

非参数统计课程大纲

- 1、2019 春季学期——2021 春季学期.....P1
- 2、2022 春季学期起.....P6

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.

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|-----|---|---|------------------------------|-------------------------------|--|---------------------|
| 1. | 课程名称 Course Title | 非参数统计 Nonparametric statistics | | | | |
| 2. | 授课院系 Originating Department | 数学系 Department of Mathematics | | | | |
| 3. | 课程编号 Course Code | MA 417 | | | | |
| 4. | 课程学分 Credit Value | 3 | | | | |
| 5. | 课程类别 Course Type | 专业选修课 Major Elective Courses | | | | |
| 6. | 授课学期 Semester | 春季 Spring 【2019 春季学期——2021 春季学期】 | | | | |
| 7. | 授课语言 Teaching Language | 英文 English | | | | |
| 8. | 授课教师、所属学系、联系方式（如属团队授课，请列明其他授课教师） Instructor(s), Affiliation & Contact (For team teaching, please list all instructors) | 周敏 ZHOU Min 慧园 5 栋 206 Block 5 Room.206, Wisdom Valley Email:zhoum3@sustech.edu.cn | | | | |
| 9. | 实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact | 无 NA | | | | |
| 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 | | | | |

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| 12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements | 数理统计 MA204 或者 概率论与数理统计 MA212 Mathematical Statistics MA204 or Probability and Statistics MA212 |
| 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**

本课程对经典和现代非参数理论做一个系统全面的介绍。这些内容包含了基于秩的经典非参数统计方法, 自助法和经验似然法一类的计算强度高的现代非参数统计方法。

This course provides a comprehensive introduction to classical and modern nonparametric statistical methods. It covers classical rank based nonparametric methods as well as modern computation intensive methods such as the bootstrap and empirical likelihood methods.

16. **预达学习成果 Learning Outcomes**

学生掌握经典和现代的非参数统计方法, 尤其是基于秩的非参数假设检验, 为将来研究做好准备。

Students are expected to understand the classical and modern nonparametric statistical methods, especially rank based nonparametric methods, which provide students a good preparation for future research.

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.)

第 1 章 简介 (2 学时)
Chapter 1. Introduction (2 hours)

第 2 章 二分类数据问题 (4 学时)
Chapter 2. The dichotomous data problem (4 hours)

第 3 章 单样本位置问题 (4 学时)
Chapter 3. One-sample location problem (4 hours)

第 4 章 两样本位置问题 (4 学时)
Chapter 4. Two-sample location problem (4 hours)

第 5 章 两样本的分散问题以及其他两样本问题 (4 学时)
Chapter 5. Two-sample dispersion problem and other two sample problems (4 hours)

第 6 章 单因子分析 (6 学时)
Chapter 6. The one-way layout (6 hours)

第 7 章 双因子分析 (6 学时)
Chapter 7. The two-way layout (6 hours)

第 8 章 独立性检验问题 (3 学时)
Chapter 8. The independent problem (3 hours)

第 9 章 回归问题 (4 学时)
Chapter 9. Regression Problems (4 hours)

第 10 章 概率密度函数估计 (3 学时)
Chapter 10. Density Estimation (3 hours)

第 11 章 自助法 (4 学时)
Chapter 11. Bootstrap (4 hours)

第 12 章 U 统计量 (4 学时)
Chapter 12. U-statistics (4 hours)

每周进度 weekly schedule:

第 1 周: 简介 (2 学时), 二分类数据问题 (2 学时)
Week 1: Introduction (2 hours), The dichotomous data problem (2 hours)

第 2 周: 二分类数据问题 (2 学时)
Week 2: The dichotomous data problem (2 hours)

第 3 周: 单样本位置问题 (4 学时)
Week 3: One-sample location problem (4 hours)

第 4 周: 两样本位置问题 (2 学时)
Week 4: Two-sample location problem (2 hours)

第 5 周: 两样本位置问题 (2 学时), 两样本的分散问题以及其他两样本问题 (2 学时)
Week 5: Two-sample location problem (2 hours), Two-sample dispersion problem and other two sample problems (2 hours)

第 6 周: 两样本的分散问题以及其他两样本问题 (2 学时)
Week 6: Two-sample dispersion problem and other two sample problems (2 hours)

第 7 周: 单因子分析 (4 学时)
Week 7: The one-way layout (4 hours)

第 8 周: 单因子分析 (2 学时)
Week 8: The one-way layout (2 hours)

第 9 周: 双因子分析 (4 学时)
Week 9: The two-way layout (4 hours)

第 10 周: 双因子分析 (2 学时)
Week 10: The two-way layout (2 hours)

第 11 周: 独立性检验问题 (3 学时), 回归问题 (1 学时)
Week 11: The two-way layout (2 hours), Regression Problems (1 hour)

第 12 周: 回归问题 (2 学时)
Week 12: Regression Problems (2 hours)

第 13 周: 回归问题 (1 学时), 概率密度函数估计 (3 学时)
Week 13: Regression Problems (1 hours), Density Estimation (3 hours)

