

# CS167: Machine Learning

Syllabus

Logistics

Machine Learning: Introduction

Monday, January 26<sup>th</sup>, 2026





# Md Alimoor Reza

- Assistant Professor of Computer Science, Dept. of Mathematics and Computer Science, Drake University
- Office: 323 Collier-Scripps
- Email: [md.reza@drake.edu](mailto:md.reza@drake.edu)
- Phone: 515-271-1972
- Office hours: Tues/Thurs: 1:00-3:30pm CDT  
additionally by appointment  
[Zoom link](#)

# Course Logistics

# Contacting

- I am here to help! To get a reply as quickly as possible:
  - For questions about the class, assignments, personal matters, etc: email [md.reza@drake.edu](mailto:md.reza@drake.edu)

# Course mechanics

- Syllabus, schedule, assignments, announcements, etc. on Drake Blackboard
  - <https://drake.blackboard.com>
  - [Syllabus link](#)
- Class meeting times and locations:
  - Location: Meredith Hall # 234
  - Time: Monday/Wednesday 11:00 am - 12:15 pm (CRN#12201)
  - Time: Monday/Wednesday 12:30 pm - 1:45 pm (CRN#13316)

# Course mechanics

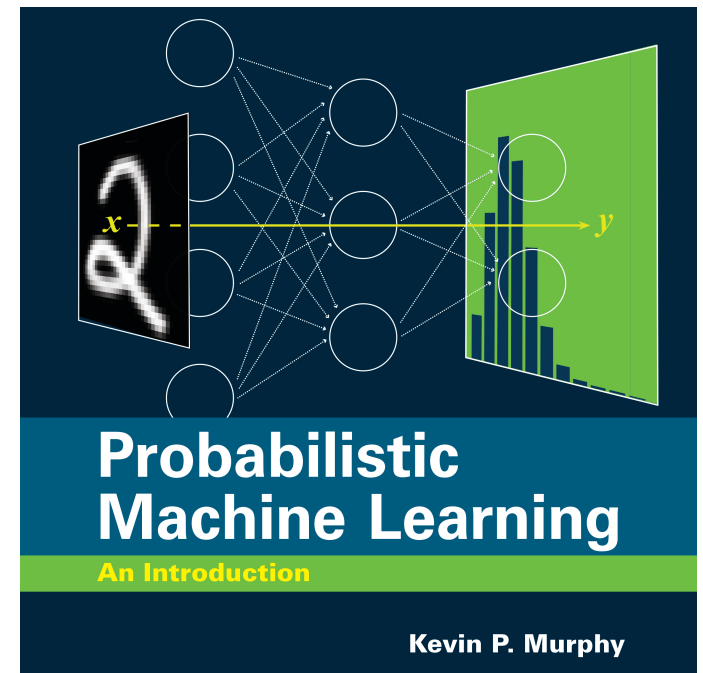
- Office hour times and location:
  - Office hour#1: Tuesday: 1:00 pm - 3:30 pm
  - Office hour#2: Thursday 1:00 pm - 3:30 pm
  - Location: Collier-Scripps#323

Additionally by appointment

[Zoom link](#)

# Course mechanics

- Textbook:
  - We will not follow any particular textbook
  - Optional chapter reading will be assigned from:
    - [Probabilistic Machine Learning: An Introduction](#)
    - Kevin P. Murphy (2022)



# Grading and Requirement

- Notebook assignments (30%): *take home 5-6 assignments (submit on Blackboard)*
- In-class activities (15%): *10-12 simple coding activities or paper-based tasks (submit on Blackboard)*
- Quizzes (30%): *3 quizzes, 10% each*
- Projects (20%): *2 projects, each worth 10% of final grade*
- Attendance/Participation (05%): *Participation in polls, not based on correctness, physical attendance during lecture time*

# Grading and Requirement

- Notebook assignments (30%): *take home assignments*.

**Notebooks Assignments (30%)** Throughout the course, we will be learning to apply machine learning principles using Python machine learning tools. Machine learning code is often developed in and communicated using an interactive integrated development environment called Jupyter Notebooks which support a natural interleaving of code, output/results, and mark-up documentation. You will regularly submit notebook files (files with the extension .ipynb) to demonstrate your proficiency with the Python tools we are using. Given the long computation times of the programs you write, I will not usually be executing your code, so it is critical that the results from your executions are preserved in the notebook. You can expect to submit 5-6 assignments throughout the course.

