

# CSC242: Introduction to Artificial Intelligence

Lecture 0.0

Please put away all electronic devices

# Welcome to CSC242!

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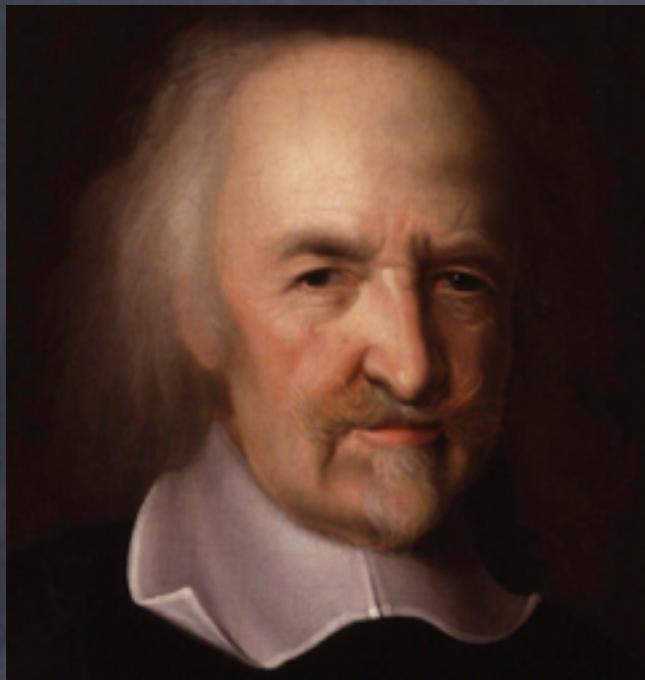
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See AIMA Chapter 1

