

## ECON 313: Economics of Data

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INSTRUCTOR	Annie Liang Email: annie.liang@northwestern.edu
TA	Hershdeep Chopra Email: hershdeepchopra2026@u.northwestern.edu
LOCATION/TIME	<b>Lecture:</b> TR 2-3:20pm, Tech Institute Lecture Room 5 <b>TA Office Hours:</b> F 1-1:50pm, Tech Institute Lecture Room 5
COURSE DESCRIPTION	<p>Predictive algorithms and big data are increasingly being used by firms and policymakers to guide high-stakes decisions, with a range of ethical, social, and policy implications. This course covers theoretical frameworks for thinking through those implications. The course is split into three parts, which model these issues at different scales. The first part of the course starts with the individual decision maker. We cover foundational theories regarding what information is, and how it is used in decision problems and for learning. The second part of the course considers the interaction between an agent and an algorithm. We cover topics regarding strategic data disclosure and manipulation. The final part of the course considers broader social implications of algorithm design, with an emphasis on recent topics regarding fairness in algorithm decision-making. The objective of the course is not to provide any “answers” regarding the questions raised, but rather to equip students with tools and frameworks that they can use to develop their own analyses of emerging social and economic issues related to big data and algorithms.</p> <p>This class will be <b>in-person only</b>.</p>
GRADING	There are <b>six problem sets</b> . No extensions are granted, but the lowest problem set grade is automatically dropped. The remaining five problem sets each count for 10% of the final grade. Students are permitted to collaborate in groups of up to 3 for problem sets, but must turn in individually-written solutions, and must list the names of their collaborators on the solutions. Additionally there are <b>two exams</b> (non-comprehensive), each worth 25% of the final grade.
SCHEDULE	There is <b>no class</b> on April 27. The first exam will take place on May 2, and the second exam will take place on May 30.
TOPICS AND SCHEDULE	<p><b>Topic 1:</b> Modeling Information</p> <p>Lecture 1: Introduction Lecture 2: Information and Bayesian Updating Lecture 3: Gaussian Updating Lecture 4: Decision Problems Lecture 5: Blackwell Dominance Lecture 6: Bayesian Persuasion Lecture 7: Herding and Learning Traps</p> <p><b>Topic 2:</b> Strategic Interactions Between Agents and Algorithms</p> <p>Lectures 8-9: Tools from Game Theory Lecture 10: Data Externalities</p>

Lecture 11: Strategic Data Manipulation

Lecture 12: (Differential) Privacy

**Topic 3:** Algorithmic Fairness

Lecture 13: Definitions of Fairness

Lecture 14: Fairness and Accuracy

Lecture 15: Algorithmic Inputs

Lecture 16: Algorithms and Humans