Mario Román

Mathematics and Computer Science student

Contact

Mario Román García
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Languages

Spanish, English, Italian

Programming

Experience in **Haskell**, the proof assistants **Agda** and **Coq**, and imperative programming in **C++**.

Software

Technical knowledge of **Gnu/Linux**. Experienced user of **Emacs** and **LaTeX**.

Education

2018-2019 MSc. Mathematics and Founds. of Computer Science — University of Oxford

Candidate. Expected graduation in September 2019.

- Categories, Proofs and Processes
- Homological Algebra
- Quantum Computer Science

2013-2018 Bachelor degree in **Mathematics** — University of Granada

Emphasis in abstract algebra. Grade Point Average: 9.55/10.

- Calculus
- Geometry, linear algebra
- Numerical methods
- Probability
- Algebra
- Analysis and measure theory
- Topology
- Non-euclidean geometry
- Algebraic topology
- Galois theory
- Mathematical modelling
- Statistical inference
- Curves and surfaces
- Differential equations
- Number theory, criptography
- Computational algebra
- Modern algebra
- Logic, discrete mathematics

2013-2018 Bachelor degree in **Computer Science** — University of Granada

Emphasis in computation. Grade Point Average: 9.35/10

- C++ Programming
- System administration
- Electronics
- Computer architecture
- Operative systems
- Algorithms
- Data structures
- Object-oriented programming
- Computability theory
- Automata and languages
- Software engineering
- Information theory
- Functional programming
- Databases
- Computer graphics
- Artificial intelligence
- Metaheuristics
- Advanced functional prog.

2015-2018 **Courses and conferences**

Attended:

- CAP Days - Siegen, on computable homological algebra and categories.
- School on Univalent Mathematics - Birmingham, on Univalent foundations.
- EUTypes Summer School, on Homotopy type theory, Agda and Coq.
- Seminar on Affine group schemes, Hopf algebras and algebroids.
- ESSLLI-Barcelona, on Logic, Languages and Computation.
- Lambda World, on functional programming.
- OrientaMat - LaTeX course, volunteering as *teaching assistant*.

2008-2012 **Estalmat** — University of Granada, Spain

A project to detect and stimulate the precocious mathematical talent.

Mathematics

2017-2018 **Category theory and λ-calculus** — Bachelor's thesis

Advisor: Prof. Pedro A. García-Sánchez.

Bachelor thesis on the relationship between type theories and categorical logic. Martin-Löf type theories are regarded as the internal language of locally closed cartesian categories and presented as a foundation of mathematics. Agda and Coq are used to prove theorems in Homotopy type theory.

2016-2017 **Koszul pairs and their applications** — unpublished

Research grant. Working with the Algebra Department on Homology theory from a categorical perspective.

Computer science projects

2016-Now **Mikrokosmos** github.com/mroman42/mikrokosmos
Hackage: hackage.haskell.org/package/mikrokosmos
An didactic free software λ-calculus interpreter written in Haskell supporting multiple evaluation strategies and exemplifying the Curry-Howard isomorphism.

2014-2015 **GranaSAT Client** github.com/mroman42/granasatClient
Git repository: github.com/mroman42/granasatClient
Software for a satellite student experiment for the European Space Agency BEXUS campaign.

A complete portfolio can be found at mroman42.github.io.

Publications

2018 **Mikrokosmos: an educational lambda calculus interpreter**
Mario Román
(Submitted for publication)

2016 **A comparison of implementations of basic evolutionary algorithm operations in different languages**
J.J. Merelo-Guervós, I. Blancas, P. Castillo, G. Romero, V. Rivas, M. García-Valdez, A. Hernández-Aguila, M. Román.
DOI: 10.1109/CEC.2016.7743980
Conference: IEEE Congress on Evolutionary Computation (CEC)

Awards and Grants

2017-2018 **Collaboration Grant** Algebra department, University of Granada
By virtue of which I can develop my **bachelor's thesis**, I administer the deparment servers and I develop **didactic material** and assist in the teaching of the course **"Logic and Programming"**.

2015-2016 **Erasmus+ Grant** University of Milan
Exchange student at the University of Milan for a year. Studying at the department of computer science.

2012–2013 **International Mathematical Olympiad (IMO)** Argentina
National *Gold & Silver Medals* and international *Honourable mention*.

Interests

I am passionate about **category theory**, **abstract algebra**, **logic** and their applications to functional programming and proof assistants. Since I started programming with dependently typed languages such as Coq and Agda, I have become increasingly more interested in type-theoretical foundations of mathematics, categorical logic and topos theory.

I am actively involved in the **divulgation of mathematics** and computer science at a universitary level. I weekly organize mathematics and computer-science talks at my university; where I have been able to develop teaching skills and a deeper understanding of mathematics.

2014–Now **LibreIM** libreim.github.io/
Founder and coordinator of a community of Math&CS students. I am the main contributor to our blog and the organizer of weekly seminars where I have organized seminars about Haskell, Category theory and Constructive mathematics, among other topics.