Introspection

Other Minds

Vision

Action

Language

Problem-Solving

Mathematics

Games

Adaptation &

Logic

Learning

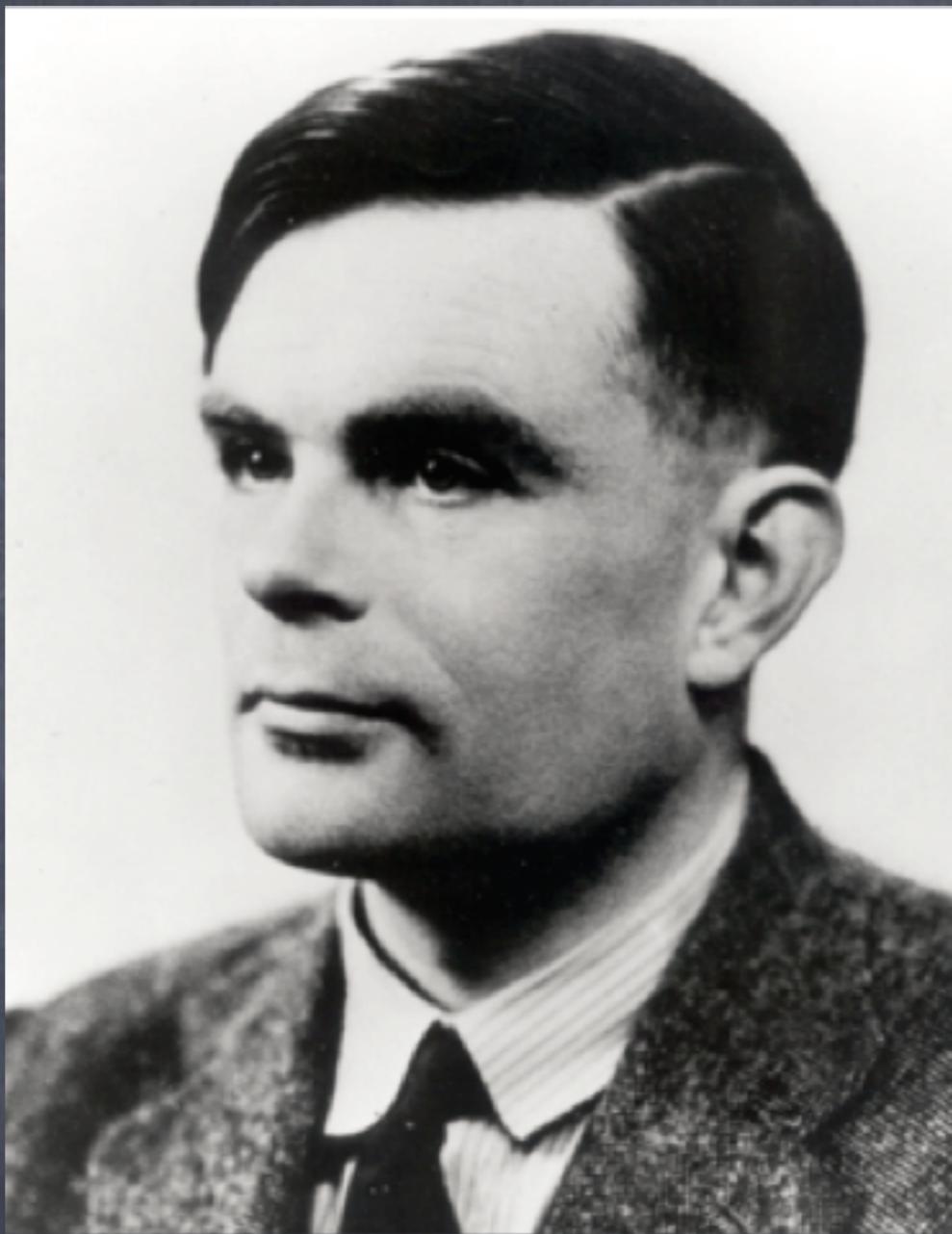
Community

Planning

Creativity

Technology

Music & Art



Alan Turing  
1912-1954

M I N D  
A QUARTERLY REVIEW  
OF  
PSYCHOLOGY AND PHILOSOPHY

— 306 —  
**I.—COMPUTING MACHINERY AND  
INTELLIGENCE**

By A. M. TURING

*1. The Imitation Game.*

I PROPOSE to consider the question, 'Can machines think?' This should begin with definitions of the meaning of the terms 'machine' and 'think'. But if one appeals to the dictionary one finds that 'think' is used in three different senses, and 'machine' in at least four, so that the question is not easily answered. If the meaning of the words 'machine' and 'think' are to be found by examining how they are commonly used, it is difficult to decide what to take as the meaning, since the attitude is dangerous. If the meaning of the words 'machine' and 'think' are to be found by examining how they are commonly used, it is difficult to decide what to take as the meaning, since the attitude is dangerous. Instead of attempting such a definition I shall replace the question by another, which is closely related to it and is expressed in relatively unambiguous words.

The new form of the problem can be described in terms of a game which we call the 'imitation game'. It is played with three people, a man (A), a woman (B), and an interrogator (C) who may be of either sex. The interrogator stays in a room apart from the other two. The object of the game for the interrogator is to determine which of the other two is the man and which is the woman. He knows them by labels X and Y, and at the end of the game he says either 'X is A and Y is B' or 'X is B and Y is A'. The interrogator is allowed to put questions to A and B thus:

C: Will X please tell me the length of his or her hair?  
Now suppose X is actually A, then A must answer. It is A's

"I propose to consider the question,  
'Can machines think?'"

# The Imitation Game (Turing Test)

Interrogator



A: Male? Female?  
B: Male? Female?



A



B

"Will A please tell me the length of his or her hair?"



"My hair is <sup>A</sup> shingled,  
and the longest  
strands, are about nine  
inches long."



A: Male? Female?  
B: Male? Female?



B



A: Male? Female?  
B: Male? Female?



A

"No, I am the woman,  
don't listen to him!"



B

"I am the woman,  
don't listen to him!"



A: Male? Female?  
B: Male? Female?



A



B



C



B

C: Male? Female?

B: Male? Female?



C



B

C: Computer? Person?  
B: Computer? Person?



C



B

Q: Please write me a sonnet on the subject of the Forth Bridge.

A: Count me out on this one. I never could write poetry.

Q: Add 34957 to 70764.

A: (Pause about 30 seconds then) 105621.

Q: Do you play chess?

A: Yes.

Q: I have K at my K1 and no other pieces. You have only K at K6 and R at R1. It is your move. What do you play?

A: (Pause 15 seconds then) R-R8 mate.

Male/Female?  
Human/Computer?



C



B

Accuracy<sub>A</sub> ≥ Accuracy<sub>C</sub> ?

Last State			
	$q_1$	$q_2$	$q_3$
Input	$i_0$	$q_2$	$q_3$
	$i_1$	$q_1$	$q_2$

State	$q_1$	$q_2$	$q_3$
Output	$o_0$	$o_0$	$o_1$

The Theological Objection

The 'Heads in the Sand' Objection

The Mathematical Objection

The Argument from Consciousness

Arguments from Various Disabilities

Lady Lovelace's Objection

Argument from Continuity in  
the Nervous System

The Argument from Informality  
of Behaviour

The Argument from Extra-Sensory Perception

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I.—COMPUTING MACHINERY AND  
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1. *The Imitation Game.*

I PROPOSE to consider the question, 'Can machines think ?' This should begin with definitions of the meaning of the terms 'machine' and 'think'. The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is dangerous. If the meaning of the words 'machine' and 'think' are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question, 'Can machines think ?' is to be sought in a statistical survey such as a Gallup poll. But this is absurd. Instead of attempting such a definition I shall replace the question by another, which is closely related to it and is expressed in relatively unambiguous words.