# Grading and Requirement

- **In-class activities (15%):** *10-12 simple coding activities or paper-based tasks (submit on Blackboard).*

**In-class Activities (15%)** You'll also regularly submit notebook files with simple coding or paper-based activities. These should be easier since they follow the lecture and are usually done during or right after class. I won't run your code, so please make sure to save the results in the notebook. Expect to submit about **10-12 in-class activities** throughout the course.

# Grading and Requirement

- **Quizzes (30%):** *3 quizzes, 10% each*

**Quizzes (30%)** There will be 3 quizzes that will be administered via Blackboard. They will not be timed, and you will have a few days to complete them. Quizzes should be completed individually. There is no time limit on these quizzes. As in the real world, you will be allowed to use external resources like the class notes and the internet. You will be required to cite any sources that you used while completing these quizzes other than the class notes.

# Grading and Requirement

- **Projects (20%):** *2 projects, each worth 10% of final grade*

**Projects (20%):** The 2 projects in this course will emphasize the design, execution, and interpretation of machine learning experiments. The grading emphasis will be on how well you explain your data and experiment as well as your written interpretation. For these, you will submit Jupyter Notebooks with more extensive writing in the mark-up cells than for your regular notebook assignments.

# Grading and Requirement

- **Attendance/Participation (05%):** *Participation in polls, not based on correctness*

**Attendance/Participation (05%):** This class is highly interactive, meaning that active participation is both expected and the norm. You will receive credit for your participation, and it will be counted towards your final grade. I will keep track of your involvement using a signature sheet. Throughout the course, I will pose questions using polling software and conduct in-class Q&A sessions to better understand how the class is grasping the content. These responses will not be evaluated for correctness but rather for completion. ***More than five absences may result in being withdrawn from the course.*** If you miss an assessment because of illness, you must provide documentation before you can take an assessment. All other absences from assessments must receive prior approval.

# Grading Scale

- The tentative grading scale for this course would be as follows:

A (93%-100%)	A- (90%-92.9%)	B+ (87%-89.9%)
B (84%-86.9%)	B- (80%-83.9%)	C+ (77%-79.9%)
C (74%-76.9%)	C- (70%-73.9%)	D (60%-69.9%)
F (0%-59.9%)		

# Course overview

- Brush up on necessary programming tools and libraries
  - Python basics, Pandas library, PyTorch, GitHub, Google Colab (notebook)
- Classical Machine Learning
  - K-nearest-neighbors (k-NN)
  - decision trees
  - random forests (RF)
  - support vector machines (SVM)
  - perceptrons

