



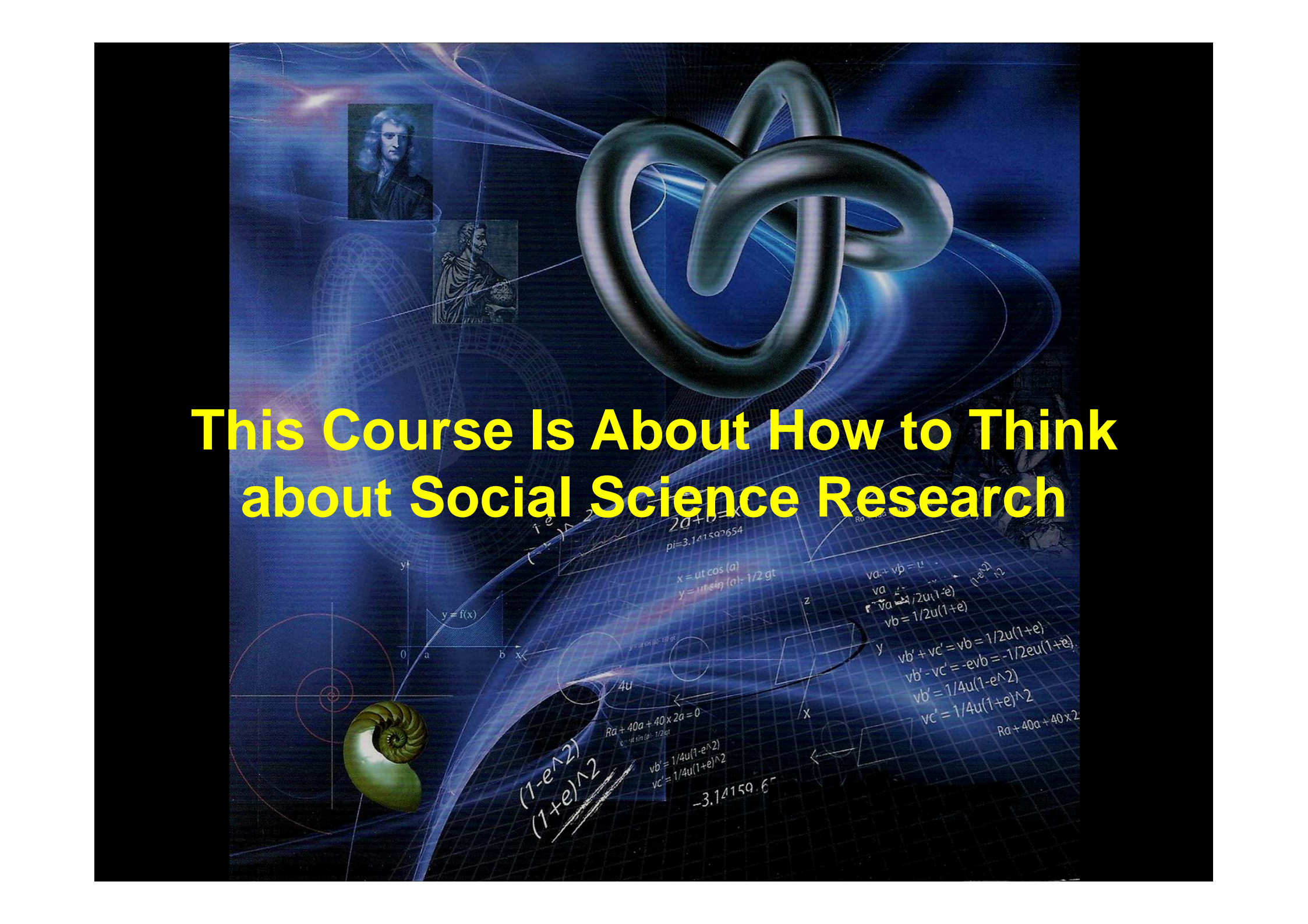
**A course in Ten Lectures:**  
**Quantitative Techniques for  
Social Science Research**

**Ismail Serageldin**

Alexandria

2012

# Prologue



# This Course Is About How to Think about Social Science Research

# What is Social Science?

- **Social science is the field of study concerned with society and human behaviors.**
- **"Social science" is commonly used as an umbrella term to refer to a plurality of fields outside of the natural sciences. These include: anthropology, archaeology, criminology, economics, education, history, linguistics, communication studies, political science and international relations, sociology, geography, law, and psychology.**

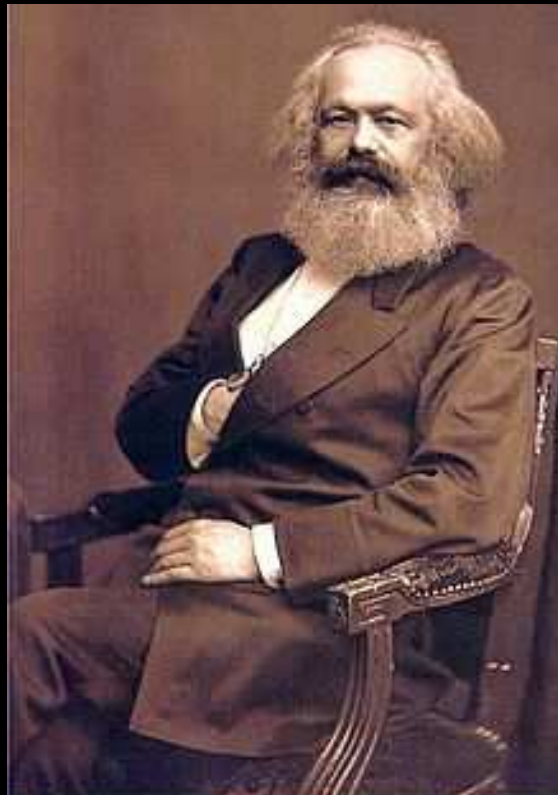
# Modern Social Science

- The “**science of society**” established in 19th century sociology (Latin: socius, "companion"; -ology, "the study of", and Greek λόγος, lógos, "word", "knowledge").
- Émile Durkheim, Karl Marx and Max Weber are typically cited as the principal architects of modern social science by this definition.