The new form of the problem can be described in terms of a game which we call the 'imitation game'. It is played with three people, a man (A), a woman (B), and an interrogator (C) who may be of either sex. The interrogator stays in a room apart from the other two. The object of the game for the interrogator is to determine which of the other two is the man and which is the woman. He knows them by labels X and Y, and at the end of the game he says either 'X is A and Y is B' or 'X is B and Y is A'. The interrogator is allowed to put questions to A and B thus:

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Intelligence is a multi-faceted phenomenon.

In Computer Science, we are interested in computational solutions to problems that are associated with intelligent behavior.

Our tools are programs that exhibit intelligent behavior.

# CSC242: A Computational Approach to AI

- Formal models of problems associated with intelligent behavior
- Algorithms for solving those problems
- Programs that implement the algorithms and demonstrate the solution

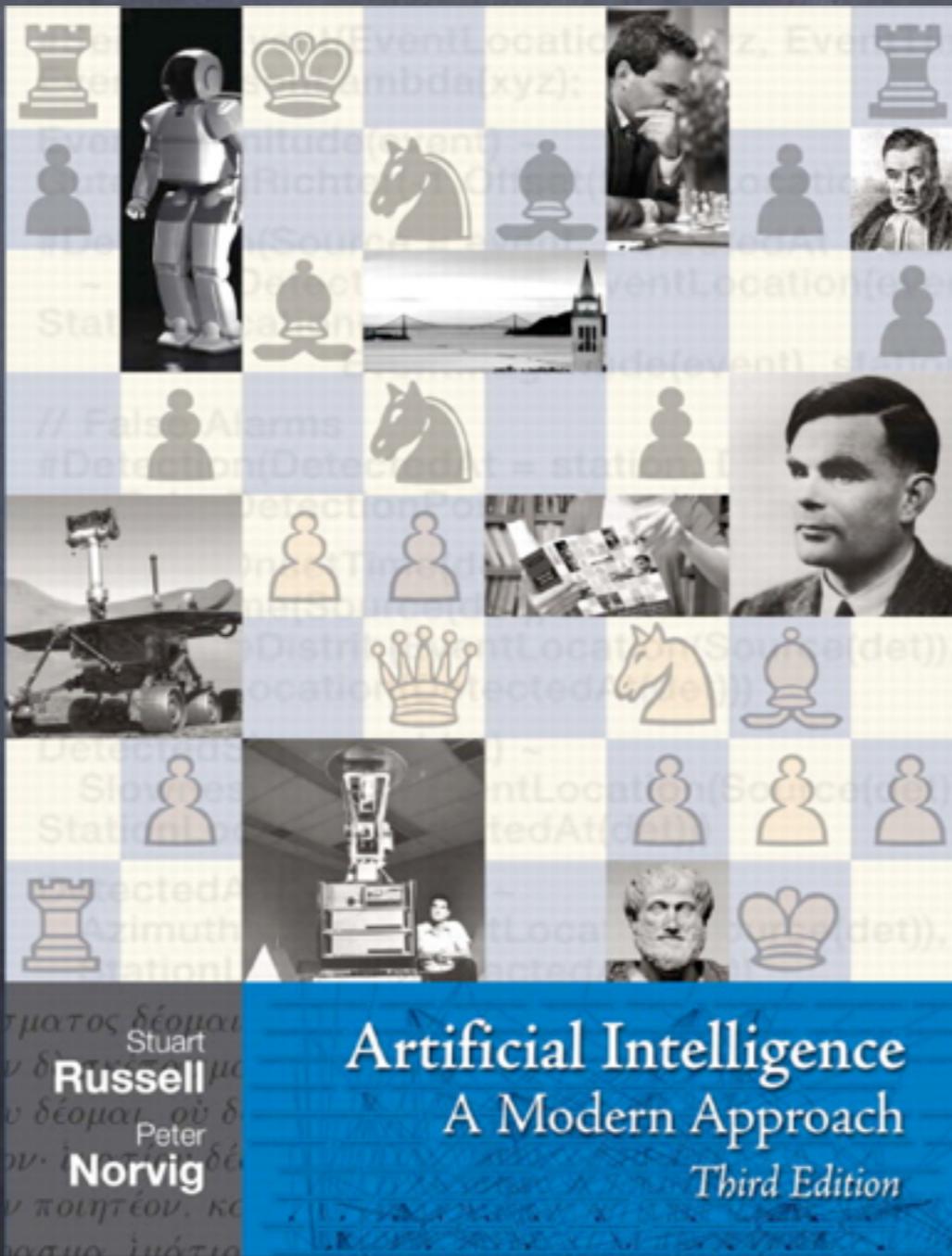
# CSC242 Logistics

Syllabus on BlackBoard

# Prerequisites

- Required: CSC172 (MTH150)
- Highly recommended: CSC173

# Textbook



# Organization

Unit 1: Search	Reading	Homework	Project	Exam
Unit 2: Representation	Reading	Homework	Project	Exam
Unit 3: Uncertainty	Reading	Homework	Project	Exam
Unit 4: Learning	Reading	Homework	Project	Exam
Final Exam	Wednesday, December 18, 0830			

# Homework

- There is homework for every class
- Homework is not graded
- You should do it anyway
- We will (sometimes) go over homework at the start of the next class
  - or in TA Study Sessions

