

理学院（数学与应用数学专业）课程简介

课程编号：1713001080

课程名称：时间序列分析

学分/学时： 3.5/56

先修课程：概率论基础、统计学基础（1）、（2），随机过程、

适用专业：统计学，数学与应用数学

课程性质：限选

教材：《时间序列分析-单变量和多变量方法》 William W S.Wei (美)（第二版），易丹辉，刘超，贺学强等译，中国人民大学出版社，2009.

主要参考书：

1. George E.P.Box Gwilym M.Jenkins, GREGORY C .REINSELA, Times Series Analysis - Forecasting and Control(Fourth Edition),JOHN WILEY&SONS,INC.,PUBLICATION. 2008.
2. Peter J.Brockwell 著，田铮译，《时间序列的理论与方法》（第二版），高等教育出版社、施普林格出版社，2001.
3. 《时间序列分析》，安鸿志编著，华东师范大学出版社，1992.
4. 何书元，《应用时间序列分析》，北京大学出版社，2003.

内容简介：

时间序列分析是统计学专业的一门重要的专业必修课，是继《随机过程》、《多元统计与回归分析》之后另一门非常重要的专业核心课程。该课程旨在概率论、随机过程、多元统计及回归分析的基础上，对按时间顺序排列的、随时间变化且相互关联的数据序列进行分析，找出反映事物随时间的变化规律，并利用观测数据之间的自相关性，建立一个相对最优数学模型来描述客观现象的动态特征，从而对数据变化趋势做出正确的分析和预测的一门集理论与应用为一身的课程。通过该课程的学习，使学生一方面掌握处理动态数据的理论与方法，同时对之前所学知识进行系统性回顾；另一方面，通过该课程的学习，使学生逐渐了解与掌握如何把实际问题与时间序列理论相联系，并通过理论模型的建立与调整、完善，更好地解释、

解决实际问题。

《时间序列分析》是统计学专业本科三年级的一门专业必修课，其先修课程为《概率论基础》、《多元统计与回归分析》、《随机过程》、《贝叶斯分析》。该课程主要内容包括:时间序列的基础知识，平稳时间序列模型，非平稳时间序列模型，时间序列的预报，时间序列模型的识别、参数估计及模型选择，季节性时间序列模型等。

Course Description

School of Science Faculty

Course Code: 1713001080

Course Name: Time Series analysis

Credit/Hours: 3.5/56

Textbooks: William W.S.Wei, Time Series Analysis Univariate and Multivariate Methods(Second Edition), Progressive Publishing Alternatives, 2005.

Reference Books:

- 1.George E.P.Box Gwilym M.Jenkins, GREGORY C.REINSEL, Times Series Analysis – Forecasting and Control》(Fourth Edition), JOHN WILEY&SONS,INC.,Hoboken,New Jersey, 2008.
- 2.Peter J.Brockwell, Richard A.Davis,Time Series:Theory and Methods(Second Edition),Springer – Verlag New York,Inc.,1991.
- 3.An Hongzhi, Time Series analysis, East China University Publishing, 1992.
- 4.He Shuyuan, Applied Time Series Analysis, Bei Jing University Publishing, 2003.

Course Description:

Times series analysis is a compulsory course for the third- year undergraduates of statistics major with a good background in Foundations of Probability Theory、Multiple Statistics and Regression、Stochastic Processes. A time series is a sequence of observations taken sequentially in time. Many sets of data appear as time series: A monthly sequence of the quantity of goods shipped from a factory , a weekly series of the number of road accidents, and so on. Examples of time series abound in such fields as economics, business, engineering ,the natural Sciences, and the social sciences. Time series analysis is concerned with techniques for the analysis of this dependence. This requires the development of stochastic and dynamic models for time series

data and the use of such models in important areas of application. The course is designed to improve the related students understanding to the statistics basic theory, method and skills. Meanwhile, it is beneficial of decision , data mining and data progressing and analysis.

Basic contents of this course include: white noise, autoregressive model, moving average model, ARMA model, asymptotical convergence theory, least square estimation, maximum likelihood estimation, forecast of ARMA model, identification of ARMA model, ARCH model, GARCH model, unit root process, frequency domain models and multi time series analysis.