

Minds and Machines
SYMSYS 1
Stanford University
Summer 2026

Instructors

TBD

Course coordinator

Dr. Bonnie Krejci

Contact us

TBD

Lecture time and location

TBD; 1.5 hours per week, in person

Discussion section times and locations

TBD; 1 hour per week, in person

Course format

This is a flipped classroom. You will be asked to watch videos and do readings on your own each week. Then, you will attend a small discussion section with your TA and a larger, all-class lecture with the instructor.

Course description

This course provides an overview of the interdisciplinary study of cognition, information, communication, and language, with an emphasis on foundational issues: What are minds? What is computation? What are rationality and intelligence? Can we predict human behavior? Can computers be truly intelligent? Lectures focus on how the methods of philosophy, mathematics, empirical research, and computational modeling are used to study minds and machines.

Students must take this course before being approved to declare Symbolic Systems as a major. All students interested in studying Symbolic Systems are urged to take this course early in their student careers.

The course material and presentation will be at an introductory level, without prerequisites.

Learning goals

- Analyze formal and natural systems at multiple levels of abstraction and from multiple intellectual perspectives
- Understand and articulate connections among the numerous, superficially distant fields of study that comprise ‘cognitive science’
- Develop key analytic and computational skills that are widely used in cognitive science and beyond
- Prepare yourself to uncover surprising and useful connections in your future studies in SymSys, computer science, psychology, linguistics, philosophy, and beyond

Textbook

None. Please access course material via Canvas

Exams

None

Evaluation

Weekly Responses	10%
Problem Sets	30%
Participation	25%
in lecture - 10%	
in section - 15%	
Module Projects	35%

Honor Code policy

All work submitted should be exclusively your own. You may discuss homework concepts aloud, but *you may not share any written documents* pertaining to homework questions, including emails, draft answers, etc. *You may not use LLMs (“AI”) at all.* For more details, refer to the [Honor Code Policy](#) document. Failure to follow the Honor Code policy is a serious offense and can lead to major sanctions, including failing the class and official sanctions through the [Office of Community Standards](#). Students who are repeating the class must submit original work on all assignments.

Late assignment policy - subject to change before Summer session

- *Weekly Responses* will be accepted only until the deadline; you won't be able to make a submission after that time. Do not submit via email or submission comment.

- *Problem Sets* incur a penalty of 10% per day off of the total score, based on the timestamp of the submitted assignment. E.g., an assignment with a score of 90 turned in 24 hours and 1 minute late is considered two days late, and would earn a score of 70.
- *Module Projects* incur a 10% penalty per day, just as outlined above for problem sets. The final Module Project must be submitted by **Saturday, August 15th** at the latest, even for a penalty.

Discussion section attendance policy

- Discussion sections meet in person, not on Zoom.
- If you are sick during your section or need a one-time switch, you may attend a different section. The TA or section leader who you actually see in person is the one who will enter your participation grade.
- Otherwise, you must attend the section that you are enrolled in.

Dropping of lowest grades, by category

- Your lowest Weekly Response grade gets dropped
- Your lowest Problem Set grade gets dropped
- Your lowest participation grade from discussion section gets dropped
 - i.e., you have one “free” absence
- Your lowest participation grade from lecture gets dropped
 - i.e., one free absence
- You can use these drops for any reason. If you are absent or do not submit a problem set or weekly response, your grade will show up on Canvas as a zero; however, it is *automatically* dropped in the calculation of your overall grade.

Students with documented disabilities

Students with disabilities are welcome in this class. Please send your OAE letters to the instructor. We may share your letter with your TA, unless you request otherwise.

Student-athletes

Attendance is an important part of this course, and we recommend taking it during a quarter when you can make all of the class sessions. Student-athletes have the same number of free absences as any other student. Absences cannot be made up.

Grading scale

Letter grade	Percentage
A	93-100%*
A-	90-92%
B+	87-89%
B	83-86%
B-	80-82%
C+	77-79%
C	73-76%
C-	70-72%
D+	67-69%
D	63-66%
D-	60-62%
NP	<60%
CR	>70%
NC	<70%
I	by request only

*Students earn A+s on the basis of a high numerical score in the A-range, but we do not guarantee in advance what the cutoff is.

Late enrollment

Students who add the class after the first day of classes are still responsible for meeting all of the stated assignment deadlines and attending all classes. You can use your dropped assignment grades for any of the initial assignments that you miss.

Repeating the course

Students who enroll in the course for a second quarter must submit original work in the second/subsequent quarters.

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Module 1: What is a mind?

