# 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 the affiness criterion;
- available here.

2023 **The stable and unstable homotopy theory of spectra.**

- what are the strict and stable model structures in the category of spectra and their relation;
- available here.

2023 **Elliptic cohomology, genera and the index of Dirac operators in loop spaces.**

- for a course on Index theory at the Australian National University;
- available here.

2022 **The underlying infinity category of a model category.**

- how an $\infty$-category arises from a model category, describing the same homotopy theory;
- available here.

2022 **A crash introduction to the Conley index.**

- a fast dive into the Conley index theory;
- available here.

## Research projects

Jul 2023 - Dec 2023 **Topological Hochschild and Cyclic homology.**
An oriented reading project on Nikolaus-Scholze's cyclic homology paper.

Out 2023 - Dec 2023 **Cohomology of coherent and quasi-coherent sheaves.**
A project from the *twoples* program.

Aug 2022 - Aug 2023 **Simplicial and dendroidal homotopy theory.**
Granted CNPQ:117105/2022-8.

Sep 2022 - Dec 2022 **The underlying infinity category of a model category.**
A project from the *twoples* program.

Aug 2021 - Aug 2022 **Topological methods in dynamics: the Conley index.**
Granted CNPQ:118747/2021-5.

Apr 2021 - Sep 2021 **Axis-symmetric solutions to Poisson equation.**
Research project from the PIC-ON program.

## Talks

### Conference talks

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

2023 **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 **Research grant.**
CNPQ 118633/2023-6.

Aug 2022 - Aug 2023 **Research grant.**
CNPQ 117105/2022-8.

2022 **Third prize**, *International mathematics competition for undergraduate students (IMC).*

Aug 2021 - Aug 2022 **Research grant.**
CNPQ 118747/2021-5.

2019 **Junior research grant.**
Pic-jr, CNPQ.

2018 **Junior research grant.**
Pic-jr, CNPQ.

## Related courses

2024 **Topics in algebraic geometry: rationality problems.**
Ph.D. level 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 - current **Algebraic vector bundles reading seminar.**
eCHT's reading seminars in algebraic vector bundles.

2023-1 **Cyclic (co)homology reading group.**
A reading group on cyclic (co)homology and its appearances in algebra and geometry.

2022-current **S4 seminars group**, *Organizer.*
A student-run seminar group aiming to present mathematical topics in an accessible way.