ERFAN MIRZAEI

ELLIS Ph.D. Student in Machine Learning
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EDUCATION

Ph.D. in Applied Mathematics — Nov 2023 – Present
Istituto Italiano di Tecnologia & École Polytechnique & Università di Genova — Genoa, Italy / Paris, France

- The overarching goal is to explain why and how overparameterized models generalize by leveraging the PAC-Bayes framework and statistical physics.
- Advisors: Massimiliano Pontil, Karim Lounici.

M.Sc. in Artificial Intelligence and Robotics — Nov 2020 – June 2023
University of Tehran — Tehran, Iran

- GPA: 19.49/20 (4.0/4.0). Ranked 2nd in cohort. Courses: ML, RL, DL, Information Theory, Neuroscience Fundamentals, Distributed Optimization, Game Theory.
- Thesis: Investigating the Role of Diversity on Social Bandit Learning

B.Sc. in Mechanical Engineering — Sep 2016 – Sep 2020
University of Tehran — Tehran, Iran

- GPA: 17.34/20 (3.66/4.0). Top 15% of undergraduate students.
- Thesis: Controlling Temperature Using RL in Smart Environments.

PUBLICATIONS & PRE-PRINTS

Symbols: † denotes equal contribution.

1. **E. Mirzaei**, A. Maurer, M. Pontil. *Hot Training Errors Predict Cold Test Errors in the Interpolation Regime*. AXIOM: Foundations of Efficient Deep Learning, NeurIPS 2026 Workshop. [OpenReview]
2. A. Maurer, **E. Mirzaei**, M. Pontil. *Generalization of Gibbs and Langevin Monte Carlo Algorithms in the Interpolation Regime*. ICML, 2026. [arXiv] [Code]
3. G. Turri, G. Pacreau, G. Meanti, T. Devergne, D. Ordonez, **E. Mirzaei**, et al. *kooplearn: A Scikit-Learn Compatible Library of Algorithms for Evolution Operator Learning*. Under Review, 2025. [arXiv] [Code]
4. **E. Mirzaei**, A. Maurer, V. Kostic, M. Pontil. *An Empirical Bernstein Inequality for Dependent Data in Hilbert Spaces and Applications*. AISTATS, 2025. [arXiv] [Code]
5. **E. Mirzaei**, A. Tavakoli, S.P. Shariatpanahi, R. Hosseini, M.N. Ahmadabadi. *Exploiting Expertise of Non-Expert and Diverse Agents in Social Bandit Learning: A Free Energy Approach*. IEEE Transactions on Cognitive and Developmental Systems (IEEE TCDS), 2025. [arXiv] [DOI]
6. H. Ghaemi†, **E. Mirzaei**†, M. Nouri†, S.R. Kheradpisheh. *BioLCNet: Reward-modulated Locally Connected Spiking Neural Networks*. DOL Conference, 2022. [arXiv] [Code]

AWARDS, RECOGNITIONS & MEMBERSHIPS

EMS Membership — Feb 2026 – Present
European Mathematical Society (EMS) — Europe

- Active member supporting the advancement of mathematics and related research across Europe.

INdAM Membership (Real Analysis, Measure Theory & Probability) — Jan 2026
Istituto Nazionale di Alta Matematica (INdAM) — Italy

- National network of mathematical excellence supporting research projects and scientific mobility.

National Graduate Entrance Exam Top Rank Aug 2020
National Organization of Educational Testing Iran

· Ranked 27th (Top 0.1%) nationwide in Computer Science.

Winner of Supporter Foundation of the University of Tehran Scholarship (2×) Oct 2016/17
University of Tehran Tehran, Iran

· Recognized for outstanding academic performance

EXPERIENCE

Teaching Assistant (Comp. Neuroscience & NeuroAI) Part-time contract - Jul 2022, 2025 & 2026
Neuromatch Academy Remote

· Instructed and mentored students through course material and final projects.

Teaching Assistant 2021 – 2022
University of Tehran Tehran, Iran

· Courses: Information Theory, Reinforcement Learning, Distributed Optimization.

Python Instructor (Volunteer) Oct 2022-2025
KaarYar Remote

· A social start-up providing education to underprivileged communities.

Undergraduate Research Assistant Jul 2020 - Sep 2020
School of Mechanical Engineering, University of Tehran Tehran, Iran

SELECTED TALKS & TUTORIALS

Temperature Paths Reveal Generalization in the Interpolation Regime Sep 2026
Mathematics & Efficiency of Deep Learning, ELLIS Reading Group Online

· Presented our ICML 2026 paper, *Generalization of Gibbs and Langevin Monte Carlo Algorithms in the Interpolation Regime*, with Andreas Maurer and Massimiliano Pontil. [Video]

PAC-Bayesian Theory: Four-part Mini-course Aug 2026
Learning Theory Circle Online

· Taught a four-part tutorial on PAC-Bayesian theory. Group page [Video]

Generalization of Gibbs and Langevin Monte Carlo Algorithms in the Interpolation Regime 2026
University of Trieste Trieste, Italy

· Presented the ICML 2026 paper with Andreas Maurer and Massimiliano Pontil.

Learning Dynamical Systems from the Perspective of the Koopman Operator May 2025
Reading Club, University of Genoa Genoa, Italy

· Presented an overview of Koopman-operator methods, including Kostić et al., *Learning Dynamical Systems via Koopman Operator Regression in Reproducing Kernel Hilbert Spaces* (NeurIPS 2022). Meeting page.

SKILLS

Languages	English (C1), Italian (A2), Farsi/Persian (Native)
Programming	Python (PyTorch, Tensorflow, Scikit-Learn), MATLAB, R
Miscellaneous	LaTeX, Git, Slurm (HPC)