# Founders of Modern Social Science



**Émile Durkheim**  
(1858-1917)



**Karl Marx**  
(1818-1883)



**Max Weber**  
(1864-1920)

# Thinking about the Social Sciences

- **Because Social Sciences study human societies and human behaviors, we are concerned with complex issues and subtle problems.**



**From Community to Compassion...**  
**It is all about humans**

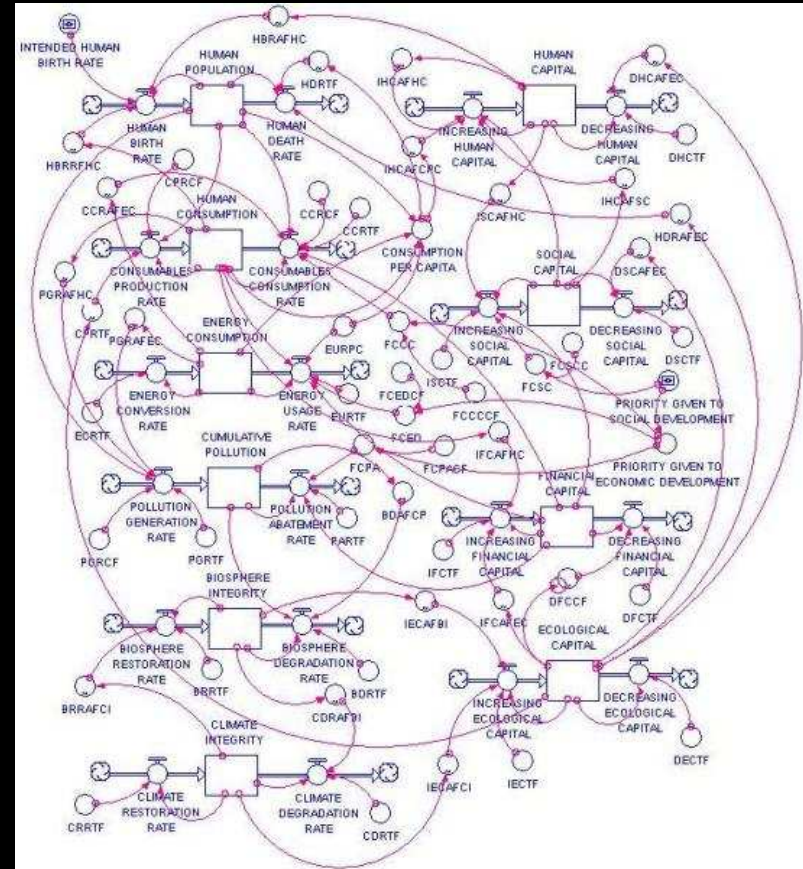




**Human Motivations  
are many and  
complex**

A word cloud of human motivations on a parchment background. The words are arranged in a dense, overlapping manner. The most prominent words, shown in larger, bolder fonts, include 'FUN', 'INSTINCT', 'DANCE', 'PLAY', 'GRATITUDE', 'INTERACTION', 'JOY', 'FUTURE', 'TRUTH', 'CREATIVITY', 'COMMITMENT', 'PEACE', 'WISDOM', 'RESPONSIBILITY', 'HONESTY', 'IDEALISM', 'TOGETHER', and 'LAUGHTER'. Other words like 'Unity', 'Respect', 'Helpfulness', 'Openness', 'Humour', 'Joyfulness', 'Cooperation', 'Integrity', 'Mindfulness', 'Assertiveness', 'Consciousness', 'Innovation', 'Tolerance', 'Inspiration', 'Enthusiasm', 'Acceptance', 'Compassion', 'Integrity', 'Responsibility', and 'Laughter' are also present in various sizes and orientations.

Unity  
Respect  
Helpfulness  
Openness  
Truth  
humour  
Joyfulness  
Cooperation  
PLAY  
Wisdom  
GRATITUDE  
consciousness  
INTERACTION  
Tolerance  
FUTURE  
Enthusiasm  
Acceptance  
Commitment  
Compassion  
DANCE  
Peace  
Integrity  
Mindfulness  
Assertiveness  
Responsibility  
Honesty  
Idealism  
innovation  
Inspiration  
Together  
JOY  
laughter

