MGT 7606 Analytical Modeling Foundations for Information Systems Management

Spring 2027

Instructor	Lizhen Xu, Ph.D. Associate Professor of Information Technology Management
Class Time & Location	Friday 2:00-4:45pm - Room 436, College of Business
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Course Description

This course is designed to provide doctoral students with an introduction in analytical modeling methodologies for research in Information Systems. The course emphasizes two complementary quantitative research approaches: applied game-theoretic modeling and structural empirical modeling. The game-theoretic modeling component focuses on the application of economic theories and game-theoretic frameworks to understand strategic interactions among firms, consumers, platforms, and other market participants in digital environments. Topics may include static and dynamic games, strategic decision-making, information asymmetry, signaling, and mechanism design. The structural empirical modeling component introduces advanced econometric and structural approaches to modeling economic behaviors, identifying underlying behavioral and economic mechanisms, and evaluating managerial and policy implications. Topics may include temporal point processes, discrete choices with random coefficients, dynamic decision making and forward-looking behaviors, among others.

We will achieve the course objectives through lectures on key theoretical concepts and methodological foundations, individual reading and critical evaluation of research papers, and in-class presentations and discussions. Students will be encouraged to examine how analytical models can be developed to address important research questions in Information Systems, how theoretical predictions can be derived and interpreted, and how structural empirical methods can be used to estimate economic models, test theoretical implications, and generate managerial insights. By the end of the semester, each doctoral student is expected to develop a solid understanding of the foundations and applications of game-theoretic and structural empirical modeling, as well as the ability to critically evaluate and apply these methodologies in developing rigorous and impactful Information Systems research.

Learning Objectives

By the end of this course, students are expected to be able to:

- Understand the theoretical foundations of game-theoretic modeling and explain how economic theories and game-theoretic frameworks can be applied to study strategic interactions among firms, consumers, digital platforms, and other market participants in Information Systems contexts.

- Understand the foundations of structural empirical modeling and explain how structural approaches can be used to identify underlying economic mechanisms and quantify behavioral responses.

- Understand and evaluate game-theoretic modeling and structural empirical modeling research in Information Systems and related disciplines.

- Apply analytical modeling methodologies to Information Systems research questions.

Course Materials

Required Readings: Required research papers and book chapters posted on Canvas

Useful books:

- Game Theory for Applied Economists, by Robert Gibbons (1992), Princeton University Press (ISBN 978-0691003955)

- Game Theory, by Drew Fudenberg and Jean Tirole (1991), The MIT Press (ISBN 978-0262061414)

- The Theory of Industrial Organization, by Jean Tirole (1988), The MIT Press (ISBN 978-0262200714)

- Discrete Choice Methods with Simulation, Second Edition, by Kenneth E. Train (2009), Cambridge University Press (ISBN 978-0521766555)

- Dynamic Economics: Quantitative Methods and Applications, by Jerome Adda and Russell W. Cooper (2003), The MIT Press (ISBN 978-0262012010)

Grading

The final letter grade for this course will be based on the following:

Class participation: 20%
Paper presentation: 20%
Weekly reports: 20%
Homework: 10%
Research Proposal and Presentation: 30%

Attendance and Class Participation

Students are required to attend all classes. Absences under special circumstances need to be pre-approved by the instructor. Students will be graded based on their contribution to the discussion of the

readings. All students are expected to be ready to discuss ALL assigned articles each class. The class discussion grade will be based on the relative contribution of each student to the class as a whole as well as their performance in the presentations. In determining the class discussion grade we will consider the following: familiarity with the assigned readings, the understanding of technical details, the ability to integrate material from a diverse set of readings, the ability to develop new ideas based on the readings, the ability to provide real-world examples to support or refute the readings, and the ability to ask and/or answer relevant questions.

Paper Presentation

Students are also required to present assigned research papers in turn. Students need to make a formal presentation covering the details of the assigned research paper and be prepared for questions and in-depth discussion. This is a great opportunity to improve your academic presentation skills.

Weekly Reports

For each class student will prepare a 1-2-page report on each assigned article. These reports should be turned in **by 12:00pm** on the day the articles are discussed. NO LATE REPORTS WILL BE ACCEPTED. For each article, the report should contain:

- Overview of the article that communicates what the student took away from reading the article as well as a summary of the article's greatest strengths and weaknesses.
- Three questions/issues to be discussed in class
- 1-2 follow-up research questions that the student thinks are worthy of research.

Homework

There will be one or two homework assignments designed to let students practice the key concepts covered in the lectures. Each student needs to complete the homework assignments INDIVIDUALLY and submit them before the announced deadlines as instructed.

Research Proposal

At the end of this course, students will submit a research proposal for a highly focused study that can be completed in the following 6 to 12 months. The research proposal should identify a problem domain and provide a problem definition. The motivation, the relevant literature review, the models, and the estimation methods should also be incorporated. A plan for conducting the research as well as potential results and contributions should be discussed.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit http://www.catalog.gatech.edu/policies/honor-code/ or http://www.catalog.gatech.edu/rules/18/.

Any student suspected of cheating or plagiarizing on homework, reports, or research proposal will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations (https://catalog.gatech.edu/rules/22/) articulate some basic expectations between students and faculty. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. We shall all commit to the ideals of Georgia Tech while in this class.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or http://disabilityservices.gatech.edu/, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail the instructor as soon as possible in order to set up a time to discuss your learning needs.