

**MACF 491A (MAST 723/MAST 881X)**  
Topics in Math & Computational Finance II  
*Winter 2015*

- Instructor:** Dr. C. Hyndman, Office: LB 921.15(SGW), Phone: 848-2424, Ext. 5219  
Email: [cody.hyndman@concordia.ca](mailto:cody.hyndman@concordia.ca)
- Office Hours:** To be announced.
- Class Schedule:** Mondays and Wednesdays, 16:15-17:30.
- Text:** Capinski, M. and Kopp, E., *Portfolio Theory and Risk Management*.  
Cambridge University Press, Cambridge, 2014.
- References:**
1. Elton, E. et al., *Modern Portfolio Theory and Investment Analysis*. 7th Edition, McGraw-Hill, New York, 2003.
  2. Cornuejols, G. and Tutuncu, R., *Optimization Methods in Finance*. Cambridge University Press, Cambridge, 2007.
  3. Research papers to be specified.
- Outline:** This course is broadly concerned with portfolio optimization theory and methods. We shall consider the following topics in a rigorous framework:
- Review of market instruments and financial derivatives
  - Risk and return
  - Optimization review (Lagrange multipliers; Karush-Kuhn-Tucker Theorem, Quadratic optimization, linear and quadratic programming)
  - Portfolio optimization: minimum variance portfolios, efficient frontier, capital market line, Sharpe ratios
  - Security market line, capital asset pricing model
  - Utility maximization: duality methods, dynamic programming.
  - Risk measures: VaR, coherent risk measures
  - Asset liability management
  - Bond portfolio management and immunization
  - Optimal liquidation: Almgren and Chris model
  - Other topics (time permitting).
- Course Evaluation:** Weighted average of:
- Assignments (30%),
  - Project (40%),
  - Final Exam (30%).