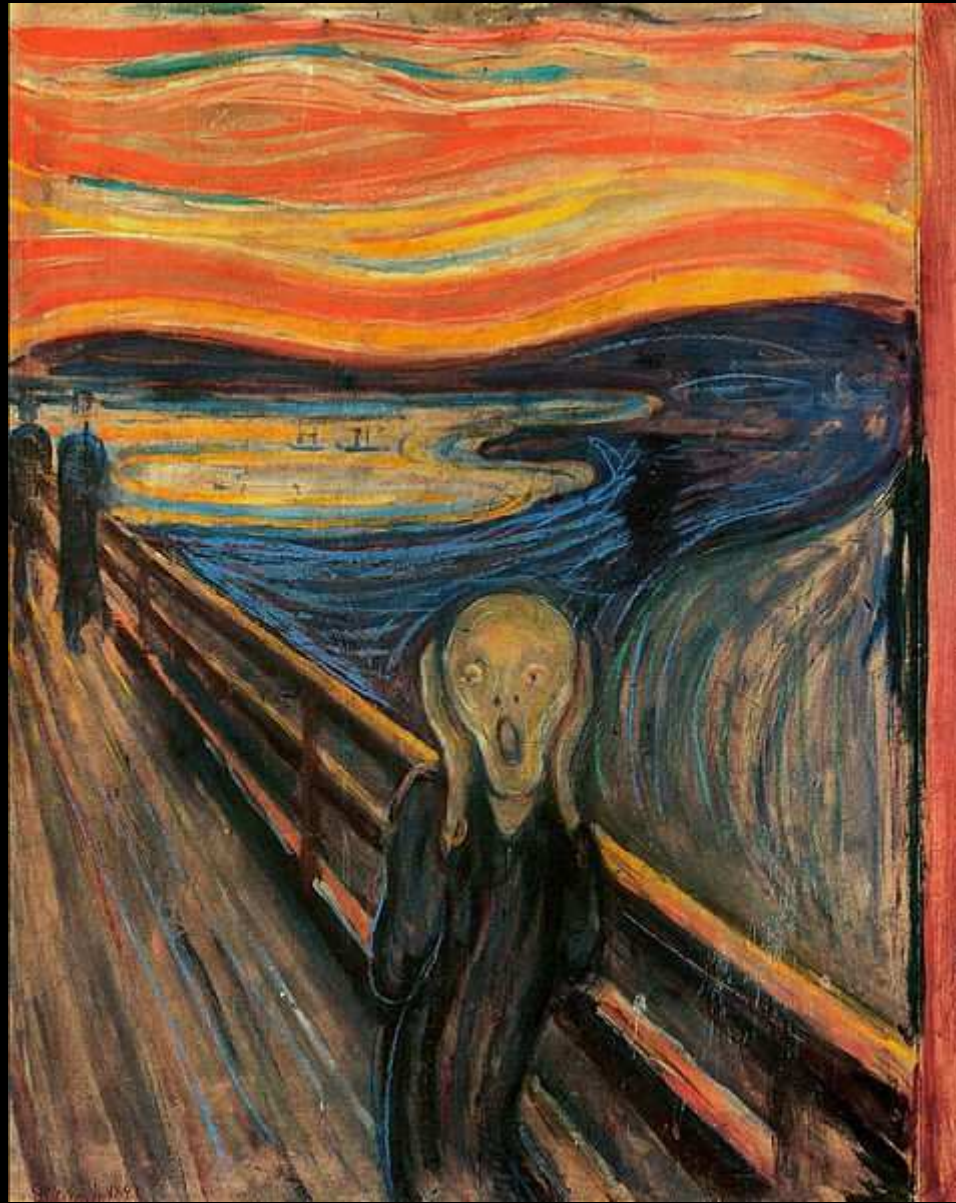


**Our societies can be very complex**

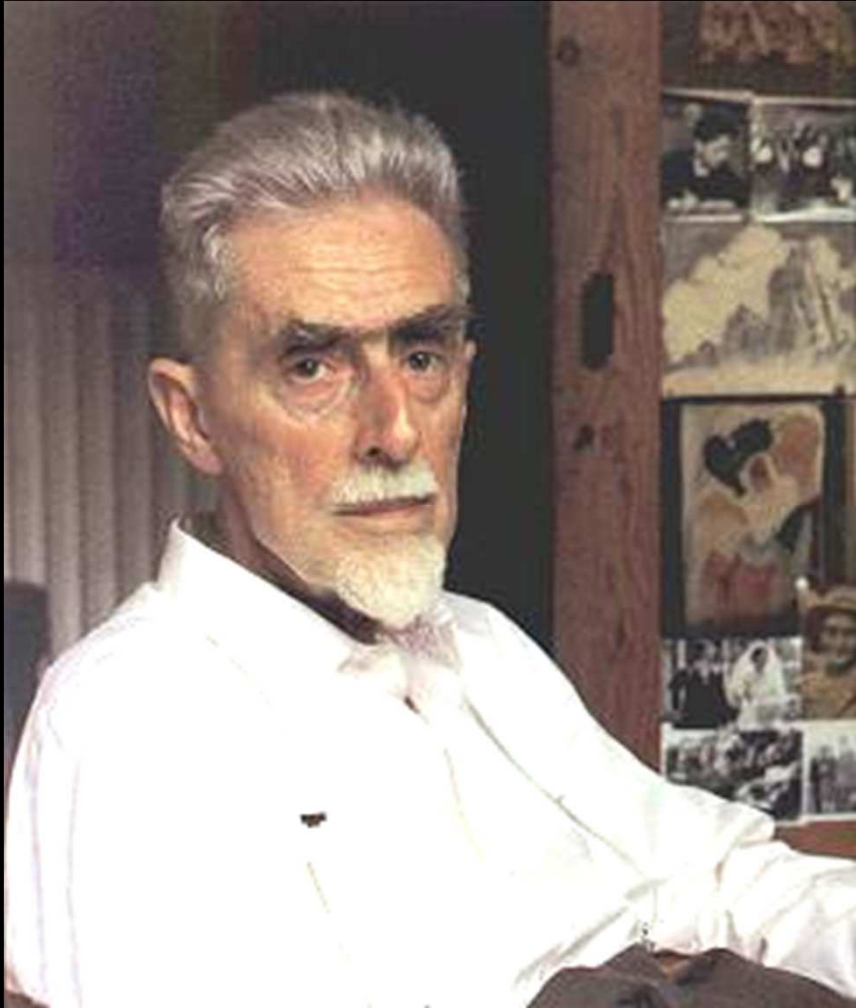
**Sometimes, we feel that artists capture  
and express society's issues and  
people's problems much better than  
social scientists..**



