

# Hanieh Hatami

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## Education

### Sharif University of Technology(SUT), Iran

B.S of science in Physics (Major)

- GPA: 18.64/20 ([Transcript](#))

Minor in Economics

- GPA: 19.43/20 ([Transcript](#))

Fall 2020 – Present  
(Expected February 2025)

## Research Experience

### Data-driven method to reveal the dynamic and noise using Hermite polynomials(In Prep)

Sharif University of Technology

Supervisor: [Prof. M Reza Rahimi Tabar](#)

July 2024 – Present

- In this research, we deployed a new, yet superior method to reveal the **drift, diffusion and jumps** from moments of data which proves to be **more accurate and faster** than methods in literature. All the results, including extensive numerical simulations was generated by my Python codes, and they were double-checked by Mathematica. This method uses Hermite Polynomials to find **the best basis to approximate** the function of kramers-Moyal's coefficient. We applied advanced statistical techniques to derive the theory, which helped the theory to become robust to tail perturbations.

### Data-driven analysis of higher order interactions(In Prep)

Sharif University of Technology

Supervisor: [Prof. M Reza Rahimi Tabar](#)

Sep 2024 – Present

- Smooth multidimensional dynamics all can be decomposed into a network of self loops, pairwise interactions, and higher order interactions which proves to be critical in understanding behavior of systems. Our team developed a far more accurate and faster method that can reveal higher order interactions and my python codes show that out method in estimation is nearer to real parameters than other methods.

### Interaction analysis of crypto-fiat exchange rate(In Prep)

Sharif University of Technology

Supervisor: [Prof. Shahin Rouhani](#)

July 2024 – Present

- Our team used enhanced numerical methods to analyze the interaction network of exchange rates. I solved the problems of fake causality detection of usual correlation detection methods with theory of Kramers-Moyal's expansions and my codes revealed the best fitting dynamics which show the interactions between Crypto-Fiats and help us to undrestand the network of them.

### Stochastic Processes in Econophysics

Sharif University of Technology

Supervisor: [Prof. M Reza Rahimi Tabar](#)

May 2024 – July 2024

- In this paper, we explore the application of stochastic processes to economic modeling, emphasizing the intersection of physics and economics. It aims to provide a comprehensive overview of how concepts from statistical mechanics and probability theory can be utilized to analyze complex economic systems, particularly in understanding market behaviors, risk management, and forecasting. By detailing various models such as Brownian motion, Markov chains, and agent-based models, the work highlights the importance of randomness and uncertainty in economic phenomena, advocating for a more nuanced approach to economic analysis that incorporates these elements for better predictive accuracy and robustness in decision-making.

Documents: [GitHub Repo](#)

### Agent-Based Wealth Distribution with Life-cycle

Shahid Beheshti University

Supervisor: [Prof. Ali Hosseiny](#)

Jan 2024 – March 2024

- In this research, we investigated the wealth distribution of a society of ten thousand people in a thousand years. Our method is nearer to the real world data than others; Because we used the life-cycle model for people which is not in the 10% reachest people in our sample data.

## Teaching Assistant Experience

### Econophysics

Instructor: [Prof. M Reza Rahimi Tabar](#)

Fall 2024 / Sharif University of Technology

### Contemporary Physics

Instructor: [Prof. Shahin Rouhani](#)

Fall 2024 / Sharif University of Technology

### Introductory Programming (in Python)

Instructor: [Dr. H. Hosseinkhani](#)

Fall 2022 / Sharif University of Technology

## Awards & Achievements

<b>Ranked 6</b> out of 60 students in department of Physics and department of Economics	2024
<b>Top 1%</b> in the national university entrance exam(among 155000 students)	2020
<b>Ranked 1</b> graduated at Bahonar Magnet High School.	2020