第 14 周: 自助法 (2 学时)
Week 14: Bootstrap (2 hours)

第 15 周: 自助法 (2 学时), U 统计量 (2 学时)

Week 15: Bootstrap (2 hours), U-statistics (2 hours)

第 16 周: U 统计量 (2 学时)

Week 16: U-statistics (2 hours)

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

- (1) Myles Hollander, Douglas A. Wolfe, and Eric Chicken. Nonparametric statistical methods. 3rd. Wiley. 2013.
- (2) A.C. Davison (2013), Statistical Models. Cambridge Series in Statistical and Probability Mathematics.
- (3) J. Shao (1998). Mathematical Statistics. Springer-Verlag.
- (4) Bradley Efron and Robert J. Tibshirani. An introduction to the bootstrap. Chapman & Hall. 1993.
- (5) Art B. Owen. Empirical likelihood. Chapman & Hall/CRC. 2001.

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 | | 0 | | |
| 课堂表现 Class Performance | | 0 | | |
| 小测验 Quiz | | 10 | | |
| 课程项目 Projects | | 0 | | |
| 平时作业 Assignments | | 20 | | |
| 期中考试 Mid-Term Test | | 30 | | |
| 期末考试 Final Exam | | 40 | | |
| 期末报告 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)

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20. 记分方式 GRADING SYSTEM

- A. 十三级等级制 Letter Grading
 B. 二级记分制（通过/不通过） Pass/Fail 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

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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 | 非参数统计 Nonparametric statistics |
| 2. | 授课院系 Originating Department | 统计与数据科学系 Department of Statistics and Data Science |
| 3. | 课程编号 Course Code | MA 417 |
| 4. | 课程学分 Credit Value | 3 |
| 5. | 课程类别 Course Type | 专业选修课 Major Elective Courses |
| 6. | 授课学期 Semester | 春季 Spring 【2022 春季学期起】 |
| 7. | 授课语言 Teaching Language | 英文 English |
| 8. | 授课教师、所属学系、联系方式 (如属团队授课, 请列明其他授课教师) Instructor(s), Affiliation & Contact (For team teaching, please list all instructors) | 陈欣 CHEN Xin 慧园 3 栋 420 Block 3 Room.420, Wisdom Valley Email: chenx8@sustech.edu.cn |
| 9. | 实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact | |
| 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 | | | | |
| 12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements | 数理统计 MA204 或者 概率论与数理统计 MA212 Mathematical Statistics MA204 or Probability and Statistics MA212 | | | | |
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| 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

本课程对经典和现代非参数理论做一个系统全面的介绍。这些内容主要包含非参数回归,基于秩的经典非参数统计方法,以及现代计算方法例如 bootstrap.

This course provides a comprehensive introduction to classical and modern nonparametric statistical methods. It covers nonparametric regression and classical rank based nonparametric methods as well as modern computation intensive methods such as the bootstrap.

16. 预达学习成果 Learning Outcomes

学生掌握非参数回归,经典和现代的非参数统计方法,以及基于秩的非参数假设检验,为将来研究做好准备。

Students are expected to understand nonparametric regression and the classical and modern nonparametric statistical methods, and rank based nonparametric methods, which provide students a good preparation for future research.

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.)

学习掌握核光滑的方法在密度函数以及回归分析里面的各类问题，学习非参数检验，尤其是基于秩的非参数检验的各类方法。

Learn to master the various methods of kernel smoothing in non-parametric density functions and regression analysis, and learn nonparametric tests, especially various methods based on rank.

第1章 非参数回归简介 (3 学时)

第2章 柱状图分析 (6 学时)

第3章 概率密度函数估计 (12 学时)

第4章 非参数回归 (12 学时)

第5章 半参数模型 (6 学时)

第6章 秩统计量 (9 学时)

Chapter 1 Introduction to Nonparametric Regression (3 class hours)

Chapter 2 Histogram Analysis (6 class hours)

Chapter 3 Probability Density Function Estimation (12 class hours)

Chapter 4 Non-parametric regression (12 class hours)

Chapter 5 Semiparametric Model (6 class hours)

Chapter 6 Level Statistics (9 class hours)

SUSTech
Southern University
of Science and
Technology

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

- (1) Nonparametric statistical methods. By Myles Hollander, Douglas A. Wolfe, and Eric Chicken. 3rd. Wiley. 2013.
- (2) Nonparametric and Semiparametric Models, By Hardle, Muller, Sperlich and Werwatz, Springer-Verlag. 2004.

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 | | 0 | | |

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|---|--|----|--|--|
| 课堂表现 Class Performance | | 0 | | |
| 小测验 Quiz | | 30 | | |
| 课程项目 Projects | | 0 | | |
| 平时作业 Assignments | | 0 | | |
| 期中考试 Mid-Term Test | | 30 | | |
| 期末考试 Final Exam | | 0 | | |
| 期末报告 Final Presentation | | 40 | | |
| 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**
 B. 二级记分制（通过/不通过） **Pass/Fail 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