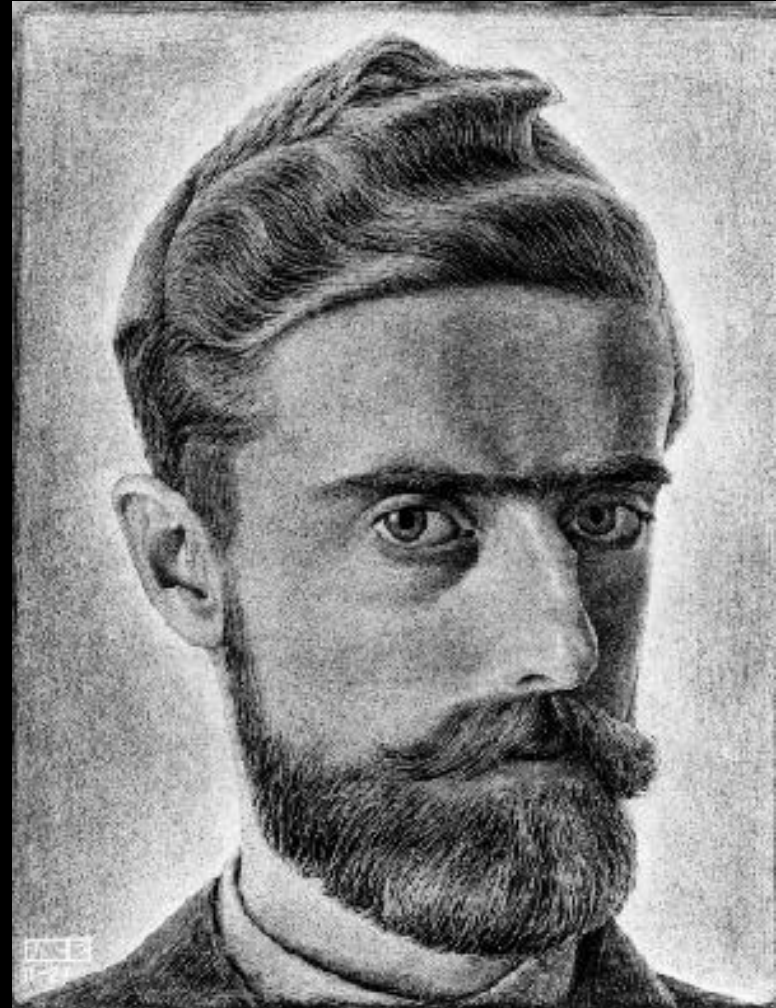
**Edvard Munch**  
(1863 – 1944)



