Alessio Santamaria

Curriculum Vitæ

Department of Informatics
University of Sussex
Falmer, Brighton, BN1 9QJ

A PhD in Computer Science with a solid research background and teaching experience. I intend pursuing an academic career that involves a strong component of research and teaching.

Education

2015–2019 **PhD in Computer Science**, *University of Bath*.
Thesis: *Towards a Godement Calculus for Dinatural Transformations*, examined by Prof Alex Simpson and Dr Willem Heijltjes. The main contribution is to provide a solution for the compositionality problem of dinatural transformations. Supervisors: Prof Guy McCusker, Dr Alessio Guglielmi.

2013–2015 **Master's Degree (Laurea Magistrale) in Mathematics**, *Università di Genova*, grade 110/110 cum laude.
Dissertation: *Frames and Equilogical Spaces*. A research dissertation about showing how Frames are algebras for Equilogical Spaces via a Stone Duality-like theorem. Supervisor Prof Giuseppe Rosolini.

2010–2013 **Bachelor's Degree (Laurea) in Mathematics**, *Università di Genova*.
Dissertation: *Borel and Lebesgue σ-algebras*. Supervisor Prof Giancarlo Mauceri.

Awards and funding

2021 **Best paper award**, *FoSSaCS 2021*.
We were invited to submit a journal version of our article to a special issue of Logical Methods in Computer Science devoted to the best FoSSaCS papers.

Apr 2019 **Postgraduate Teacher of the Year Award**, *University of Bath*.
Apr 2018 The Award is given by the University of Bath Students' Union every year since 2018. Quotes from the nominations include: "Alessio goes out of his way to explain each concept that students must learn, providing multiple examples and ensuring that students understand before moving on" and "Without his astounding tutorials, I doubt I could have understood half of the course materials I do now".

2015–2019 **University Research Studentship Award (URSA)**, *University of Bath*.
The University's studentship funded my PhD for 3.5 years, paying all fees, providing a training support fund and a living allowance.

Research experience

My research focuses on the study of algebraic structures arising from the semantics of programming languages.

Employment history

Jan 2023– **Lecturer in Computer Science**, *University of Sussex*, Brighton, UK.
I am part of the Foundations of Software Systems group.

Mar 2020– **Assegnista di Ricerca**, *Università di Pisa*, Italy.
Jan 2023 Part of the Analysis for Program Analyses project (PRIN 2017), under the lead of Prof Filippo Bonchi. We developed a novel graphical language for freely generated bimonoidal categories. Previously I worked on algebraic approaches to categorical logic; I also studied categorical tools for the semantics of automata with non-determinism and quantitative features and possible connections between coinduction up-to techniques and abstract interpretation.

Aug 2019– **Postdoctoral Research Assistant**, *Queen Mary, University of London*.
Feb 2020 Part of the Interface Reasoning for Interactive Systems project (`https://gow.epsrc.ukri.org/NGBOViewGrant.aspx?GrantRef=EP/R006865/1`), under the lead of Prof Edmund Robinson. We described different kinds of bisimulations of transition systems as instances of logical relations.

