האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

Using Exact Sciences Modeling Tools to Understand Social Phenomena - 55772

Last update 28-10-2023

HU Credits: *3*

Degree/Cycle: *2nd degree (Master)*

Responsible Department: *Business Administration*

Academic year: *0*

Semester: *2nd Semester*

Teaching Languages: *Hebrew*

Campus: *E. Safra*

Course/Module Coordinator: *Dr. Renana Peres*

Coordinator Email: *peresren@huji.ac.il*

Coordinator Office Hours: *by appointment*

Teaching Staff:

Prof Renana Peres

Course/Module description:

What is the conceptual connection between ferromagnetism and formation of social norms? How do musical genres emerge and evolve? If you are an entrepreneur who wants to allocate a given advertising budget over time, what will be the best way to do it? What collaborations are more likely to lead to success? What can create a stock market bubble?

Computational social studies – the use of modeling tools used by exact scientists to understand social phenomena is one of the most intriguing trends in the scientific landscape these days.

The goal of the course is to give students a sneak peak into this exciting world, and show them how modelling skills and techniques from exact sciences can be used to better understand social phenomena.

Course/Module aims:

In this course we will go over several classes of social phenomena: the formation of social norms, stock market bubbles, political movements, organizational collaboration, resource allocation, and the evolution of cultural phenomena.
For each of these social phenomena, we will learn how modeling tools from exact sciences can be used to gain insights to it.

Learning outcomes - On successful completion of this module, students should be able to:

This course is intended to
•Familiarize students with the concepts of modeling.
•Introduce students to intriguing social phenomena that can be modeled.
•Present students with the state-of-the art methods for modeling these phenomena
•Expose students to research literature on these topics.
•Give students the chance to experience hand-on with modeling social phenomena of interest.

Attendance requirements(%):

100

Teaching arrangement and method of instruction: The course will combine oral lectures, homework assignments, and reading.

Course/Module Content:

1. Introduction
Topics:
Opening problem
Principles of modeling
Modeling social phenomena

2. Theoretical tools
Topics:
Basic assumptions of social systems and individual decision making:
Bounded rationality
Trial and error
Social influence, signaling and contagion
Connectivity
Broken symmetry

3. Norm Creation
Topic: The creation and enforcement of social norms

4. Political and Social movements
Topic:
Modeling political opinion formation, riots, strikes, migration waves, and other socio-political events.

5. Stock market behaviours
Topics:
Bubbles
Synchronicity
Fads and herding

6. Formation of societies and cities
Topics:
Explaining the formation of cities
Minority clustering and its implications
Immigration waves and their implications

7. Cultural phenomena
Topics:

The emergence and evolutions of Genres
Trends in popular music – the day the music died?
Music and software piracy

8. Organizational dynamics
Topics:
Organizational rivalry and collaboration
Relationships with suppliers, distributors and joint venture partners (the focus is on the impact of social interactions among consumers on the firm's decision making in these topics).

9. New Product growth
Topics:
Bass model – Using diffusion equations to model new product growth
Agent based modeling.

Required Reading:
A tentative reading list:
Phil W. Anderson, ''More is Different,'' Science 177 (4 August, 1972):393--396.
W. Brian Arthur, ''Inductive Reasoning and Bounded Rationality,'' American Economic Review, Papers and Proceedings, 84 (May, 1994):406--11.
Herrero, Carlos P. "Ising model in small-world networks." Physical Review E65, no. 6 (2002): 066110.
Robert Axelrod, ''An Evolutionary Approach to Norms,'' American Political Science Review, 80 (December, 1986):1095--1111.
Thomas Schelling, Micromotives and Macrobehavior, Norton, New York, 1978. (selected chapters)
Saavedra, Serguei, Kathleen Hagerty, and Brian Uzzi. "Synchronicity, instant messaging, and performance among financial traders." Proceedings of the National Academy of Sciences 108, no. 13 (2011): 5296-5301.

Additional Reading Material:
TBD

Grading Scheme:
Written / Oral / Practical Exam 30 %
Essay / Project / Final Assignment / Home Exam / Referat 70 %

Additional information:

The course is being taught in several leading research institutions worldwide. It is the first of its kind to allow students to connect two seemingly unrelated worlds - exact sciences and social sciences.

The course requires a solid mathematical background and some programming skills. A high school knowledge in Physics will be of a great help for students. Therefore, it is suitable for exact sciences students, who want to expand their knowledge to other domains.