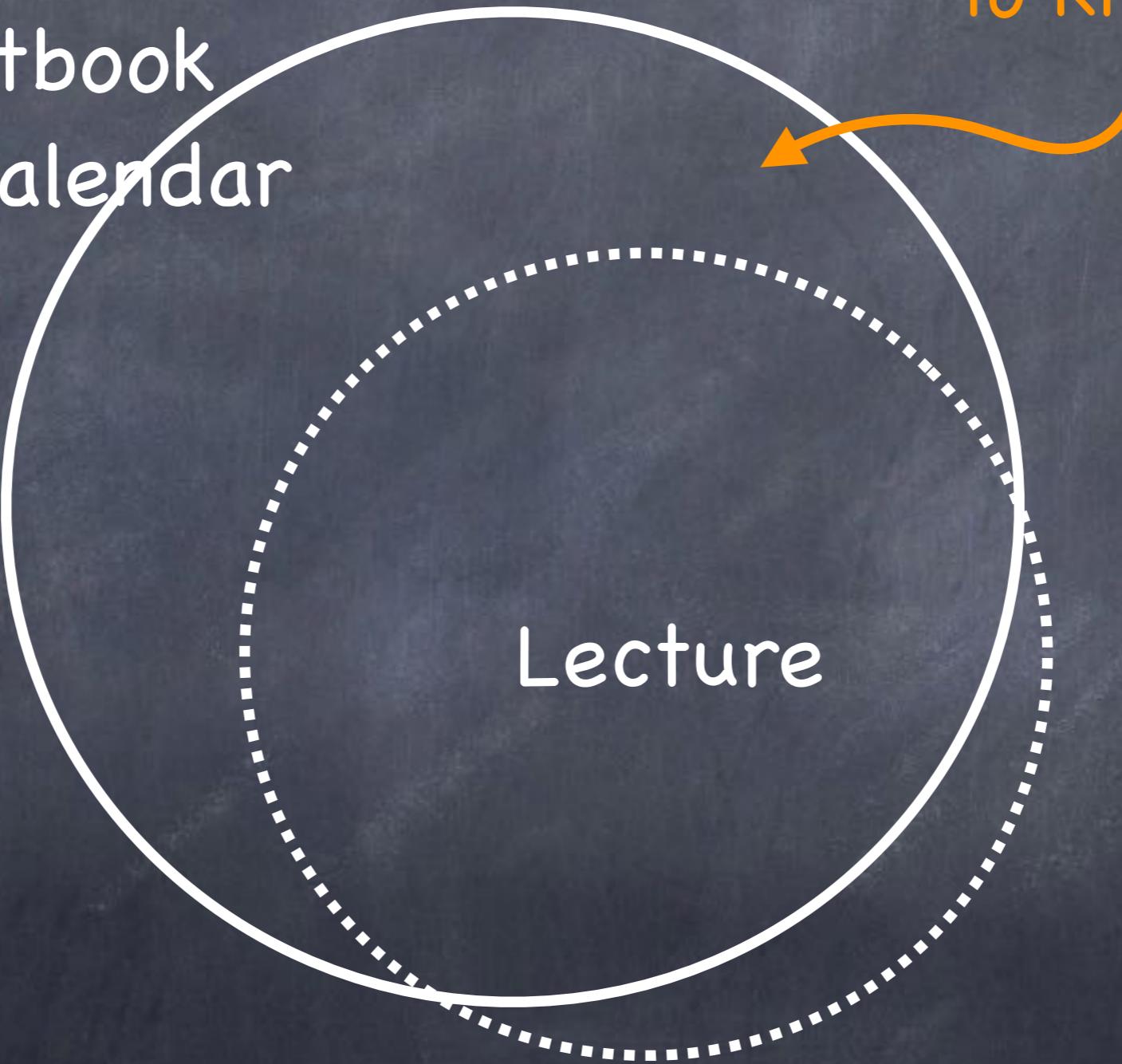
# Projects

- There is a project for every unit
- Implementation of (some of) the ideas covered in the unit
- Deepen your understanding
- You can get started immediately by reading the textbook

What You Need  
to Know

Textbook  
per calendar

Lecture