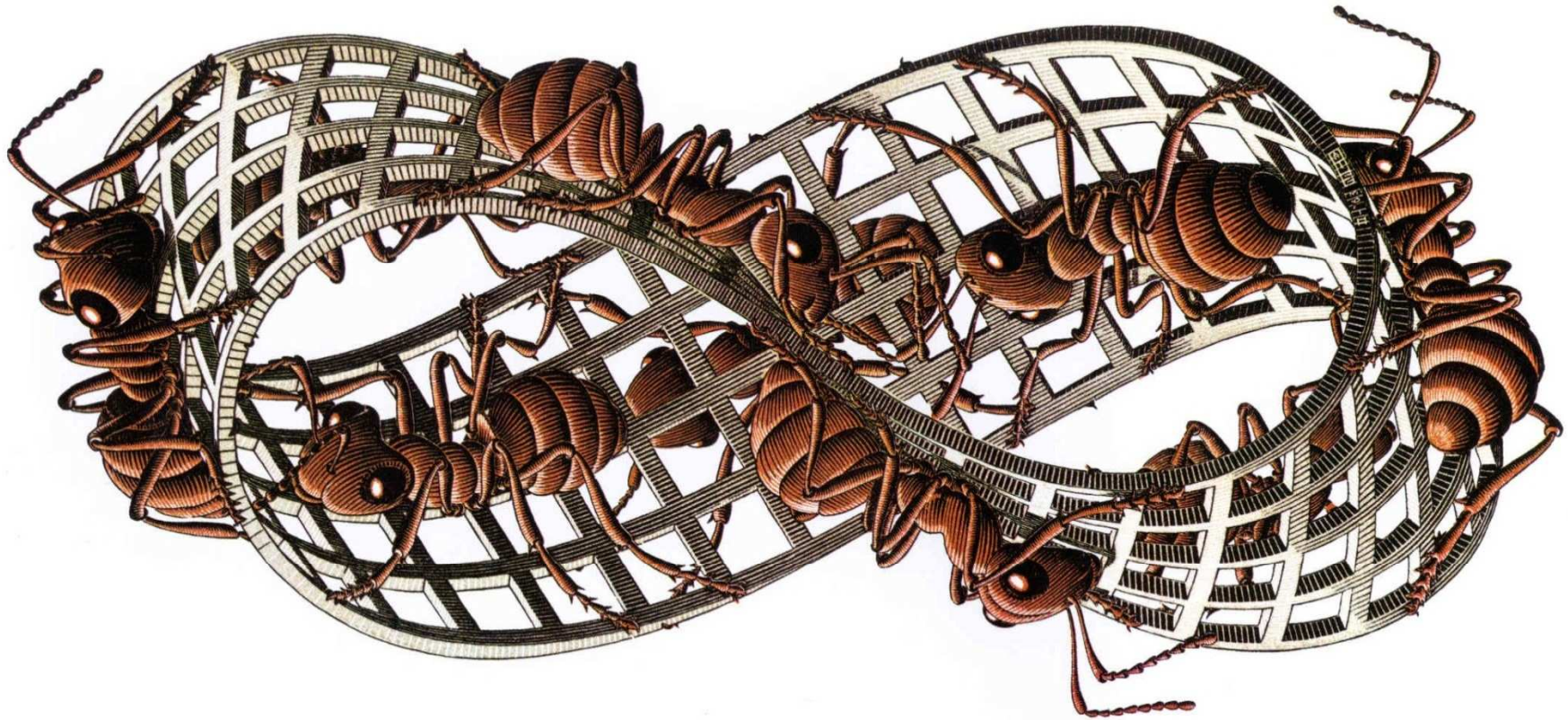




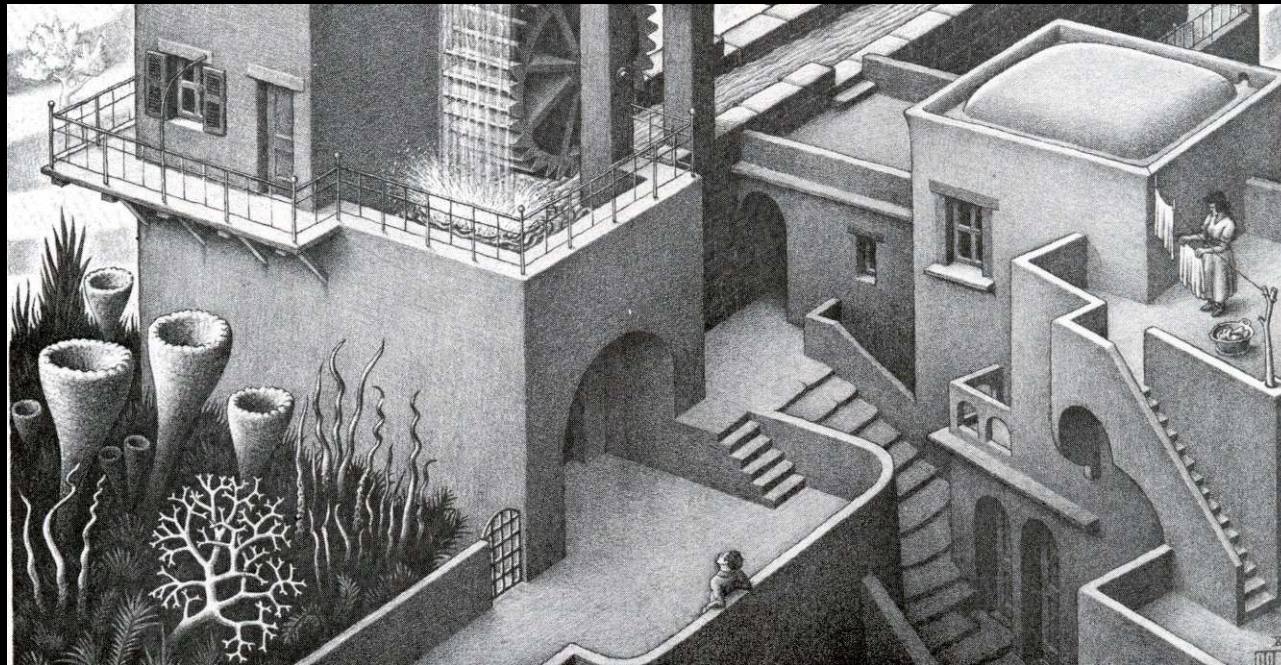
**M. C. Escher**  
(1899-1972)