# Course overview

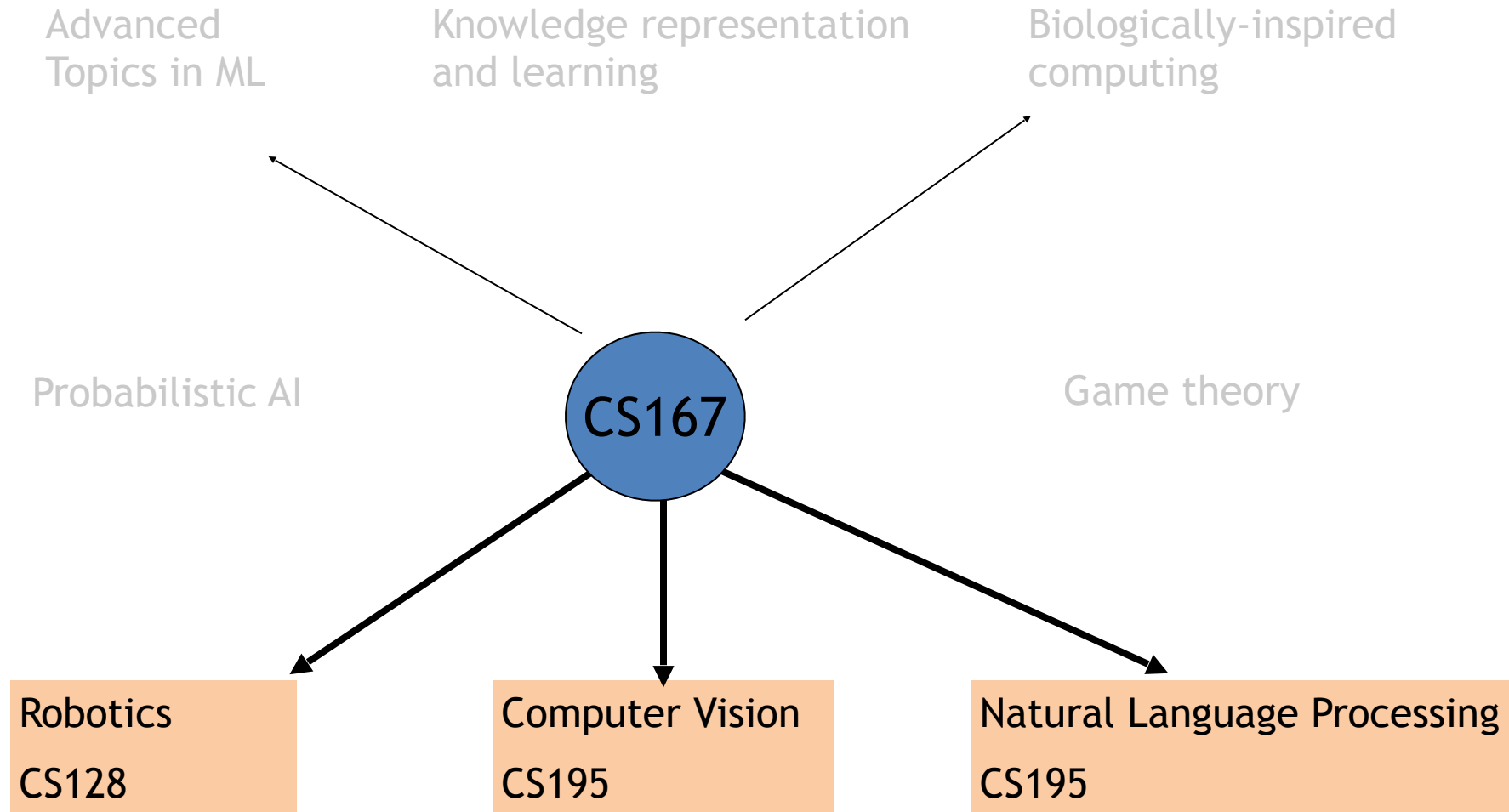
- Deep Machine Learning
  - Multilayer Perceptron (MLP)
  - Convolutional Neural Network (CNN)
  - Recurrent Neural Network (RNN)
  - Long Short-Term Memory (LSTM)
  - Transformers
- Applications
  - Computer vision, natural language processing, robotics, audio/speech analysis

# Why take this class?

- Learn a lot about Machine Learning

- Apply a variety of modeling techniques to classification, regression, and unsupervised learning problems using data in different formats (such as typical structured data, text, and images).
- Create software that utilizes machine-learning programming libraries in order to conduct machine-learning-based data analysis.
- Develop and conduct machine-learning-based data analysis experiments, and they will be able to interpret and explain the results.
- Feel comfortable with using industry-standard tools such as Google Colab, GitHub, etc
- Understand fundamentals of machine learning
- Gain an understanding of the advantages and disadvantages of different learning paradigms so that students can choose appropriate solutions given a problem description
- Receive hands-on experience with commonly used algorithms and software tools within machine learning

# Why take this class?



# Careers in ML/AI

- ‘Pure’ ML/AI
  - Academia, industry labs
- Applied ML/AI
  - Almost any area of CS
  - NLP, vision, robotics
  - Economics
- Cognitive Science