# TA Study Sessions

- Regularly scheduled workshop-style TA sessions
- Days/times TBD
  - Check BlackBoard for changes

# CSC242 Logistics

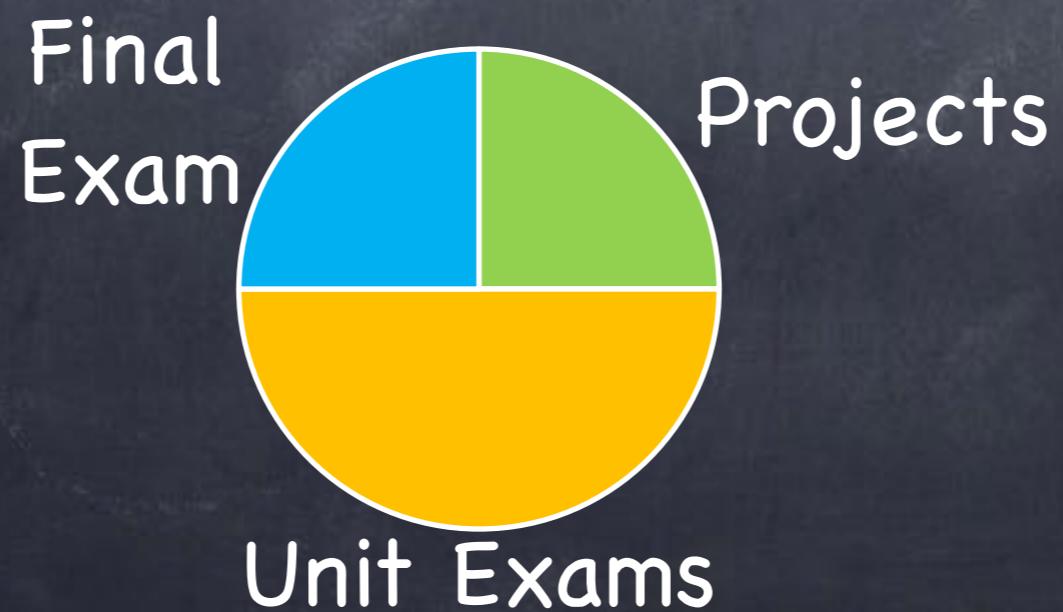
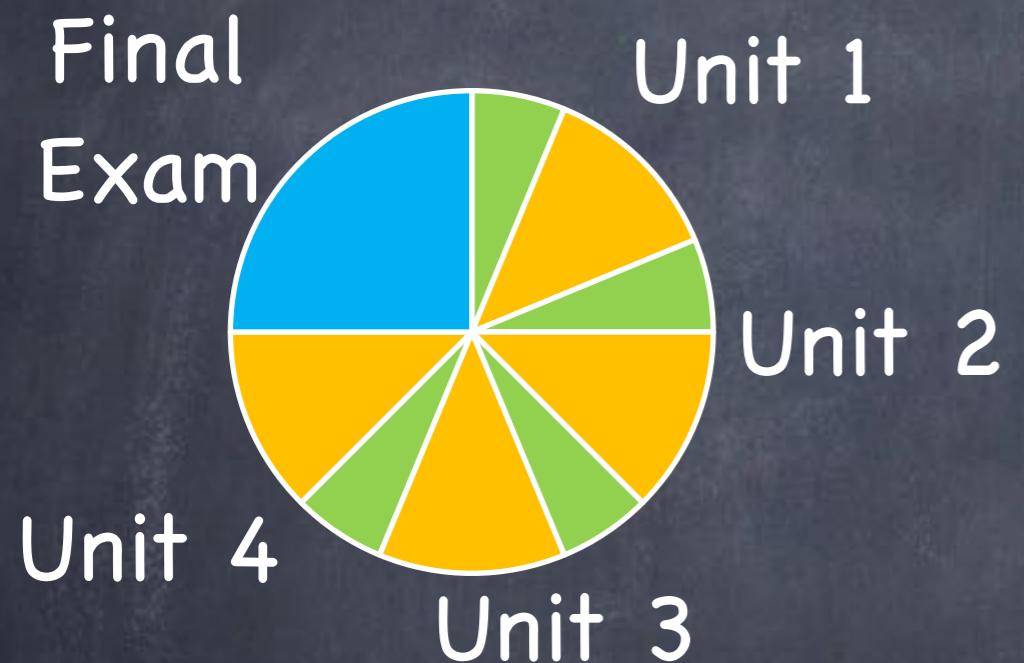
- Prerequisites
- Textbook
- Organization
- Homework
- Projects
- TA Study Sessions

