Marco Tuccio

Physics of Complex Systems Master of Science

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Work Experience

European Center for Living Technology
Oct 2023

Research Fellow

- Development of a web application for interaction with machine learning models for precision medicine

Donostia International Physics Centre
Nov-Dec 2022

Internship

- Experimental design on testing two-dimensional DNA hybridization.
- Master Thesis literature research and key ideas development.

Education

Master of Science in Physics of Complex Systems
Oct 2020 - Apr 2023

University of Turin — GPA: 4.0 - summa cum laude

- Theoretical focus on mathematical methods for modeling complex systems, especially biological ones. Computational focus on Machine Learning, Agent Based Modeling and Network Science
- Knowledge in Dynamical Systems, Stochastic Processes, Systems Biology, Statistical Mechanics, Machine Learning theory, Information theory, Agent Based Modeling, Molecular Biology, Network Science, Game Theory and Nonlinear Physics.
- Coding projects in Machine Learning and Neural Networks architectures (FNN, CNN, Autoencoders) in Tensorflow and Keras, Agent Based Simulations with the MESA package and Object Oriented Python programming.

Bachelor of Science in Engineering Physics
Sep 2014 - Sep 2020

Polytechnic of Turin

- Electrical Engineering profile with advanced Physics (Quantum, Nuclear and Condensed Matter). Electronics from analog to digital both theory and lab. Introduction to Nanotechnology

Projects

Dimensionality reduction in protocell DNA replication kinetics
Mar 2022 - Apr 2023

Master of Science Thesis

Supervisor: Prof. Steen Rasmussen - *Southern Denmark University and the Santa Fe Institute*

SKILLS: Python, Julia, MATLAB, OOP, DNA Thermodynamics, Physical Chemistry, Polymer Physics, Chemical Kinetics Modeling, Chemical Reaction Networks, literature research, scientific writing.

- Modeling and Simulation of Chemical Reaction Networks applied to non-enzymatic DNA replication.
- Object oriented Python implementation of a kinetic graph based model of DNA hybridization with state-of-the-art performance.

Dendritic architecture for Neural Networks
June-July 2021

Supervisor: Prof. Matteo Osella - *University of Turin*

SKILLS: Python, Object-Oriented Programming, TensorFlow, Keras, Convolutional Neural Networks, neuromorphic computing, scientific writing.

- Custom TensorFlow code for a Feedforward Neural Network (FNN) mimicking neuronal dendritic computation.

Agent based model of an artificial financial market
May 2021 - Jan 2022

Supervisor: Prof. Marco Maggiora - *University of Turin*

SKILLS: Python, MESA ABM framework, Object-Oriented Programming, financial modeling, scientific writing.

- Agent Based Model of a financial market with fundamentalist and technical type traders.
- Web-based interface for simulation monitoring

Food ingredients chemical compounds network
May-June 2021

Supervisor: Prof. Michele Tizzoni - *ISI Foundation*

SKILLS: Python, NetworkX, Gephi, statistical inference.

- Mapping a compounds-ingredient database into a filtered bipartite graph through disparity filtering method.

Volunteering

Main Organiser of EBEC Final round Turin 2019
Jan 2018 - Aug 2019

Board of European Students of Technology

- The European wide final round of the biggest student-organized engineering competition in Europe, hosting 180 participants from every European country.
- Fundraised and handled the intricacies of the 143,000€ budget needed for the event.
- Planned the event's logistics, marketing and fundraising campaigns.
- Led and coordinated the organizing effort of the 23 members of the core team as well as managed the information flow between all the involved organizing parties from the BEST network.
- Managed information flow between organizers and all the stakeholders: Companies, Universities and Media.

Main Organiser of EBEC Turin round 2018
Lug 2017 - Jan 2018

Board of European Students of Technology: Turin chapter

- Coordinated the organising team of the engineering competition that in 2017 hosted more than 400 participants for free at Polytechnic of Turin.
- Collaboration with company stakeholders: Reply and General Electric's AvioAero

Board of European Students of Technology: Turin chapter
Nov 2016 - Jan 2018

Fundraising Coordinator — Turin European Cultural Exchange

- Increased fundraising campaign income by 34% and introduced new company partnerships into our events.

Workshops, Conferences

VI Venice Meeting on Fluctuations in Small Complex Systems, Venice, Italy.
European Center for Living Technology - Internal Project Group Meeting, Venice, Italy.
European Center for Living Technology - WIVACE 2023, Venice, Italy.
Poster presenter: Origins of Life Donostia Meeting 2023 - San Sebastian, Spain.
Symposium on intelligence: natural, artificial and synthetic - Barcelona, Spain

Skills

Programming Languages

Python: Expert
Libraries: TensorFlow, Keras, NumPy, Pandas, SciKit-learn, NetworkX, MESA, Nupack, SciPy, Juliacall, Plotly, Matplotlib, Itertools

Julia: Advanced

MATLAB: Advanced

C++: Basic

Skills

Python, Julia, Object-Oriented Programming (OOP), Advanced Statistics, Machine Learning, TensorFlow, SciKit-Learn, Pandas, Numpy, Feed-Forward Neural Nerworks, Convolutional Neural Networks, Autoencoders, Microsoft Excel, Linux system administration

Theoretical Knowledge

Machine Learning Theory, Stochastic Processes, Statistical Mechanics, Chemical Reaction Networks, Physical Chemistry, Game Theory, Graph Theory, Molecular Biology, Systems Biology, Network science, modeling, scientific writing

Personal skills

Thanks to the volunteering projects I've been involved I've gained experience in Project Management, Team Leadership and Teamwork. Moreover I've refined my Public Speaking skills, learned how to fund-raise and write grants.

Languages

Italian: *Native*
English: *Fluent*
Spanish: *Basic*