

## 00102892: Statistical Learning Fall 2019

**Lectures:** Mondays 3:10–5:00 pm and odd Wednesdays 10:10 am–noon, 411 Classroom Building 2

**Instructor:** Wei Lin (weilin@math.pku.edu.cn)

*Office hours:* Tuesdays 9:30–11:00 am, 1547 Science Building 1

**Teaching Assistant:** Huiyuan Wang (huiyuan.wang@pku.edu.cn)

*Office hours:* Wednesdays 3:00–5:00 pm, 259 Science Building 5

### Course Description:

This is an introductory statistical machine learning course for graduate and upper-level undergraduate students in statistics, applied mathematics, computer science, and other fields which involve learning from data. The course covers fundamental principles of machine learning and major topics in supervised, unsupervised, and semi-supervised learning, including linear regression and classification, spline and kernel smoothing, model selection and regularization, additive models, tree-based methods, support vector machines, clustering, principal component analysis, nonnegative matrix factorization, graphical models, etc.

### Primary Text:

Hastie, T., Tibshirani, R. and Friedman, J. (2009). *The Elements of Statistical Learning: Data Mining, Inference, and Prediction* (2nd ed.). Springer.

### Supplementary Texts:

1. 周志华 (2016). 机器学习. 清华大学出版社.
2. 李航 (2019). 统计学习方法 (第 2 版). 清华大学出版社.
3. Russell, S. J. and Norvig, P. (2016). *Artificial Intelligence: A Modern Approach* (3rd ed.). Pearson.
4. Murphy, K. P. (2012). *Machine Learning: A Probabilistic Perspective*. MIT Press.
5. Goodfellow, I., Bengio, Y. and Courville, A. (2016). *Deep Learning*. MIT Press.
6. Shalev-Shwartz, S. and Ben-David, S. (2014). *Understanding Machine Learning: From Theory to Algorithms*. Cambridge Univ. Press.
7. Vershynin, R. (2018). *High-Dimensional Probability: An Introduction with Applications in Data Science*. Cambridge Univ. Press.
8. Wainwright, M. J. (2019). *High-Dimensional Statistics: A Non-Asymptotic Viewpoint*. Cambridge Univ. Press.

### Homework:

There will be homework assignments due every other Monday in class. If you missed the class, contact the TAs to turn in your homework by the end of the day. No late homework will be accepted.

### Exams:

There will be one two-hour, closed-book midterm exam on Wednesday, November 6. There will be no final exam, but students need to work in groups of two to four on a final project. Proposals of project topics are due by Monday, November 18. Oral presentations of projects are scheduled on Wednesday, December 18 and Monday, December 23.

### Grading:

The course grade breaks down as follows: homework 30%, midterm exam 30%, and project 40%.

### Website:

Lecture topics and homework assignments will be posted on the course website at <http://www.math.pku.edu.cn/teachers/linw/2892f19.html>.