# Grading

● Projects 25%

● Unit Exams 50%

● Final Exam 25%



# Grading

UR definitions ↗

A	Excellent	90
B	Above Average	80
C	Minimum Satisfactory	70
D	Minimum Passing	60
E	Fail	<60

Subject to change! ↘

# Excuses/Accommodations

- Excuses: Arranged in advance
- Medical excuses: See posted syllabus
- Computer excuses: NO
- Disability accommodations: In advance

# Electronics

- No electronics in class
- Disability accommodations:
  - Make arrangements ASAP

# How to Succeed in CSC242

- Do the reading before class
- Come to class: listen, take notes, ask questions
- Do the reading again after class
- Do the homework
- Do the project during the unit
- Bring your questions to the study sessions
- You will be ready for the exams

# Academic Honesty

or

How to not be a Cheater and Get Satisfaction  
from Your Work and be a Productive Member  
of Society rather than a Parasitic Leech of  
Other People's Ideas

# Academic Honesty

If it's not your work, don't say that it is.

# Academic Honesty

- Do not submit others' work as your own
- Acknowledge sources of supporting material
- You must be able to explain anything you submit in person at any time

# Academic Honesty

- Collaboration on projects is allowed
  - Groups of no more than 3 CSC242 students
  - Acknowledge your collaborators in your submissions
- You'll learn more by doing more YOURSELF