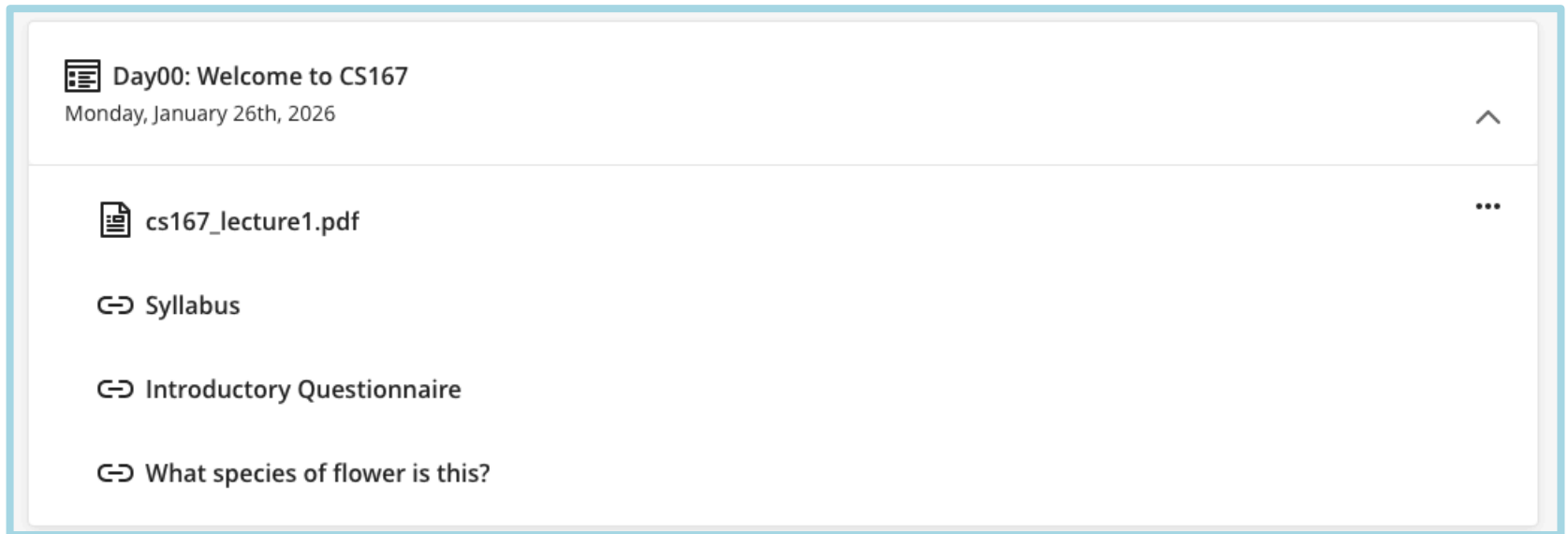


# Prerequisites

- CS 66: Introduction to Computer Science II
- Practically, this means:
  - Proficiency in a general-purpose programming language
  - Some level of mathematical maturity will be helpful, esp. with calculus, linear algebra, statistics
  - Willingness to learn some programming and/or math on your own if necessary

# Blackboard Tour

# Task: Posted on Blackboard



The screenshot shows a Blackboard course page for CS167. At the top, there is a header section with a document icon, the text "Day00: Welcome to CS167", and the date "Monday, January 26th, 2026". To the right of the date is an upward-pointing chevron icon. Below the header is a list of course items. The first item is a PDF document titled "cs167\_lecture1.pdf" with a document icon and a three-dot menu icon to its right. The following three items are links, each preceded by a double-headed arrow icon: "Syllabus", "Introductory Questionnaire", and "What species of flower is this?".

Day00: Welcome to CS167  
Monday, January 26th, 2026

cs167\_lecture1.pdf

Syllabus

Introductory Questionnaire

What species of flower is this?

# Introduction to Machine Learning

# An Example: Classifying my dog

- Imagine we want to classify which image depicts a specific dog we want to identify
- Our training data might look something like this:



# An Example: Classifying my dog

- Then, when we have some new pictures of my dogs, the idea is that we can make a **prediction** based on previous data as to whether it is **Zoey** or **Ace** in the photo.



