

# METHODS IN FINANCE THEORY - FNCE 928

\*\*\*TENTATIVE\*\*\*

---

JOHN Y. ZHU

**Course Description:** This doctoral level course introduces students to game theory and continuous-time methods. Both techniques represent fundamental approaches to organizing, modeling and understanding complex financial phenomena. The game theory half will cover equilibrium concepts, moral hazard, signaling and screening. Highlights include rigorous formulations and analyses of the perfect Bayesian equilibrium concept and the principal-agent relationship. Both ideas are central to theories of corporate finance and financial markets - subjects that the students will be exposed to in the spring. The continuous-time methods half will cover basic stochastic calculus and applications to capital structure, Merton's consumption-portfolio problem and optimal contracts.

**Organization:** We will meet once a week for about 2.5 hours.

**Prerequisites:** Some mathematical sophistication. A familiarity with the basic principles of microeconomics is useful but not required.

**Grading:** Students are expected to come to class and participate actively. Grades will be based on a midterm and presentations.

**Texts:** There are four textbooks (\* means required):

- \*(MWG) Mas-Colell, Whinston and Green: Microeconomic Theory.
- \*(BD) Bolton and Dewatripont: Contract Theory.
- \*(DP) Dixit and Pindyck: Investment Under Uncertainty.
- (KS) Karatzas and Shreve: Brownian Motion and Stochastic Calculus.

**Schedule** (Subject to Change):

- *Game Theory*

- 08/28: Chapters 7 and 9A, 9B, 9-Appendix A (MWG).
- 09/04: Chapter 8 (MWG). 8.D.4, 8.D.5, 8.E.1, 8.E.3 Optional: 8.D.7, 8.E.2
- 09/11: Chapters 9C, 9D, 9-Appendix B (MWG). 9.C.1, 9.C.2, 9.C.3, 9.C.7 Optional: 9.C.4
- 09/18: Chapters 13A, 13B, 13C (MWG) and Chapter 3 (BD). 13.C.5, Question 8
- 09/25: Chapters 13D, 14 (MWG) and Chapters 2, 4 (BD). Questions 1 and 3
- 10/02: Problem Solving
- 10/09: Midterm

- *Continuous-Time Methods*

- 10/16: Chapter 3 (DP).
- 10/23: Chapter 4 (DP).
- 10/30: Chapter 5 (DP).
- 11/13: Chapters 6, 7 (DP).
- 11/20: Chapter 11 (DP).
- 11/27: Presentations
- 12/04: Presentations