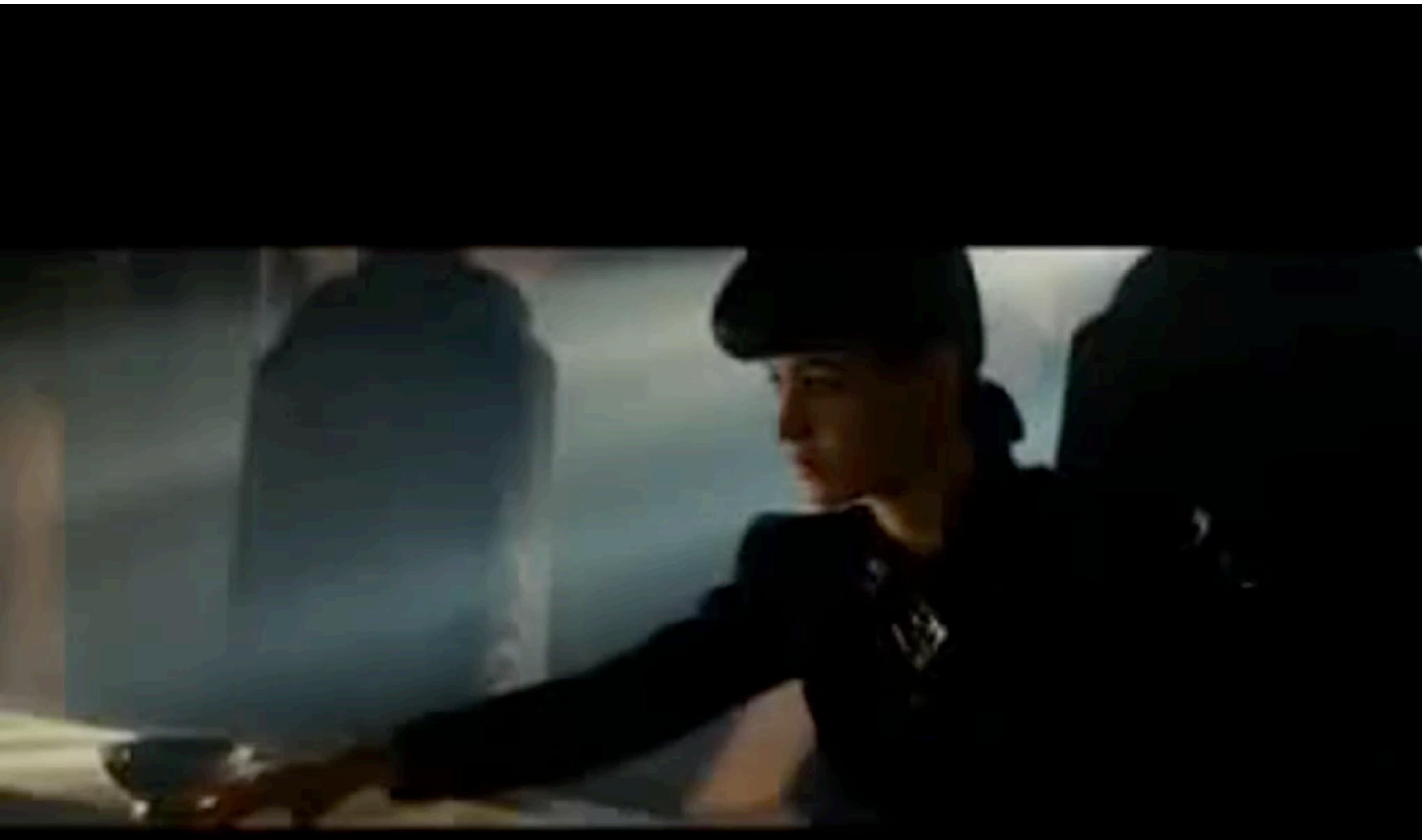
# Academic Honesty

UR Academic Honesty Policy:  
[www.rochester.edu/college/honesty](http://www.rochester.edu/college/honesty)

College Center for Advising Services (CCAS)  
[www.rochester.edu/College/CCAS/](http://www.rochester.edu/College/CCAS/)



