Sergio Maciel

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▬▬▬ Education

2021-current	**Bachelor's degree in mathematics**, *University of São Paulo*, Brazil.
2023-2	**Exchange Program**, *Australian National University*, Australia.

▬▬▬ Written work

Published

2022 **Hilbert's third problem and Dehn invariants**, Annals of the X Biennal of Mathematics of the Brazilian Mathematical Society.
- ○ in portuguese;
- ○ how Dehn solved Hibert's third problem and the current state of the generalized versions;
- ○ avaiable here.

Other work

2023 **A quick note on cohomology of (quasi)coherent sheaves and Serre's criterion for affiness.**
- ○ an almost self-contained proof of Serre's affiness criterion for schemes;
- ○ available here.

2023 **The stable and unstable homotopy theory of spectra.**
- ○ the construction and properties of the strict and stable model structures in the category of spectra;
- ○ available here.

2023 **Elliptic cohomology, genera and the index of Dirac operators in loop spaces.**
- ○ the relation between elliptic cohomology and the Atiyah-Singer index theorem as well as some motivation for topological modular forms;
- ○ for a course on Index theory at the Australian National University;
- ○ available here.

2022 **The underlying infinity category of a model category.**
- ○ how an ∞-category arises from a model category and how they describe the same homotopy theory;
- ○ available here.

2022 **A crash introduction to the Conley index.**
- ○ a fast dive into the Conley index theory, outlining the most important results and some ways they are used;
- ○ available here.

▬▬▬ Research projects

Fev 2024 - current	**Universality for the Maurer-Cartan equation in Lie algebroids and differentiable stacks**

Research aiming to extend the Maurer-Cartan form and its classical universality properties to higher Lie theory.
Granted CNPQ 118633/2023-6.

Jul 2023 - Dec 2023	**Topological Hochschild and Cyclic homology.** A directed reading project on Nikolaus-Scholze's cyclic homology paper and some other sources.
Out 2023 - Dec 2023	**Cohomology of coherent and quasi-coherent sheaves.** A directed reading project on quasi-coherent sheaves and their cohomology. A project from the *twoples* program.
Aug 2022 - Aug 2023	**Simplicial and dendroidal homotopy theory.** Directed reading project on the homotopy theory of simplicial sets, ∞-categories and operads
Sep 2022 - Dec 2022	**The underlying infinity category of a model category.** A directed reading project on the construction of the infinity category associated to a model category. A project from the *twoples* program.
Aug 2021 - Aug 2022	**Topological methods in dynamics: the Conley index.** Directed reading project on the theory of the Conley index for dynamical systems and the relation with the index for operators in Hilbert spaces.
Apr 2021 - Sep 2021	**Axis-symmetric solutions to Poisson equation.** Undergraduate research project from the PIC-ON program on solutions for the Poisson equation with axial symmetry.

▬▬▬ Talks

Conference talks

2024	**Topological Hochschild and cyclic homology for K-theory.** VII Colloquium of the Center-East region.
2022	**Hilbert's third problem and Dehn invariants.** X Biennal of Mathematics of the Brazilian Mathematical Society.
2022	**Topological methods in dynamical systems: the Conley index.** International Symposium of the University of São Paulo.

Other talks

2023	**Cobordism and why we generalize things**, *S4 seminars group.* Institute of Mathematics and Statistics, University of São Paulo.
2023	**Vector fields and the hairy ball theorem**, *S4 seminars group.* Institute of Mathematics and Statistics, University of São Paulo.
2022	**Groups, tilings and a theorem**, *S4 seminars group.* Institute of Mathematics and Statistics, University of São Paulo.
2021	**Qualitative theory of differential equations**, *S4 seminars group.* Institute of Mathematics and Statistics, University of São Paulo.

▬▬▬ Teaching

2024-1	**Teaching assistant**, *Algebraic Topology.* University of São Paulo.
2023-1	**Teaching assistant**, *Calculus I for Physics.* University of São Paulo.

2019	**Teaching assistant**, *Physics I.*
	Federal Institute of Santa Catarina.

Grants and awards

Aug 2023 - current	**Undergraduate research Fellowship.**
	CNPQ 118633/2023-6.
Aug 2022 - Aug 2023	**Undergraduate research Fellowship.**
	CNPQ 117105/2022-8.
2022	**Third prize**, *International mathematics competition for undergraduate students (IMC).*
Aug 2021 - Aug 2022	**Undergraduate research Fellowship.**
	CNPQ 118747/2021-5.
2019	**Junior research Fellowship.**
	Pic-jr, CNPQ.
2018	**Junior research Fellowship.**
	Pic-jr, CNPQ.

Related courses

2024-1	**Relative homological algebra**
	Graduate level course at the University of São Paulo.
2024	**Topics in algebraic geometry: rationality problems.**
	Ph.D. level summer course at the Instituto de Matemática Pura e Aplicada (IMPA).
2023-1	**Triangulated categories and Bridgeland stability.**
	Graduate level course at the University of São Paulo.
2023	**Diferential topology.**
	Ph.D. level summer course at the Instituto de Matemática Pura e Aplicada (IMPA).
2023	**Homology and Cohomology.**
	Graduate spring course from the electronic Computational Homotopy Theory (eCHT).
2021	**Real analysis.**
	Summer course at the Federal University of Rio de Janeiro (UFRJ).

Other activities

Sep 2023 - Dec 2023	**Algebraic vector bundles reading seminar.**
	eCHT's reading group in algebraic vector bundles.
2023-1	**Cyclic (co)homology reading group.**
	A reading group on cyclic (co)homology and its applications to both algebra and geometry.
2022-current	**S4 seminars group**, *Organizer.*
	A student-run seminar group aiming to present mathematical topics in an accessible way.