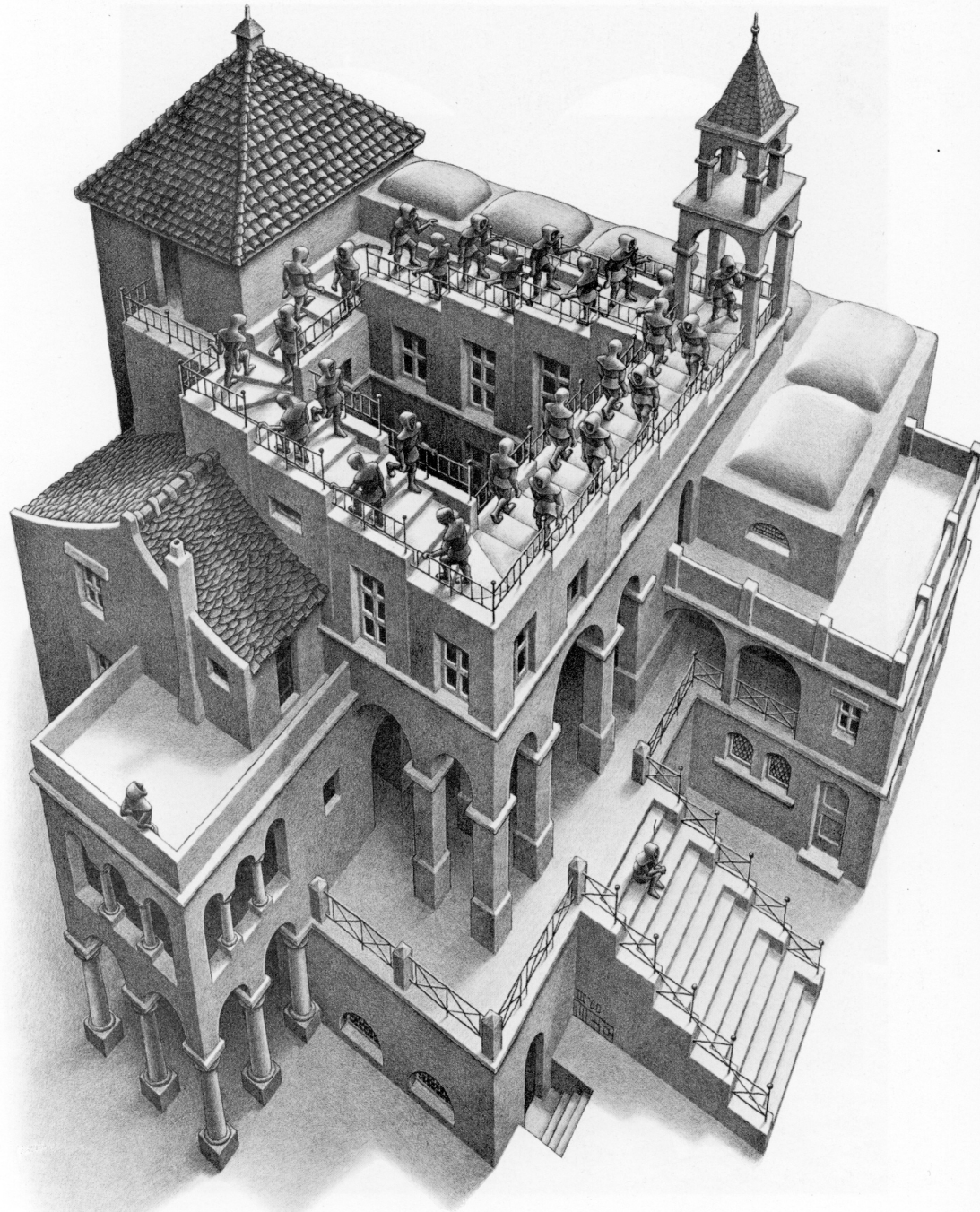


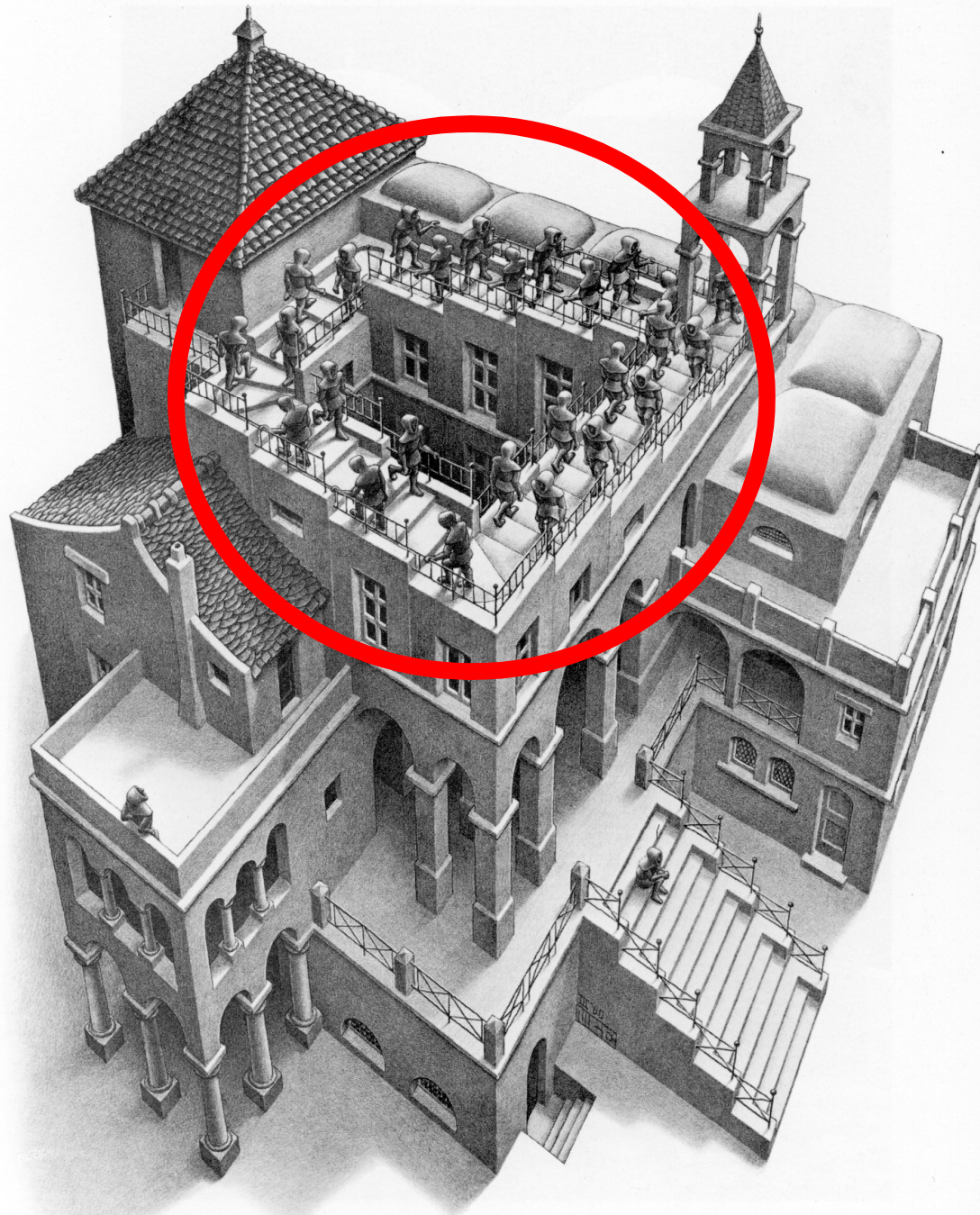
**M. C. Escher**  
(Self-Portrait 1929)