## Course Projects

<b>Detailed investigation of stochastic dynamic equations with polynomials, binning, ...</b> Supervisor: <a href="#">Prof. M Reza Rahimi Tabar</a> / Codes &/or Documents: <a href="#">Github Repo</a>	Sharif University of Technology Apr 2024
<b>Higher-order interactions in high-dimensional complex systems with polynomials method</b> Supervisor: <a href="#">Prof. M Reza Rahimi Tabar</a> / Codes &/or Documents: <a href="#">Github Repo</a>	Sharif University of Technology Apr 2024
<b>Friendship networks and educational networks and their connection</b> Supervisor: Prof. Saman Moghimi Araghi / Codes &/or Documents: <a href="#">Github Repo</a>	Sharif University of Technology Oct 2023
<b>Drawing random graphs and checking the characteristics of the object</b> Supervisor: Prof. Saman Moghimi Araghi / Codes &/or Documents: <a href="#">Github Repo</a>	Sharif University of Technology Oct 2023
<b>Songbird-social data analysis</b> Supervisor: Prof. Shahin Rouhani / Codes &/or Documents: <a href="#">Github Repo</a>	Sharif University of Technology Jun 2023
<b>Converting Data into Goods in Banking</b> Supervisor: Prof. Farhad Nili / Codes &/or Documents: <a href="#">Github Repo</a>	Sharif University of Technology Dec 2023
<b>A look at the article on the development of higher education and the gender gap</b> Supervisor: Prof. M. Javad Dashtimanesh / Codes &/or Documents: <a href="#">Github Repo</a>	Sharif University of Technology Dec 2023
<b>The difference between the pattern of industrialization in England and America</b> Supervisor: Prof. Farhad Nili / Codes &/or Documents: <a href="#">Github Repo</a>	Sharif University of Technology Jun 2022
<b>The role of government in growth</b> Supervisor: Prof. A. Mahmoudzadeh / Codes &/or Documents: <a href="#">Github Repo</a>	Sharif University of Technology Jun 2023
<b>International Dimensions of Climate Change Policies</b> Supervisor: Prof. A. Mahmoudzadeh / Codes &/or Documents: <a href="#">Github Repo</a>	Sharif University of Technology May 2023
<b>Labor Market (Minimum Wage Rate)</b> Supervisor: Dr. Tajrishy / Codes &/or Documents: <a href="#">Github Repo</a>	Sharif University of Technology Nov 2022

## Selected Courses

### Physics Courses:

**Stochastic Processes:**(Graduate/Grade: 20.0/20.0), **Complex Systems:**(Graduate/Grade: 19.5/20.0), **THERMODYN & STAT MECH1:** (Grade: 19.0/20.0), **THERMODYN & STAT MECH2:**(Grade: 20.0/20.0), **Introductory Programming(in Pyhton):**(Grade: 20.0/20.0), **Biophysics:**(Graduate/Grade: 18.0/20.0), **Network Science:**(Graduate/Grade: 18.0/20.0),

### Economics Courses:

**Principles of Economics:** (Grade: 20.0/20.0), **Macroeconomics:**(Grade: 20.0/20.0), **Econometrics:**(Grade: 20.0/20.0), **Engineering Statistics and Probability:**(Grade: 20.0/20.0), **History of Economics:**(Grade: 19.3/20.0), **Microeconomics:**(Grade: 19.0/20.0), **Digital Economics:**(Grade: 17.7/20.0)

## Technical Skills

<b>Programming Languages:</b>	Python(NumPy, Pandas, Requests, Seaborn, Matplotlib, PyTorch, Scrapy, ...), STATA, R, C, Mathematica, Matlab
<b>Tools &amp; Frameworks:</b>	Adobe Indesign, MS Office, $\text{\LaTeX}$ , Git, Parallel Computation, Web Scraping

## Language

<b>Persian:</b>	Native	<b>English:</b>	Fluent C2 (IELTS: TBA)	<b>German:</b>	Upper Intermediate (B2)
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## Community & Leaderships

<b>Collaboration with the student scientific Journal</b> Member of the editorial council in ranked 1 students' scientific journal, <a href="#">Takaneh magazine</a> .	Sharif University of Technology 2023 – Present
<b>Students' Union Council</b> In terms of education and welfare, we helped students to have a good studying.	Sharif University of Technology 2023 – 2024
<b>Lecturer</b> Giving Several Introductory Talks at Weekly Seminars of Lambda Circle Session Series.	Sharif University of Technology 2022