

## STAT5330: 統計計算 (Statistical Computing)

**Lecture:** Monday 11:10-12:00pm, Wednesday 10:10-12:00pm  
綜合三館 837

**Instructor:** 徐南蓉  
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**TA :** TBA

### Reference:

1. The Elements of Statistical Learning (2009), Hastie, Tibshirani and Friedman, Springer.
2. Bayesian Data Analysis (2004), Gelman, Carlin, Stern and Rubin, Chapman & Hall.
3. Convex Optimization (2004), S. Boyd and L. Vandenberghe, Cambridge University Press.
4. Computational Statistics (2005), Givens and Hoeting, Wiley.
5. An Introduction to the Bootstrap (1993), Efron and Tibshirani, Chapman & Hall.

### Course Description:

This course covers modern computationally intensive methods for statistical analysis. The goal of the course is to learn:

1. What are these methods and their usefulness?
2. How do they work?
3. Implement these methods for your own problems in statistical inference. (i.e., you need to know how to program)

Topics include

- Random number generation
- Monte Carlo methods
- Numerical approximation for expectations
- Convex optimization
- EM algorithm and its generalizations
- Bootstrap method and cross-validation
- Bayesian analysis and Markov chain Monte Carlo
- Dimensional reduction methods for high-dimensional data
- Data visualization

**Grading:** homework 50% + project 50% (the best homework gets extra points)

### Class Rules:

- No late homework and do it by yourself
- Respect others: be on time for class and turn off your electronic devices.