**Their contributions are immense and  
essential...**

**But to design policies we need to analyze  
and study...**

**Trying to understand these issues  
requires thinking.**

**Thinking about quantifying things in the social sciences requires even more thinking**

**But we have tools...**

# Origins of Statistics

- The original idea of "statistics" was the collection of information about and for the "state". The word statistics derives directly, not from any classical Greek or Latin roots, but from the Italian word for state.
- The *Doomsday Book* of William the Conqueror (11<sup>th</sup> C) is an excellent surviving example. It was used to establish the tax base.



## **Probability Came in the mid 17<sup>th</sup> C**

- **Blaise Pascal and Pierre de Fermat, in France, were the pioneers of probability theory.**

## **Modern Statistics also Came in the mid 17<sup>th</sup> C**

- **John Graunt produces modern descriptive statistics in London.**

## Origin of Statistics in mid-17th century

- John Graunt, a native of London, began reviewing a weekly church publication issued by the local parish clerk that listed the number of births, christenings, and deaths in each parish. These so called *Bills of Mortality* also listed the causes of death.
- Graunt who was a shopkeeper organized this data in the form we call **descriptive statistics**, which was published as *Natural and Political Observations Made upon the Bills of Mortality*.
- Shortly thereafter he was elected as a member of Royal Society.

# **Statistics has become an essential Science**

- **During the 20th Century statistical thinking and methodology have become the scientific framework for literally dozens of fields including education, agriculture, economics, biology, and medicine, and with increasing influence recently on the hard sciences such as astronomy, geology, and physics. In other words, we have grown from a small obscure field into a big obscure field.**

**-- Professor Bradley Efron**

**We want to make this less obscure...**

**But this course is not to master the tools,  
it is to master **thinking** about what you  
need for your analysis... It is about  
**thinking clearly about the social sciences****

**Hence, as you take  
this Course, remember...**

**It is about Thinking!**



# It Is About Thinking Through Complex Issues







Do NOT worry  
about the math!

$\pi = 3.141592654$

$x = ut \cos(\alpha)$   
 $y = ut \sin(\alpha) - \frac{1}{2}gt^2$

$va + vb = u$   
 $va = \frac{1}{2}u(1-e)$   
 $vb = \frac{1}{2}u(1+e)$

$vb' + vc' = vb = \frac{1}{2}u(1+e)$   
 $vb' - vc' = -evb = -\frac{1}{2}eu(1+e)$   
 $vb' = \frac{1}{4}u(1-e^2)$   
 $vc' = \frac{1}{4}u(1+e)^2$