- Course introduction video (TBD) **watch**
- Module 1 overview (Goodman) **watch**

Week 1: Meaning of mind

Bodies, minds, and machines

- Minds and bodies (Flanagan) **read**
- Bodies, minds, and machines (Lassiter) **watch**
- Optional: They're made out of meat! (Bisson) **read**

From embodied to abstract machines

- Pattern on the stone (Hillis), Ch. 1-2 **read**
- From embodied to abstract machines (Lassiter) **watch**

Friday 6/26

Course introduction
Weekly Response 1 due
Week 1 Problem Set due

Week 2: The computational theory of mind

Automata and computation

- Automata and computation, Part 1 (Schwarz) **watch**
- Automata and computation, Part 2 (Schwarz) **watch**

Minds as automatic formal systems

- Minds as automatic formal systems (Lassiter) **watch**

Levels of analysis

- Can neuroscience understand Donkey Kong? (Yong) **read**
- [Levels of analysis](#) (Cooper & Peebles) **read**
- Levels of analysis (Lassiter) **watch**

Tuesday 6/30

Weekly Response 2 due

Friday 7/3

Levels of analysis
Week 2 Problem Set due

Week 3: Thinking machines and their detractors

Machines for natural language grammar

- How language works (Pinker) **read**
- Machines for natural language grammar (Lassiter) **watch**

Simulation of a mind

- Chinese room argument (Searle) **read**
- Simulation of a mind (Lassiter) **watch**
- Optional: Computing machinery and intelligence (Turing) **read**

Tuesday 7/7

Weekly Response 3 due

Friday 7/10

Imitation games
Week 3 Problem Set due

Module 2: Synthetic minds

- Module 2 overview (Goodman) **watch**

Week 4: Artificial intelligence and neural networks

Introduction to artificial intelligence, machine learning, and deep learning

- [A short history of AI](#) (AI100) **read**
- [Large language models](#) (Mitchell) **read**

Introduction to (machine) learning

- Introduction to machine learning (Sahami) **watch**
- How we learn (Dehaene) Ch 1 **read**
- [The nature of code](#) (Shiffman), Ch 10, sections 1-3 **read**

Tuesday 7/14

Weekly Response 4 due

Friday 7/17

Large language models
Module 1 Project due

Week 5: Learning and bias

Neural networks

- Neural networks - Part I (Piech) **watch**
- Neural networks - Part II (Piech) **watch**

Neural networks in practice

- [Understanding neural networks with TensorFlow Playground](#) (Sato) **read**
- [Hands-on in the playground](#) (Kane) **watch**

Algorithmic bias and ethics in artificial intelligence

- [An overview of catastrophic AI risks](#) (Center for AI Safety) **read**
- [AI's fairness problem](#) (Wang et al.) **read**
- Algorithmic bias (Birhane) **read**
- Optional: [Coded bias](#) **watch**

Tuesday 7/21

Weekly Response 5 due

Friday 7/24

Ethics and artificial
intelligence
Week 5 Problem Set due

Module 3: Organic minds

- Module 3 overview (Goodman) **watch**

Week 6: Reasoning and rationality

Learning, reason, and action

- Background video: [A visual guide to Bayesian thinking](#) (Galef) **watch**
- [Bayesian models of perception and action](#) (Ma et al.), Ch. 1 **read**
- Perception (Gardner) **watch**

Optimality versus heuristics

- Background video: Decision theory (Briggs), Sections 1-3 **watch**
- Judgment and decision-making (Jhangiani) **read**
- Optional: Judgment under uncertainty (Tversky and Kahneman) **read**

Tuesday 7/28

Weekly Response 6 due

Friday 7/31

How rational are we?
Module 2 Project due

Week 7: Learning and development

How babies think

- How babies think (Gopnik) **read**
- [Cognitive development](#) (Gelman) **read**
- How we learn (Dehaene), Ch. 2 **read**
- Cognitive development: How we (learn to) think and learn (Gweon) **watch**
- Optional: [What do babies think?](#) (Gopnik) **watch**
- Optional: How to grow a mind (Tenenbaum et al.) **read**

Tuesday 8/4

Weekly Response 7 due

Friday 8/7

How to build a baby
Week 7 Problem Set due

Module 4: Interacting minds

- Module 4 overview (Goodman) **watch**

Week 8: Social reasoning

How we think others think

- [Social learning](#) (Gweon) **read**
- The Naive Utility Calculus (Jara-Ettinger et al.) **read**

Pragmatics

- Grice's theory of implicature (Kroeger) **read**

Tuesday 8/11

Weekly Response 8 due

Friday 8/14

Module 3 Project due