

**NATIONAL TAIWAN UNIVERSITY**  
**Department of Finance**  
**FIN 7047 Quantitative Analysis**

**Profs. Kuan & Yang**

**Spring 2020**

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This is the first course in econometrics for master students; undergraduate students with proper statistics and mathematics background are welcome to take this course.

This course is designed to prepare students with basic knowledge of econometric and statistical (machine) learning methods that are useful for analyzing economic/financial data. In addition to the conventional linear regression and maximum likelihood methods, various topics in statistical learning, such as LASSO, classification and regression trees, random forests, and neural networks, will also be covered. These learning methods have been widely applied to extract features from very large data sets (“big data”) and are now popular in practice.

This course requires programming in **R**, which is a flexible tool for econometric analysis and computational tasks. Our TA will introduce basic ideas in **R** coding every week and give coding exercises for practice. Our exams will also include problems in **R** codes.

### **Reading**

- [S1] Kuan, C.-M., Lecture Slides, <https://cool.ntu.edu.tw/login/>; some videos are also available there.
- [S2] Wooldridge, J. M., *Introductory Econometrics, A Modern Approach*, 6th Edition, Cengage Learning, 2016.
- [S3] James, G., D. Witten, T. Hastie, and R. Tibshirani, *An Introduction to Statistical Learning with Applications in R*, Springer, 2015.

### **R Programs**

- R program: <https://cran.r-project.org/bin/windows/base/>
- R studio: <https://www.rstudio.com/products/rstudio/download/>
- R tutorial: <https://www.econometrics-with-r.org/index.html>

### **Course Outline**

**Lecture 1** Economic Data and Simple Linear Regression (S2, Chap. 1, 2)

**Lecture 2** Multiple Linear Regression: Estimation (S2, Chap. 3)

**Lecture 3** Multiple Linear Regression: Inference (S2, Chap. 4, 7)

**Lecture 4** Multiple Linear Regression: Asymptotics (S2, Chap. 5, 8)

**Lecture 5** Maximum Likelihood Method and Discrete Choice Models (S2, Chap. 17)

**Lecture 6** Resampling Methods (S3, Chap. 5)

**Lecture 7** Linear Model Selection and Regularization (S3, Chap. 6)

**Lecture 8** Moving Beyond Linearity (S3, Chap. 7)

**Lecture 9** Tree-Based Models (S3, Chap. 8)

**Lecture 10** Neural Networks (Notes by Prof. Yang)

**Self Study** Text Mining and Applications

**Office Hours:** TA (Ts-Mou Hwu) will hold office hours on Friday 2:00–5:00, Room 415, Management School Bldg. 2; you may also contact him at [r07723044@ntu.edu.tw](mailto:r07723044@ntu.edu.tw) for appointment.

**Grading:** Homework assignments (20%) and two exams (40% each); for questions about homework grading please contact An-Mei Tsai at [r08723023@ntu.edu.tw](mailto:r08723023@ntu.edu.tw).