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**	**应用统计 Applied 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**	STA202
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**	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（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）**	Gabrielle JING
9.	**实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact**	无 NA / 待公布 To be announced / 已确定的实验员/助教联系方式 Please list all Tutor/TA(s) **（请保留相应选项 Please only keep the relevant information）**
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				48

12.	先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	MA107 高等代数 I / MA107A 线性代数 A MA107 Advanced Linear Algebra I /MA107ALinear Algebra A
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

本课程的目的是展示如何在实践中有效地使用统计数据。目的是让学生掌握分析和使用统计思维来解决现实世界中的问题。帮助学生理解基本统计方法的概念和技术，并将统计方法应用于各种现实生活中的问题。

The purpose of this course is to show how statistics may be efficiently used in practice. The goal is to teach students to formulate, analyze, and use statistical thinking to solve real-world problems. It helps students understand concepts and techniques of useful statistical methods, and apply statistical tests to diversified real-life problems.

16. 预达学习成果 Learning Outcomes

通过本课程的学习，学生预期可达到：

- 对实际问题充分了解，并确定目标和潜在问题。
- 将现实世界中的问题转化成统计模型，并进行基本的探索性数据分析
- 使用统计软件对应用适当的统计模型进行数据分析并评估结果
- 从分析中得出结论并以浅显易懂语言解释结果并给出建议

On successful completion of the course, students should be able to:

- Understand the real life problems and identify the objectives and potential problems.
- Formulate real-world problems into statistical models and conduct basic exploratory data analysis.
- Apply appropriate statistical models to conduct data analysis and evaluate results with software package.
- Draw conclusions from your analysis, interpret your results in layman language, and make decisions.

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.)

绪论：简介 （2 学时）

统计学的起源及发展应用；统计学应用的成功案例。

Part 0: Introduction

Why study statistics
Example of statistical applications

第一部分：描述性统计（2 学时）

为何用描述性统计；各种数据类型；总结性统计量；可视化工具；实际应用。

Part 1: Descriptive Statistics
Why using descriptive statistics
Various types of data
Summary statistics, and visualization tools
Real applications

第二部分：概率基础（4 学时）

基本概念：样本空间及事件；维恩图；概率与条件概率；总概率定律和贝叶斯定理；实际应用

Part 2: Probability
Basic concepts: sample space, events
Venn Diagram and Laws of events
Probability of events, conditional probability
Law of total probability and Bayes' theorem
Real applications

第三部分： 随机变量（4 学时）

基本概念；概率密度函数和分布函数；随机变量及其特征；实际应用

Part 3: Random Variables
Basic concepts
Probability density function and distribution functions
Examples of random variables, and their characteristics
Real applications

第四部分：参数估计：点估计和置信区间 (9 学时)

参数估计意义；样本均值和总体均值；偏差、方差和均方误差；置信区间的构建及其解释；实际应用

Part 4: Parameter Estimation: Point Estimator and Confidence Interval
Motivating examples
Sample mean and population mean
Bias, variance, and mean square errors
Construction of confidence interval, and their interpretation
Real applications

第五部分：假设检验 (9 学时)

假设检验的概念与意义；I 型和 II 型错误，测试程序；实际应用

Part 5: Hypothesis Testing
Motivating examples
Concept of hypothesis testing

Type I and Type II errors
General testing procedures
Real applications

第六部分：线性回归 (9 学时)
线性回归意义；散点图和最小二乘估计；置信区间/测试和结果解释；使用线性回归预测；实际应用

Part 6: Linear Regression
Motivating examples
Scatterplot and least squares estimation
Confidence intervals/testing, and interpretation of results
Prediction using linear regression
Real applications

第七部分：方差分析 (9 学时)

为何用方差分析；方差分析的一般概念；使用 ANOVA 程序；实际应用

Part 7: Analysis of Variance (ANOVA) (4 hours)
Motivating examples
General concept of ANOVA
Procedures of conducting NOVA and reaching conclusions
Real applications

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

参考教材（Reference Textbook）：

"Probability and Statistics for Engineers and Scientists" (Prentice Hall) by Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye.

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		10		
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		50		

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)**				

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

2021 年 4 月 9 日