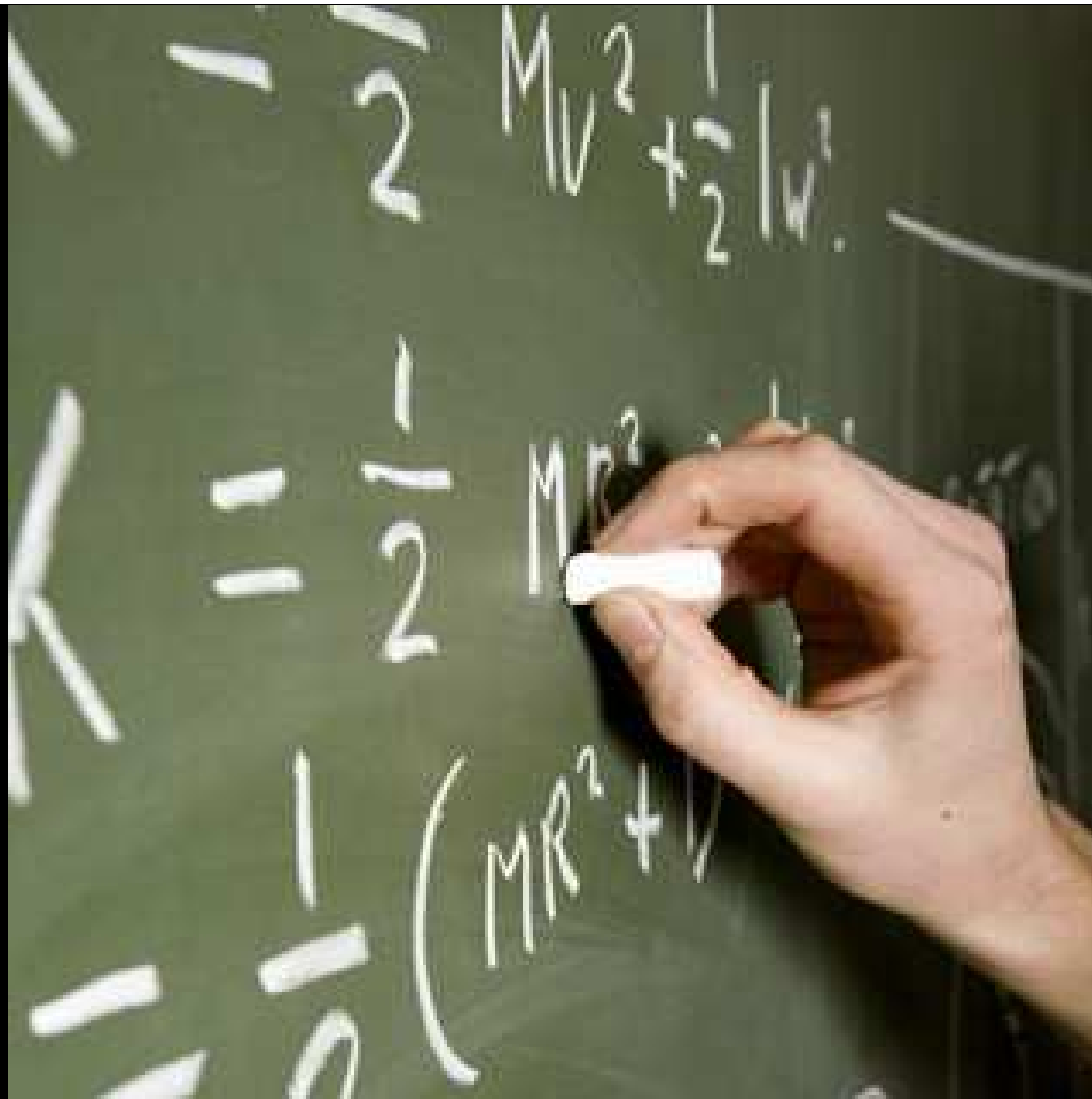
$Ra + 40a + 40 \times 2a = 0$

$\frac{(1-e^2)}{(1+e)^2}$

$vb' = \frac{1}{4}u(1-e^2)$   
 $vc' = \frac{1}{4}u(1+e)^2$

$-3.141592654$

$Ra + 40a + 40 \times 2$



**Ultimately, Doing Calculations is not that difficult**

**Where is the textbook for this  
course?**

# ELEMENTARY STATISTICS

WITH MULTIMEDIA STUDY GUIDE  
TENTH EDITION



MARIO F. TRIOLA

CK-12

flexbook

CK-12 Advanced Probability and Statistics

## SOCIAL STATISTICS

Blalock, Jr.  
*Professor of Sociology*

## STATISTICS

WINTK EDITION

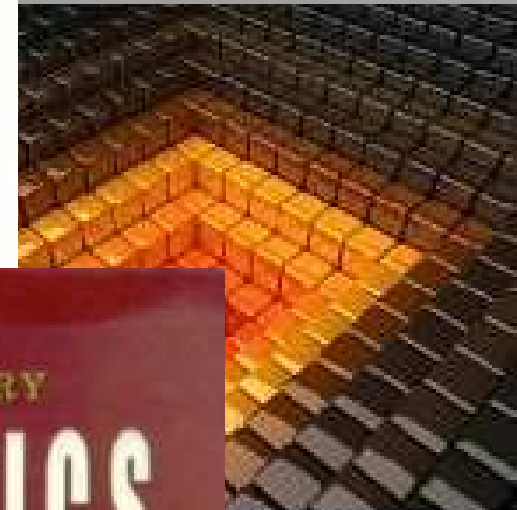
ROBERT S. WITTE • JOHN S. WITTE



# ELEMENTARY STATISTICS



MARIO F. TRIOLA



kindle edition

**There are no text books assigned for  
this course...**

**There are so many good ones, you  
can look things up at your leisure  
later..**

**For now: just think!**



**Just Use Your Brain ... And...**

**THINK**



**So ...**

**Let us start on a journey of thinking  
through the fundamental concepts from  
the basics to the frontiers of current  
work...**



**Let's start on  
that journey  
together**



**It will be a course in Ten Lectures**

# Outline

1. **Science, Method & Measurement**
2. **On Building An Index**
3. **Correlation & Causality**
4. **Probability & Statistics**
5. **Samples & Surveys**
6. **Experimental & Quasi-experimental Designs**
7. **Conceptual Models**
8. **Quantitative Models**
9. **Complexity & Chaos**
10. **Recapitulation - Envoi**