# Time Series Analysis (時間序列分析)

# National Taiwan University

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**Course Description and Objectives:**

Much of statistical methodology is concerned with models in which the observations are assumed to be independent. However, many data sets occur in the form of time series where observations are dependent. In this course, we will present some important time series methods as well as recent advances of time series analysis, with a balance between theory and applications.

**Course Prerequisites**:

Mathematical statistics or econometrics or their equivalents.

**Topics:**

Fundamental concepts
Stationary time series models
Nonstationary time series models
Time series forecasting
Time series model building
Testing the random walk and unit roots
Volatility, ARCH and GARCH models
Spectral theory of stationary processes
Estimation of the spectrum
Transfer function models and cross-spectrum functions
Aggregation and disaggregation in time series

**Grading:**

Course grades are based on the weighted average of homework, projects, and exams.

**Text:**

Wei, William W.S. (2006)
*Time Series Analysis, Univariate and Multivariate Methods, 2nd Edition*
Addison-Wesley

**Software:** SAS and R

**References:**

**Books:**


Bloomfield, P. (2000/2005)
*Fourier Analysis of Time Series, 2nd Edition*
Wiley

Box, G.E.P., Jenkins, G.M. & Reinsel, G.C. (2008)
*Time Series Analysis, Forecasting and Control, 4th Edition*
Wiley

Fuller, W.A. (1996/2008)
*Introduction to Statistical Time Series*
Wiley

Hamilton, J.D. (1994)
*Time Series Analysis*
Princeton University Press

Lutkepohl, H. (1987)
*Forecasting Aggregated Vector ARMA Processes*
Springer-Verlag

Pena, D, Tiao, G.C. and Tsay, R.S. (2000)
*A Course in Time Series Analysis*
Wiley

Priestley, M.B. (1981)
*Spectral Analysis and Time Series*
Academic Press

Reinsel, G.C. (1997)
*Elements of Multivariate Time Series Analysis*
Springer-Verlag

Tsay, R.S. (2005)
*Analysis of Financial Time Series, 2nd Edition*
Wiley


**Selected Journal Articles:**