

Bernat Guillen Pegueroles

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Born: December 31, 1989—Barcelona, Spain
Languages: Spanish (native), Catalan (native), English (fluent), German (working)

Areas of specialization

Interpolation and approximation theory • Numerical Analysis • Algorithms • Data analysis

Education

2014–now

Ph.D. student, Applied Mathematics (GPA:4.0). Advisor: Charles Fefferman
Princeton University, Princeton, NJ
First two years partially supported by Fulbright-Telefonica Scholarship

Relevant coursework:

- Software Engineering for Scientific Computing
- Numerical Algorithms for Scientific Computing
- Systems for Data-centric Computing
- Introduction to PDE
- Topics in Analysis (Interpolation and Approximation)
- Topics in Analysis (Metric Embeddings and Geometric Analysis)

Relevant activities:

- SIFP² Graduate Fellow, mentoring first generation, low income students in Princeton University.
- GSG³ Secretary 2017-2018. Started the Graduate Student Center and spearheaded several projects.
- University Administrative Fellow. Performed Data Analysis on MOOC and Blended course implementation. Developed professional development program for Career Services at Princeton.
- ReMatch mentor. Mentored freshman student on a project about pattern formation, PDEs and data analysis.

¹Program in Applied and Computational Mathematics

²Scholars Institute Fellows Program

³Graduate Student Government

- 2007-2012 **Licentiate degree (BSc+MSc)**, Applied Mathematics
UPC⁴, Barcelona, Spain
- 2007-2013 **Engineer's degree (BSc+MSc)**, Telecommunication Engineering
UPC, Barcelona, Spain
Both degrees as a dual degree managed by CFIS⁵, an excellence program in UPC which requires an entry exam. I was awarded a scholarship (tuition) for being one of the TOP5 in that exam.
- Summer 2011 MBA Summer School
IESE, Barcelona, Spain
Scholarship awarded by CFIS
- Summer 2008 Summer Institute for Outstanding European Students
Bentley College, Waltham, MA
Scholarship awarded by the Fulbright Commission in Spain

Research Experience

- 2015-now Advisors: [Charles L. Fefferman](#), [Simon Levin](#).
Princeton University, PACM
Smooth Selection Problem and Applications: Improvement of algorithms for the Smooth Selection Problem (interpolation with restrictions); applications to shape space analysis of influenza genome strands. Simulations and study of pattern formation and co-evolution in parasite-host and predator-prey models.
- Summer 2017 Mentor: [Kush Varshney](#).
Data Science for Social Good Fellowship. IBM, Watson Research Center.
Developed methods for Causal Inference in Time-Series data. Implemented algorithms created within a team of researchers in the Data Science for Social Good Fellowship. Lead project and conversations with the Pardee Center for International Futures.
- 2015 Advisor: [Sergiu Klainerman](#).
Princeton University, PACM
Study of Einstein's equations in vacuum and viability of numerical methods to simulate the formation of trapped surfaces in vacuum.
- 2014-2015 Advisor: [Phillip Holmes](#).
Princeton University, PACM
Mathematical Neuroscience; study of dynamical systems reproducing the behavior of neurons and synapses in insects.
- 2013-2014 **Research Assistant**, advisors: [Modesto Orozco](#), [Oscar Flores](#).
IRB, Molecular Modeling and Bioinformatics
Applied biostatistics and computational genomics techniques to study physical properties of DNA and nucleosome positioning. Assisted in developing `nucleR`.
- 2012-2013 Advisors: [Xavier Hesselbach](#), [Xavier Munoz](#), [Sonja Klingert](#).
Universitat Politècnica de Catalunya (UPC), Networks Engineering Department, Mathematics Department
Mannheim Universität, Chair of Software Engineering
Energy and Carbon emissions aware service allocation for Data Centers based on the Dynamic Bin Packing Problem
10/10 with Honors. Stay in Mannheim Universität supported by Erasmus and CFIS scholarships. Project in the field of [All4Green FP7 EU project](#).
- 2011-2012 Advisors: [Jordi Forne](#), [David Rebollo-Monedero](#).

