Course title: MA329 Statistical Linear Models ***1st semester, 2023-2024***

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Description:

The course introduces linear models and their related statistical theories and techniques. Topics include multivariate normal distribution, distribution of quadratic forms, multiple linear regression model, estimation and testing, model diagnostics, model-building and analysis of variance models.

1. Learning outcomes

Upon completion of the course, students will

a) learn the essential skills in estimation and statistical inference using linear models,
b) employ appropriate techniques in regression model building,
c) understand the procedures of applying regression analysis to real datasets in practical problems,
d) be able to use the regression model for prediction and forecasting.

2. Pre-requisites

a) Elementary Statistics and basic distribution theories
b) Basic knowledge in calculus and linear algebra

3. Assessment Scheme

Type	Description	Weight
Assignment	Around 6 sets of assignments	30%
Midterm	1 A-4 size formula sheet (written on both sides) allowed	30%
Final Examination	1 A-4 size formula sheets (written on both sides) allowed	40%

Later assignment policy: 10% marks will be deducted for each day of delay. It will not be accepted once the solution is published (usually 3 days after the deadline).
Absence of test/exam: Strong justification will be required to apply for make-up test or exam.

4. Course schedule （Tentative）

Date (2023)	Topic
Sept 12,19,21,26	• Brief overview of the course • Ch1. Introduction • Ch2. Simple linear regression: Model, estimation and testing
Oct10	• Ch3. Generalized inverse
Oct 12	• Ch4. Random Vector and Matrices
Oct. 17, 24	• Ch5. Multivariate normal distribution
Oct 26, 31	• Ch6. Quadratic Forms
Nov 7	• Examples, revision
Nov 9	• **Midterm**
Nov 14, 21	• Ch7. Multiple regression (I): Model and estimation
Nov 23, 28,Dec5	• Ch8. Multiple regression (II): Hypothesis testing
Dec 7, 12,19	• Ch9. Multiple regression (III): Diagnostics and model-building
Dec 21, 26	• Ch10. Analysis of Variance Models
Jan 2	• Examples
Jan 4	• Revision

5. A facility for posting course announcements

You may use the University *e*-learning platform (blackboard) to access course information and course materials. The website is managed by the University. Should you have enquiry on the system, please contact the teaching assistants by e-mail. Should you have comments on the course content, please contact Professor Jian Qing SHI directly.

6. Learning resources

a) Lecture notes

For students' easy reference, lecture notes have been prepared in the format of pdf files. Students can download the files from the University *e*-learning platform

b) Assignments

All assignments and their due dates will be posted on the University *e*-learning platform

c) Major reference books

i. Rencher, AC. Linear Models in Statistics, Wiley.
ii. Mendenhall W and Sincich T. *A second Course in Statistics: Regression Analysis*, Pearson/Prentice Hall