- Textbook: David Poole and Alan Mackworth  
**Artificial Intelligence: Foundations of Computational Agents.**  
available online at [artint.info](http://artint.info)
- Secondary textbooks:
  - ▶ Russell and Norvig  
**Artificial Intelligence** [aima.cs.berkeley.edu/](http://aima.cs.berkeley.edu/)
  - ▶ Ian Goodfellow and Yoshua Bengio and Aaron Courville  
**Deep Learning** - [deeplearningbook.org/](http://deeplearningbook.org/)
- Website:  
<https://cs.uwaterloo.ca/~jhoey/teaching/cs486/index.html>
- Discussion forum and email: Piazza  
[piazza.com/uwaterloo.ca/spring2022/cs486686/home](http://piazza.com/uwaterloo.ca/spring2022/cs486686/home)
- assignments handed in and returned, grades, on LEARN

## AccessAbility Services Volunteer Notetaker Required

Interested? Complete an online application using your WATIAM:

<https://york.accessiblelearning.com/UWaterloo/>

**More information:**

**Website:** <https://uwaterloo.ca/accessibility-services/current-students/notetaking-services>

**Email:** [notetaking@uwaterloo.ca](mailto:notetaking@uwaterloo.ca)

**Phone:** 519-888-4567, ext. 35082



To accommodate a classmate who is registered with AccessAbility Services, the AccessAbility Services staff and I are looking for a volunteer notetaker for CS486. We appreciate your contribution to the university on behalf of fellow students who are unable to take notes due to a disability. If you are interested in being a volunteer notetaker, please complete the application form on the AccessAbility Services website by signing-in with your WATIAM credentials (<https://york.accessiblelearning.com/UWaterloo/>)." < >

# Overview of the Course

## Lectures:

- Introduction
- Agents and AI
- Representation and Reasoning
  - ▶ States and Searching
  - ▶ Features and Constraints (CSPs)
  - ▶ Logical inference
  - ▶ Uncertainty (Bayesian probability)
- Learning
  - ▶ Supervised learning (Regression)
  - ▶ Neural Networks and Deep Learning (Stochastic gradient descent)
  - ▶ Bayesian learning (learning Bayes Nets)
  - ▶ Unsupervised learning (Expectation-Maximization)
- Planning
  - ▶ deterministic (under certainty)
  - ▶ with uncertainty (Markov decision processes)
  - ▶ reinforcement learning
- Topics (time permitting)

# Integrity, Intellectual Property

- See official course outline at <https://cs.uwaterloo.ca/~jhoey/teaching/cs486/S22CS486Outline.html>
- Property of UW:
  - ▶ Lecture content, spoken and written (and any audio/video recording thereof);
  - ▶ Lecture handouts, presentations, and other materials prepared for the course (e.g., PowerPoint slides);
  - ▶ Questions or solution sets from various types of assessments (e.g., assignments, quizzes, tests, final exams); and
  - ▶ Work protected by copyright (e.g., any work authored by the instructor or TA or used by the instructor or TA with permission of the copyright owner).
- Sharing intellectual property without the intellectual property owner's permission is a violation of intellectual property rights.



# Current Research In A.I.

- Organizations:
  - ▶ Waterloo AI institute [waterloo.ai](http://waterloo.ai)
  - ▶ Assoc. for the Advancement of A.I. (AAAI) [aaai.org](http://aaai.org)
  - ▶ European Association for A.I. (EurAI) [eurai.org](http://eurai.org)
  - ▶ Canadian A.I. Association [caiac.ca](http://caiac.ca)
  - ▶ Intl. Machine Learning Society [machinelearning.org](http://machinelearning.org)
  - ▶ Association for Affective Computing (AAAC)  
<https://aaac.world/>
- Journals
  - ▶ Artificial Intelligence  
[journals.elsevier.com/artificial-intelligence/](http://journals.elsevier.com/artificial-intelligence/)
  - ▶ Journal of AI Research [jair.org](http://jair.org)
  - ▶ Journal of Machine Learning Research [jmlr.org](http://jmlr.org)
  - ▶ arXiv AI <https://arxiv.org/list/cs.AI/recent>
  - ▶ arXiv Learning <https://arxiv.org/list/cs.LG/recent>
- Conferences
  - ▶ International Joint Conferences on A.I. [ijcai-22.org](http://ijcai-22.org)
  - ▶ AAAI 2018 [aaai.org/Conferences/AAAI-22](http://aaai.org/Conferences/AAAI-22)
  - ▶ Neural Information Processing Systems [neurips.cc](http://neurips.cc)
  - ▶ International Conf. on Machine Learning [icml.cc](http://icml.cc)

# What is Artificial Intelligence (AI)?

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*The synthesis and analysis of computational agents that act intelligently.*

An agent acts *intelligently* when

- what it does is appropriate for its circumstances and its goals, taking into account the short-term and long-term consequences of its actions
- it is flexible to changing environments and changing goals
- it learns from experience
- it makes appropriate choices given its perceptual and computational limitations

## Next:

- What is AI? (Poole & Mackworth chapter 1.2-1.10,2.1-2.3)
- Search (Poole & Mackworth chapter 3)