

课程详述

COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	课程名称 Course Title	统计学习 Statistical Learning
2.	授课院系 Originating Department	统计与数据科学系
3.	课程编号 Course Code	STA320
4.	课程学分 Credit Value	3
5.	课程类别 Course Type	专业核心课 Major Core Courses
6.	授课学期 Semester	秋季 Fall
7.	授课语言 Teaching Language	英文 English
8.	授课教师、所属学系、联系方式 Instructor(s), Affiliation & Contact (For team teaching, please list all instructors)	荆炳义, 统计与数据科学系, jingby@sustech.edu.cn
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	待公布 To be announced
10.	选课人数限额(可不填) Maximum Enrolment (Optional)	

11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 Total
学时数 Credit Hours	48	0	0	0	48
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	MA204, Mathematical Statistics 数理统计				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite					
14. 其它要求修读本课程的学系 Cross-listing Dept.					

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

Statistical Learning merges Statistics with Computer Science and Optimization. Much of the agenda in Statistical Learning is driven by applied problems in science and technology, where data streams are increasingly large-scale, dynamic, and heterogeneous, and where mathematical and algorithmic creativity are required to bring statistical methodology to bear. The course covers a wide range of topics, including supervised and unsupervised learning, kernel methods, model selection, ensemble methods, graphical models. The goal is to study the underlying principles for those methods and be able to tackle real-life problems.

16. 预达学习成果 Learning Outcomes

Statistical Learning is widely used in many areas. For instance, bioinformatics, artificial intelligence, signal processing, communications, networking, information management, finance, game theory and control theory are all being heavily influenced by developments in Statistical Learning. Upon completion of the course, the students are expected to learn the essential techniques and underlying principles behind Statistical Learning and be able to tackle real-life problems using these tools.

17. 课程内容及教学日历 (如授课语言以英文为主, 则课程内容介绍可以用英文; 如团队教学或模块教学, 教学日历须注明主讲人)

Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)

1. Introduction.
2. Sparsity and Bias-Variance Trade-off
3. Linear Methods for Regression
4. Linear Methods for Classification
5. Basis Expansions and Regularization
6. Features and Kernel Methods.
7. Local Smoothing Methods
8. Model Selection
9. Support Vector Machine
10. Neural Networks
11. Tree-Based Methods
12. Boosting Techniques
13. Unsupervised Learning
14. Graphical Models
15. Model Averaging
16. Variational Inference

18. 教材及其它参考资料 **Textbook and Supplementary Readings**

1. An Introduction to Statistical Learning. By James, G., Witten, D., Hastie, R., and Tibshirani, R.
2. The Elements of Statistical Learning. By Hastie, T., Tibshirani, R, Friedman, J.
3. Pattern Recognition and Machine Learning. By Bishop, C.M.

课程评估 **ASSESSMENT**

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance				
课堂表现 Class Performance				
小测验 Quiz				
课程项目 Projects		20		
平时作业 Assignments		20		
期中考试 Mid-Term Test				
期末考试 Final Exam		40		
期末报告		20		

**Final
Presentation**

其它（可根据需要
改写以上评估方
式）

**Others (The
above may be
modified as
necessary)**

20. 记分方式 **GRADING SYSTEM**

A. 十三级等级制 **Letter Grading**

课程审批 REVIEW AND APPROVAL

21. 本课程设置已经过以下责任人/委员会审议通过

This Course has been approved by the following person or committee of authority

