

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 Chapter because of unforeseen circumstances, or following review of the course at the end of the Chapter. Queries about the course should be directed to the course instructor.

1.	课程名称 Course Title	生物统计学 Biostatistics				
2.	授课院系 Originating Department	Department of Biology 生物系				
3.	课程编号 Course Code	BIO210				
4.	课程学分 Credit Value	3				
5.	课程类别 Course Type	专业基础课 Major Foundational Courses				
6.	授课学期 Semester	春季 Spring / 秋季 Fall				
7.	授课语言 Teaching Language	英文 English, 中英双语 English&Chinese				
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)	陈曦, 生物系 Xi Chen, Department of Biology, chenx9@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 determined				
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	48				48

Credit Hours

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12.	先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	MA101B 高等数学（上）A Calculus I A
13.	后续课程、其它学习规划 Courses for which this course is a pre-requisite	无 NA
14.	其它要求修读本课程的学系 Cross-listing Dept.	无 NA

教学大纲及教学日历 SYLLABUS

15. **教学目标 Course Objectives**

This course provides an introduction to the basic concepts of statistics and probability, including common distributions, statistical methods, and data analysis. It is intended for undergraduate students who have not taken any statistics courses before. This course will use biological data as examples to demonstrate different aspects of statistics. This course will help you appreciate and understand the role of statistics in biology, especially in the modern biological research.

本课程介绍统计和概率的基本概念，包括常见分布，统计方法和数据分析。它适用于之前未修读任何统计课程的本科学士生。本课程将以生物学数据为例，说明统计学的不同方面。本课程将帮助学生了解和理解统计学在生物学中的作用，特别是在现代生物学研究中的应用。

16. **预达学习成果 Learning Outcomes**

1. Get a basic understanding of the role of statistics in biology.
 2. Develop an ability to apply appropriate statistical methods to summarize and analyze data for some of the more routine experimental settings.
 3. Make sense of data and be able to report the results in appropriate tables or statistical terms for inclusion in the thesis or research paper.
 4. Interpret results from various packages of programming languages, such as R and Python, and be able to use R or Python to perform appropriate statistical techniques.
1. 基本了解统计学在生物学中的作用。
 2. 培养学生应用统计方法的能力，以总结和分析一些更常规的实验设置的数据。
 3. 理解数据并能够在适当的表格或统计术语中报告结果，并应用在毕业论文或研究论文中。
 4. 解释各种编程语言包（如 R 和 Python）的结果，并能够使用 R 或 Python 执行适当的统计技术。

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.)

- **Overview (1 hour)**

0.1 - What is Statistics?

0.2 - Foundations

- **Chapter 1: Collecting and Summarizing Data (2 hours)**

1.1 - Collecting Data

1.2 - Classifying Data

1.3 - Summarizing One Qualitative Variable

1.4 - Graphing One Qualitative Variable

1.5 - Summarizing One Quantitative Variable

1.6 - Graphing One Quantitative Variable

1.7 - Chapter 1 Summary

- **Chapter 2: Probability (4 hours)**

2.1 - Notation

2.2 - Set Notation and Operations

2.3 - Interpretations of Probability

2.4 - Probability Properties

2.5 - Conditional Probability

2.6 - Independent Events

2.7 - Bayes' Theorem

2.8 - Chapter 2 Summary

- **Chapter 3: Probability Distributions (4 hours)**

3.1 - Random Variables

3.2 - Discrete Probability Distributions

3.3 - Continuous Probability Distributions

3.4 - Chapter 3 Summary

- **Chapter 4: Sampling Distributions (2 hours)**

4.1 - Sampling Distribution of the Sample Mean

4.2 - Sampling Distribution of the Sample Proportion

4.3 - Chapter 4 Summary

- Chapter 5: Estimation (4 hours)

5.1 - The Relationship Between Population and Sample

5.2 - Estimation of the Mean of a distribution

5.3 - Estimation of the Variance of a distribution

5.4 - Estimation for the Binomial distribution

5.5 - Estimation for the Poisson distribution

5.6 – Chapter 5 summary

- Chapter 6: Confidence Intervals (4 hours)