⁴Universitat Politècnica de Catalunya

⁵Center for Interdisciplinary Superior Education

Universitat Politècnica de Catalunya, Networks Engineering Department

Research on data privacy and k-anonymity: " π -likely k-anonymity".

Summer 2011

Advisor: [Antonio Acin](#).

Photonic Sciences Institute, Quantum Information Theory group, Castelldefels, Spain.

Study of SDP techniques for the problem of Mutually Unbiased Bases in C^6 .

Coding Projects & Experience

Most used: C, C++, Python, Java, MATLAB, Perl, R, Julia, MPI, openMP. [Github](#), [Bitbucket](#)

2015

[MPImap](#), MapReduce implementation on C/MPI for analyzing fault tolerance and performance. Final project (group project) for the course "Systems for Data-Centric computing".

2015

[dG_project](#), implementation of nodal discontinuous Galerkin methods for solving PDE. Final project for the course "Numerical Algorithms for Scientific Computing". Advisor: James Stone

2014

[ADMM-4-block](#), conic programming solver with 4 blocks of restrictions. Final project for the course "Software Engineering for Scientific Computing".

2013

Assisted in developing [nuc1eR](#), a bioconductor package used for nucleosome coverage analysis in DNA sequences.

Research consulting experience

2016

Working with [GlassFrog](#) on developing a methodology for the study of impact of education programs when the data is clustered/hierarchical. Applying Propensity Score Matching models to multilevel/clustered data.

2016-2017

Developed a Machine Learning approach with Tensorflow to forecasting school dropout in the Dominican Republic in collaboration with J-PAL.

Grants, honors & awards

2014-2016

Fulbright-Telefonica Scholarship for Advanced Studies.

2007-2013

CFIS grant for double degree in Mathematics and Telecommunication Engineering studies.

2011

ETSETB-Everis prize for best academic transcript in the double degree program (first cycle).

2008

ETSETB-Everis prize for best academic transcript in the double degree program (first year).

Teaching Experience

Summer 2017

ReMatch Graduate Mentor, Princeton University.

Mentored freshman on a project about the impact of domain geometrical and topological properties on the solutions of a reaction-diffusion equation.

Fall 2016

Assistant Instructor, Princeton University. Software Engineering for Scientific Computing. Instructor: James Stone.

Grading assignments and managing projects done in groups of 4-5 Graduate or Senior Undergraduate Students in Software Engineering for Scientific Computing.

Spring 2016

Assistant Instructor, Princeton University. Math Alive. Instructors: Ian Griffiths (Oxford Uni.), Adam Marcus.

Grading assignments and holding office hours for the course Math Alive, an introduction to the different applications of mathematics to real-world problems.

- Fall 2015 **Assistant Instructor, Princeton University.** Numerical Analysis. Instructor: Javier Gomez-Serrano. *Grading assignments, projects and exams as well as holding office hours and giving a lecture for the course Numerical Analysis.*
- 2010-2011 **Tutor, UPC** Tutoring seniors in high school, helping with their research projects in Applied Security and Wi-fi auditories.
- 2011-2012 **Mentor CFIS, UPC** Mentoring freshmen in CFIS.
- 2005-2013 Private tutoring.

Publications & talks

MSc Thesis

- 2013 Energy and Carbon emissions aware service allocation for Data Centers based on the Dynamic Bin Packing Problem

Conference Articles

- 2013 Energy and Carbon Emissions Aware Services Allocation with Delay for Data Centers, *JITEL 2013*

Activities & Interests

Classical and jazz clarinet. Taekwondo.

EUCCOP, IEEE student branch. Participated in several IETF projects.

Organized several education outreach programs for underprivileged children in my hometown.