Lecture 0: Course Logistics

Tao LIN

SoE, Westlake University

September 2, 2025

Course information

- **Lecture:** 13:30 - 14:15 & 14:20 - 15:05 & 15:10 - 15:55, Tuesday
- **Exercise:** 08:00 - 08:45 & 08:50 - 09:35, Thursday
- **Duration**: Sep. 01 - Dec. 26 (16 weeks)

- **Lecturers**: Tao LIN
- **TAs**: Yingming PU, Bangyan LIAO
  - The assistants will be helping you during the exercise sessions and projects.

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`https://github.com/LINs-lab/course_machine_learning`

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- **Canvas:**

  `https://canvas.westlake.edu.cn/courses/1444`

Course information (Cont'd)

Grading:

- Assignments ($5 \times 4\%$)
- Project 1 (10%), due Oct. 23, 23:59
- Project 2 (30%), due Dec. 25, 23:59
- Final exam (40%)

Course information (Cont'd)

Grading:

- Assignments ($5 \times 4\%$)
  There are five graded homeworks for theoretical questions, on the topics of
  1. math foundation
  2. linear model
  3. kernel methods
  4. EM algorithm
  5. neural network foundation
- Project 1 (10%), due Oct. 23, 23:59
- Project 2 (30%), due Dec. 25, 23:59
- Final exam (40%)

Course information (Cont'd)

Grading:

- Assignments ($5 \times 4\%$)
- Project 1 (10%), due Oct. 23, 23:59
  - The goal of Project 1 is to help you prepare for Project 2.
  - In Project 1, you will work in a group of 1-2 people.
  - You will implement the most important methods covered in the lectures and labs so far.
  - You will also submit your Python code, and a 2 page PDF report.
- Project 2 (30%), due Dec. 25, 23:59
- Final exam (40%)

Course information (Cont'd)

Grading:

- Assignments ($5 \times 4\%$)
- Project 1 (10%), due Oct. 23, 23:59
- Project 2 (30%), due Dec. 25, 23:59
  - Project 2 is the final project and gives you more freedom and responsibilities.
  - Again, you will work in a group of 1-2 people.
  - You can freely choose between two options:
    A) Machine Learning for Science.
    B) Two-Three pre-defined challenges.
- Final exam (40%)

Course information (Cont'd)

Grading:

- Assignments ($5 \times 4\%$)
- Project 1 (10%), due Oct. 23, 23:59
- Project 2 (30%), due Dec. 25, 23:59
- Final exam (40%)
  - A very standard final exam.
  - It will contain questions on what you have learned during the lectures and exercise sessions.
  - We will give you a sample exam before for you to practice.
  - You are allowed to bring one cheat sheet (A4 size paper, both sides can be used).
  - No calculator, No collaborations. No cell phones. No laptops etc.

Syllabus

- ***Basic regression and classification concepts and methods:***
  Linear models, overfitting, linear regression, Ridge regression, logistic regression, SVMs, and k-NN
- ***Fundamental concepts:***
  Cost-functions and optimization, cross-validation and bias-variance trade-off, curse of dimensionality, kernel methods.
- ***Neural networks:***
  Basics, representation power, backpropagation, CNNs, transformer models, regularization, data augmentation, dropout.
- ***Unsupervised and self-supervised learning:***
  k-means clustering, Gaussian mixture models, the EM algorithm, generative models, large language models, diffusion models, generative adversarial networks.

The syllabus provided on the website is more precise but subject to change.