6.1 - Introduction to Inferences

6.2 - Estimation and Confidence Intervals

6.3 - Inference for the Population Proportion

6.4 - Inference for the Population Mean

6.5 - Chapter 6 Summary

- Chapter 7: Hypothesis Testing for One-Sample Proportion (2 hours)

7.1 - Introduction to Hypothesis Testing

7.2 - Steps for Hypothesis Tests

7.3 - Set-Up for One-Sample Hypotheses

7.4 - Hypothesis Test for One-Sample Proportion

7.5 - Relating the CI to a Two-Tailed Test

7.6 - Chapter 7 Summary

- Chapter 8: Hypothesis Testing for One-Sample Mean (2 hours)

8.1 - Steps in Conducting a Hypothesis Test for μ

8.2 - Further Considerations for Hypothesis Testing

8.3 - Chapter 8 Summary

- Chapter 9: Comparing Two Population Parameters (2 hours)

9.1 - Difference of Two Independent Normal Variables

9.2 - Comparing Two Population Proportions

9.3 - Comparing Two Population Means

9.4 - Comparing Two Population Variances

9.5 - Chapter 9 Summary

- Chapter 10: Chi-Square Test for Independence (2 hours)

10.1 - The Chi-Square Test for Independence

10.2 - The 2x2 Table: Test of 2 Independent Proportions

10.3 - Risk, Relative Risk and Odds

10.4 - Chapter 10 Summary

- Chapter 11: Linear Regression Foundations (6 hours)

11.1 - Linear Relationships

11.2 - Simple Linear Regression

11.3 - Logistic Regression

11.4 - Coefficient of Determination

11.5 - Inference for Correlation

11.6 - Multiple Regression Model

11.7 - Chapter 11 Summary

- Chapter 12: Introduction to ANOVA (4 hours)

12.1 - Introduction to Analysis of Variance

12.2 - A Statistical Test for One-Way ANOVA

12.3 - Multiple Comparisons

12.4 - Two-Way ANOVA

12.5 - Summary

- Chapter 13: Introduction to Nonparametric Tests and Bootstrap (4 hours)

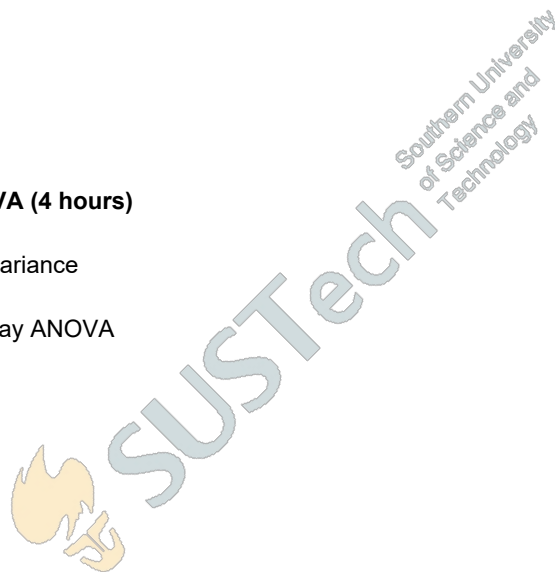
13.1 - Inference for the Population Median

13.2 - Introduction to Bootstrapping

13.3 - Summary

- Chapter 14: Real-life data (4 hours)

14.1 - Experimental design



14.2 - Survival analysis
14.3 - More examples
- Chapter 15: Summary and Review (1 hour)
15.1 - Summary of Statistical Techniques
15.2 - Choose the Correct Statistical Technique

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

教材/ Textbook : Principles of Biostatistics (2nd edition) by Pagano and Gauvreau
参考书/ Supplementary readings (not mandatory) : Fundamentals of Biostatistics (8th edition) by Rosner

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				
期中考试 Mid-Term Test		35		
期末考试 Final Exam		35		
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**

<input checked="" type="checkbox"/> A. 十三级等级制 Letter Grading <input type="checkbox"/> B. 二级记分制 (通过/不通过) Pass/Fail Grading
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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

本课程经生物系本科教学指导委员会审议通过。



南方科技大学
SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

This Course has been approved by Undergraduate Teaching Steering Committee of Department of Biology.