Publications

- Goncharov, S., Santamaria, A., Schröder, L., Tsampas, S. and Urbat, H., 2024. *Logical Predicates in Higher-Order Mathematical Operational Semantics*. Foundations of Software Science and Computation Structures (FoSSaCS 2024).
- Bonchi, F., Di Giorgio, A. and Santamaria, A., 2023. *Deconstructing the Calculus of Relations with Tape Diagrams*, Proceedings of the ACM on Programming Languages, Volume 7, Issue POPL.
- Bonchi, F. and Santamaria, A., 2022. *Convexity via Weak Distributive Laws*. Logical Methods in Computer Science, Volume 18, Issue 4 (special issue devoted to the best FoSSaCS 2021 papers).
- Hermida, C., Reddy, U., Robinson, E. and Santamaria, A., 2022. *Bisimulation as a Logical Relation*. Mathematical Structures in Computer Science, Volume 32, Special Issue 4: The Power Festschrift.
- Bonchi, F., Seeber, J., Sobocinski, P. and Santamaria, A., 2021. *On Doctrines and Cartesian Bicategories*. 9th Conference on Algebra and Coalgebra in Computer Science (CALCO 2021).
- Bonchi, F. and Santamaria, A., 2021. *Combining Semilattices and Semimodules*. 24th International Conference in Foundations of Software Science and Computation Structures (FoSSaCS 2021).
- McCusker, G. and Santamaria, A., 2021. *Composing Dinatural Transformations: Towards a Calculus of Substitution*. Journal of Pure and Applied Algebra 225 (10). Extract from my PhD thesis, with enhancements of some results.
- Santamaria, A., 2019. *Towards a Godement Calculus for Dinatural Transformations*. University of Bath, PhD thesis.
- Frosoni, G., Rosolini, G. and Santamaria, A., 2019. *Frames and Topological Algebras for a Double-Power Monad*. Journal of Logic and Analysis 11. Part of this paper is an extract of my Master's dissertation.
- McCusker, G. and Santamaria, A., 2018. *On Compositionality of Dinatural Transformations.*

27th EACSL Annual Conference on Computer Science Logic (CSL 2018).

Conferences and presentations

June 2024 FoSS seminar, Sussex (presented)
July 2023 CT2023 conference, Louvain-la-Neuve, Belgium (poster presented)
Jan 2023 POPL 2023 conference, Boston, USA (attended, with article contribution)
Sep 2021 CALCO 2021 conference, Salzburg, Austria (presented)
Mar 2021 FOSSACS 2021 conference, online (presented)
Jul 2020 ItaCaFest, online (presented)
Oct 2019 Theory Group seminar, Pisa, Italy (presented)
Jul 2019 Category Theory 2019 conference (CT2019), Edinburgh (presented)
May 2019 Theory Group seminar, Pisa, Italy (presented)
Jan 2019 Theory Group seminar at Queen Mary University, London (presented)
Sep 2018 CSL2018 conference, Birmingham (presented)
Mar 2018 Compositional Methods for Network Diagrams and Component-Based Systems workshop, Barbados (presented)
Oct 2017 Theory and Applications of Categories seminar, Genoa, Italy (presented)
Sep 2017 First Workshop on String Diagrams in Computation, Logic, and Physics (STRING2017), Oxford (presented)
Jun 2016 Oregon Programming Languages Summer School, Eugene, USA (attended)
May 2016 Proof, Computation and Complexity workshop 2016, Munich (presented)

Teaching experience

2023– **Lecturer (Assistant Professor)**, *University of Sussex*.
- Data Structures and Algorithms (1st year BSc, 275 students, sole convenor)
- Topics in Computer Science (MSc, 55 students, part of team of convenors)
- Databases (2nd year BSc, 364 students, co-convenor)

2021 **Foundations of Computing Lecturer**, *University of Pisa*.
I replaced the main lecturer for thirty hours in his 1st year Computer Science unit. Lectures were both online and in person addressing about 120 students.

2016–2019 **Teaching Assistant**, *University of Bath*.
- Delivering small-class tutorials and labs six hours per week in the following units in Computer Science:
  - Discrete Mathematics for Computation (1st year)
  - Analytical Mathematics for Applications (1st year)
  - Principles of Programming 1 (1st year)
  - Functional Programming (2nd year)
- Running on occasion one-to-one tutorials with students needing specific help
- Marking coursework in all the units above

Administrative experience

2018–2019 **Departmental Seminars organiser**.

Part of the organising committee of the internal departmental seminars in Computer Science at the University of Bath. That year we revamped the seminars by running them fortnightly on a fixed schedule, which involves all the PGR students in Computer Science giving a talk to the whole department.

2017–2018 **Departmental Doctoral Students Conference organiser**.

Part of the organising committee of the annual internal postgraduate research students conference BCCS (Bath Conference in Computer Science).

2017–2018 **Mathematical Foundations Seminar organiser**.

I organised the seminars for my research group, Mathematical Foundations, in the department. They happen weekly and involve both students and staff, including external speakers.