# Another Example: What species of Iris is this?

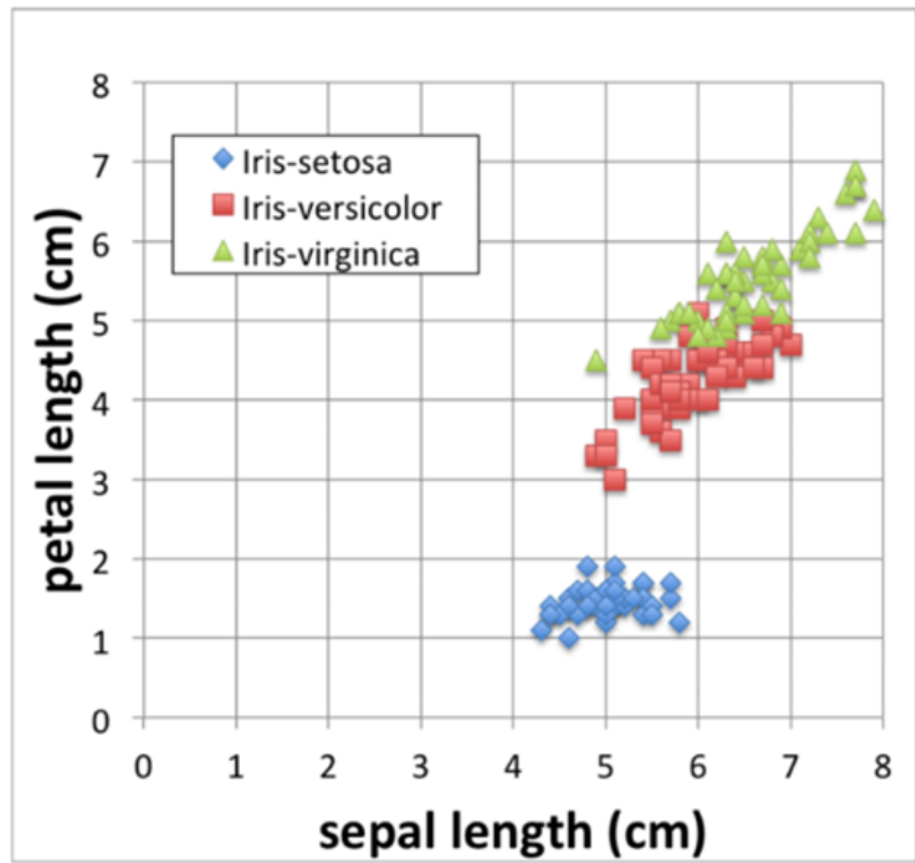
- Use the [poll link](#) to answer this question



Imagine you found this beautiful flower while on a walk and took the following measurements:

5.1 cm petal length  
7.2 cm sepal length

**What species do you think it is?**



# Machine Learning Variations

- We are going to learn about a lot of different types of machine learning in CS167. Here are a few categories to look out for:
  - **classification:** identify which category it goes in, eg, '*Spam or ham?*', '*Eric or Tim?*', '*Fish, amphibian, reptile, bird, or mammal*'
  - **regression:** real-valued labels eg, price of Bitcoin, tomorrow's temperature, etc.
  - **supervised learning:** data has labels, goal is to predict the labels of new instance
  - **unsupervised learning:** data does not have a label, the goal is to analyze/cluster the examples
  - **other issues:** missing data, sequential data, outlier anomaly detection, and many more

# Group Exercise

- Group Exercise:
  - Take 2 minutes to talk to your neighbors about the following:
    - Come up with as many examples as you can of ways you interact with machine learning on a day-to-day basis.
    - Submit your answers to the following Google form:
      - <https://forms.gle/jxwSmbe7CspmZtpv8>

# Notebook#0

- Blackboard Assignment
  - Finish Notebook#0 before Friday

## Assignments

Anything that you will turn in will live in this folder. 

### Attendance

Due date: 5/15/26, 12:00 PM (CDT)

The score represents the percentage of time the student was physically present in class (max score is 100%). Attendance was recorded on physical paper, with students adding their signature on the provided sheet.

### Notebook 0 : Onboarding

Due date: 1/30/26, 11:59 PM (CST)

# Notebook#0

- Blackboard Assignment
  - Finish Notebook#0 before next lecture on Wednesday

The screenshot shows a Blackboard assignment page for 'MACHINE LEARNING - SP26 - 1 - 12201'. The assignment is titled 'Notebook 0 : Onboarding' and is currently 2 of 2 questions remaining. The assignment content includes two questions, each worth 1 point. Question 1 asks 'Did you fill out the Introductory Questionnaire?' with a link to a Google Form. Question 2 asks 'Did you answer the flower recognition question?' with a link to another Google Form. The right sidebar provides details: the assessment is due on 1/30/26 at 11:59 PM (CST), has unlimited attempts, and is worth a maximum of 2 points. At the bottom, there is a 'Questions Filter (2)' dropdown, a 'Save and Close' button, and a 'Submit' button.

MACHINE LEARNING - SP26 - 1 - 12201

Notebook 0 : Onboarding

2 OF 2 QUESTIONS REMAINING

Assignment Content

**Question 1** 1 Point

Did you fill out the Introductory Questionnaire? <https://forms.gle/jxwSmbE7CspmZtpv8>

yes

no

[Clear selection](#)

**Question 2** 1 Point

Did you answer the flower recognition question? <https://forms.gle/vxEr9QCMgfjkPDH76>

yes

no

**Details & Information**

**Assessment due date**  
1/30/26, 11:59 PM (CST)

**Attempts**  
Unlimited

**Grading**

<b>Maximum points</b>	2 points
-----------------------	----------

Questions Filter (2) ▾

Save and Close Submit