

# FYS — History & Ethics of Measurement

Spring '05: TΘ 12:00–1:15 in Manchester (née West) 122

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Office hours	TBA

**OFFICE HOURS:** Please stop by my office at any time. During scheduled office hours, I can always be found in my office, Manchester 338. I also check my email frequently and am happy to answer questions that way. I am also happy to schedule meetings at times convenient to you.

**DESCRIPTION:** At this point in human history, we can (or think we can) measure just about anything we want to measure. Our knowledge about the world, our values, and how we choose to act are all heavily influenced by various types of measurement. As an inherently quantitative process, measuring is presumed to be objective. Yet, how things should be measured and how results should be interpreted are often far from clear. This seminar aims to trace the history of advances in measurement and to explore the contemporary challenges resulting from current measurement capabilities.

In this course, we will explore measurements in three main contexts: counting, astronomy, and risk. For the first quarter of the course, we will explore the transition from the “one vs. many” dichotomy to our modern sophisticated cardinal number system. Counting, arguably the most basic form of measurement, will serve to highlight the degree to which all measurements are abstract.

The second quarter of the course will focus on measurements in our physical world. New measurement capabilities have had profound effects both on our understanding of the world and on the economic development of societies through trade. We will try to impart an appreciation for how accurately our ancestors really could make measurements regarding our world both through astronomy and through land measurement.

In the second half of the course we will move from measurements concerning concrete objects (counting) or physical patterns (astronomy) to the measurement of uncertainty and difference through statistics. Statistical tools are used to further public policy recommendations, to assess capabilities and worth, to monitor trends, to assess and manage risk, and to quantify countless other issues in our society. Examples include measuring the tax burden on different groups, the risk of terrorist attacks, and the impact of crime prevention methods. In all of these real world examples, the questions of what to measure and how to interpret the results consistently arise as questions without clear answers. Our focus will be on critiquing various methods of measuring problems and then discussing the ethical issues these measurements invariably raise.

**DAILY QUESTIONS:** By 8am of every class day, I want two questions/comments emailed to me regarding the days reading. These can simply be thoughts you have had or aspects of the reading that you found confusing. I will often pull from these questions as part of the class discussion.

JOURNAL: During the second half of the course, you will keep a journal that records the ways in which you have noticed measurements both in your personal lives and in the news media. You will be asked to record thoughts on the worth and failings of these measurements.

PAPERS: There will be three papers assigned during the semester.

Length	Subject matter	Topic due	Draft due	Final due
5	Counting	Jan. 31	N/A	Feb. 09
5	Geography/Astronomy	Feb. 14	N/A	Feb. 23
10	Probability/Statistics	Apr. 06	Apr. 13	Apr. 25

During the first few weeks of classes, I will give more details as to what I expect in the papers and on what basis I will grade them. The first two papers can be written based on the readings and material I have put on reserve. The final paper will require significant outside research on your part.

TEXTS: There are three required texts for the course.

- *Longitude: The True Story of a Lone Genius Who Solved the Greatest Scientific Problem of His Time*, by D. Sobel. ISBN: 0-14-025879-5.

Rapidly burgeoning trade required accurate maps. But it was difficult to tell where you were at sea. In theory, there were a number of good methods. The common problem was that they all depended on being able to accurately keep track of time while at sea (without using the sun). As you may have guessed, this was solved by a “lone genius.”

- *Against the Gods: The Remarkable Story of Risk*, by P. Bernstein. ISBN: 0-47-129563-9.

Our modern economy is built upon risk. Banks lend people money so that they can buy houses. People buy insurance to protect themselves and others financially. People invest in the stock market. All of these examples rely on being able to measure risk. The conceptual leap from measuring number or position to measuring the future and the unknown was huge. This leap had tremendous implications.

- *Freakonomics: A Rogue Economist Explores the Hidden Side of Everything*, by S. Dubner and S. Levitt. ISBN: 0-06-073132-X.

This recent book is concerned with trying to apply quantitative methods to social issues. Whether you agree or disagree with the authors’ conclusions, they certainly raise some fascinating questions. The types of topics in addressed in this book are at the cutting edge of what we can and cannot measure in sociology and economics.

There will be numerous other readings of handouts or of material on reserve in the library. These will be listed on the course web page. I will also place on reserve some books that you may find useful for your paper topics.

GRADING: I will determine your final grade as follows:

First paper	10%	Participation	20%
Second paper	12%	Daily questions	15%
Final paper	18%	Journal	15%
Presentation	10%		