

课程大纲 COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	函数型数据分析 Functional Data Analysis
2.	课程性质 Compulsory/Elective	专业选修课
3.	开课单位 Offering Dept.	统计与数据科学系
4.	课程学分/学时 Course Credit/Hours	3/48
5.	授课语言 Teaching Language	全英文
6.	授课教师 Instructor(s)	史建清
7.	开课学期 Semester	春季
8.	是否面向本科生开放 Open to undergraduates or not	是
9.	先修要求 Pre-requisites	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.) 数理统计 MA204
10.	教学目标 Course Objectives	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.) 本课程主要介绍函数型数据分析中的各种方法, 学习函数型数据分析中的估计理论和常用算法, 并学习函数型数据分析的各种实际应用以及优于传统统计的一些特性。 This course introduces functional data analysis methods with applications, to illustrate common numerical and estimation routines to perform functional data analysis; to demonstrate applications where functional data analysis techniques have clear advantage over classical multivariate techniques.
11.	教学方法 Teaching Methods	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.) 授课
12.	教学内容 Course Contents	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)
	Section 1	第1章 简介 (2 学时) Chapter 1 Introduction (2 hours)
	Section 2	第2章 函数型数据和探索性分析 (10 学时) basic expansions, smoothing, functional PCA, The fda package Chapter 2 Representing functional data and exploratory data analysis (10 hours) basic expansions, smoothing, functional PCA, The fda package

Section 3	第三章 Registration (8 学时) Chapter 3 Registration (8 hours)
Section 4	第四章 函数型线性模型 (12 学时) Functional linear regression model with scalar response variable, functional principal components regression, and functional linear model with functional response Chapter 4 Functional Linear models (12 hours) Functional linear regression model with scalar response variable, functional principal components regression, and functional linear model with functional response
Section 5	第五章 贝叶斯高斯过程非参数回归模型 (8 学时) Gaussian process regression analysis, the GPFDA package Chapter 5 Bayesian nonparametric regression using Gaussian process prior (8 hours) Gaussian process regression analysis, the GPFDA package
Section 6	第六章 函数型数据分析相关课题 (8 学时) Further problems (8 hours)
Section 7	
Section 8	
Section 9	
Section 10	
.....	
13. 课程考核 Course Assessment	
	(① 考核形式 Form of examination; ②. 分数构成 grading policy; ③ 如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.) 课题表现 10% + 课程项目 50% + 平时作业 40% Class Performance 10% + Projects 50% + Assignments 40% 附注: 本科生的平时作业和课程项目将比研究生要求内容酌量减少。
14. 教材及其它参考资料 Textbook and Supplementary Readings	
	References. Ramsay, J.O. and Silverman, B.M. (2005). Functional Data Analysis. Springer. Ramsay, J.O., Hooker, G. and Graves, S. (2009). Functional Data Analysis in R and Matlab. Springer. Shi, J.Q. and Choi, T. (2011). Gaussian Process Regression Analysis for Functional Data. Chapman & Hall/CRC Press.