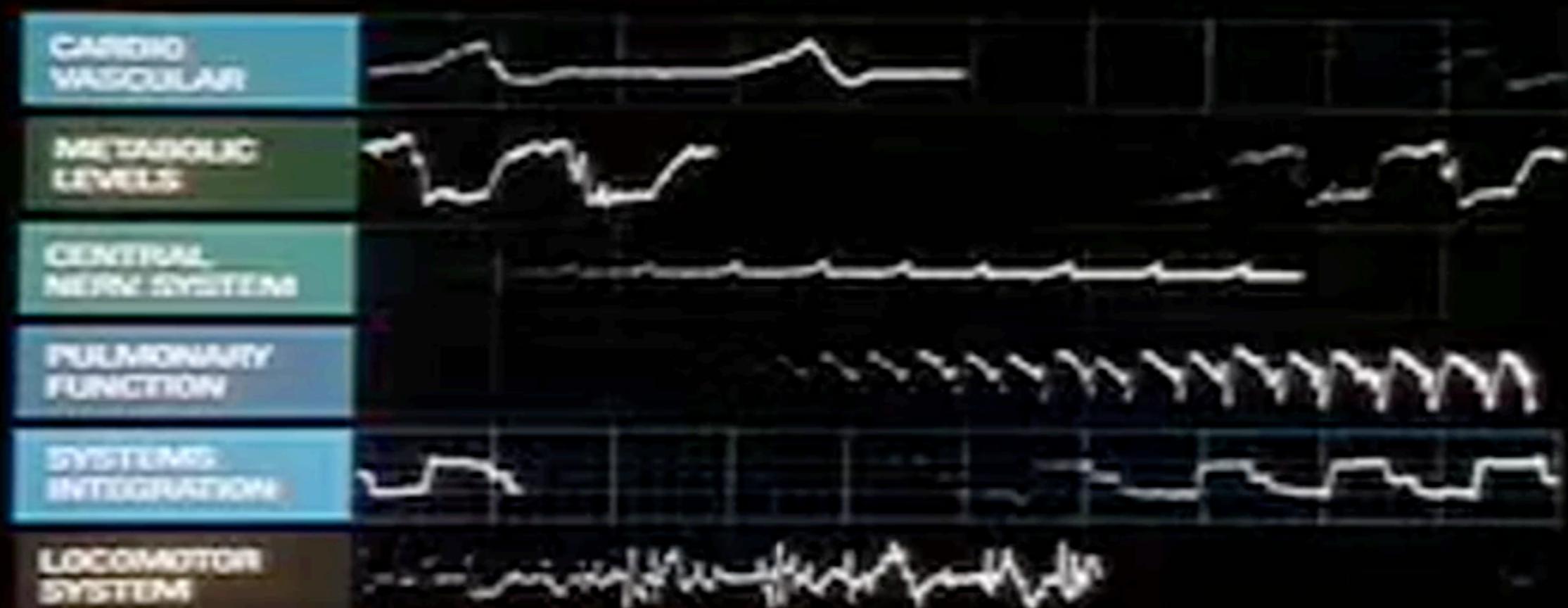














HAL 9000





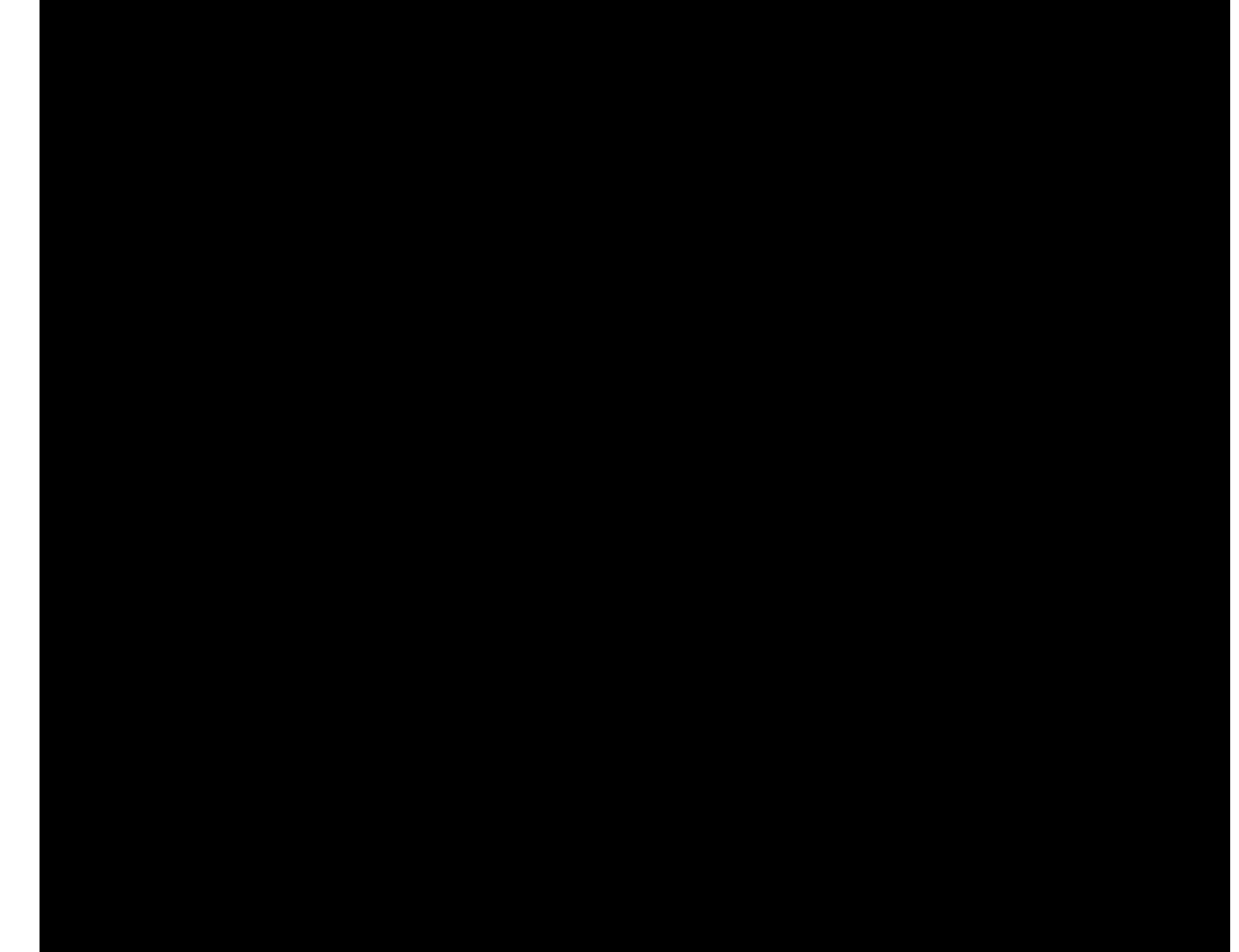
















The iRobot logo consists of the lowercase word "iRobot" in a bold, sans-serif font. The letter "i" is unique, featuring a vertical bar with a diagonal hatch pattern running from top to bottom. The letters "Robot" are in a standard bold font.



**MY RIDE**









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- Formal models of problems associated with intelligent behavior
- Algorithms for solving those problems
- Programs that implement the algorithms and demonstrate the solution

For next time:  
AIMA Chapter 3.0-3.3.1