Patrick Da Silva

Curriculum Vitae

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Diplomas

2016 - now **PhD**, *Freie Universität Berlin*, to be completed..
- Topic : Algebraic group actions on toric varieties
- Supervisor : Prof. Dr. Klaus Altmann

2013 - 2016 **Masters Degree**, *Humboldt-Universität zu Berlin.*
- Thesis title : Geometric properties of degeneracy loci of morphisms of vector bundles
- Supervisor : Prof. Dr. Gavril Farkas (https://www.mathematik.hu-berlin.de/~farkas/)

2010 - 2013 **Bachelor Degree**, *Université de Montréal, Québec, Canada, GPA : 4.3/4.3* .
- Graduate courses : Measure Theory, Functional Analysis, Probability Theory, Representation Theory, Elliptic Curves and Modular Forms.

2008 - 2010 **College Degree (CÉGEP)**, *Cégep de Saint-Laurent, Québec, Canada.*
- Attended 2 undergraduate courses (Analysis 1 - MAT1000 with Dr. Michel Delfour, Analysis 3 - MAT2100 with Dr. Marlène Frigon) before registering at the university these are first and fourth semester courses, respectively. CÉGEP is a diploma between high school and university required in Québec to attend university.

Research and internships

October 2015 - September 2018 **FQRNT scholarship**, *Advisor : Prof. Dr. Klaus Altmann*, http://www.math.fu-berlin.de/altmann/, Scholarship amount : 64500$ CAN.
- Canadian graduate scholarship given to a Quebec student for the three-year duration of a PhD program.
- BMS Student Phase II during that period.

October 2013 - September 2015 **FRQNT scholarship**, *Advisor : Dr. Angela Ortega*, http://www2.mathematik.hu-berlin.de/~ortega/, Scholarship amount : 30000$ CAN.
- Canadian graduate scholarship given to a Quebec student for the two-year duration of a Master program.
- BMS Student Phase I during that period.

September 2012 **Research in graph theory**, *Advisor : Dr. Jason I. Brown*, http://www.mathstat.dal.ca/~brown/.
- Domination polynomials over cyclic and path graphs.

May 2012 - August 2012 **NSERC scholarship**, *Advisor : Dr. Andrew Granville*, http://www.dms.umontreal.ca/~andrew/, Scholarship amount : 5,625$.
- Iteration of polynomials with rational coefficients over number fields.
- Number-theoretic generalization of the factorial function by Manjul Bhargava.

May 2011 - August 2011 **NSERC scholarship**,
Advisor : Dr. Andrew Granville, http://www.dms.umontreal.ca/~andrew/, Scholarship amount : 5,625$.

- Study of elementary number theory and problem on factorization of polynomials in $(\mathbb{Z}/p^n\mathbb{Z})[x]$. It is well-known that a monic polynomial of degree p which vanishes at every integer $\pmod p$ splits modulo p ; I proved that a monic polynomial of degree $2p$ which vanishes at every integer $\pmod{p^2}$ splits modulo p^2.

May 2010 - August 2010 **Summer Research Project**,
Advisor : Dr. Michel Delfour, http://dms.umontreal.ca/~delfour/.

- Study of various optimization techniques in $\mathbb{R}^n$: convexity methods, semi-differentials and derivatives (Gâteaux, Fréchet, Dini), subdifferentials, gradient descent, conjugate gradient method, Fletcher-Powell method, Lagrange multipliers, Karush-Kuhn-Tucker conditions, etc.

Awards and distinctions

May 2013 **Médaille du Gouverneur Géneral du Canada**.
"Lord Dufferin, third Canada governor general since the Confederation, created the Academic Medal in 1873 to promote excellence in academia across the country. Over the years, it became the most prestigious award that a (canadian) student attending an academical establishment could obtain." (Translated from French, http://www.gg.ca/document.aspx?lan=fra&id=15008)

December 2011 **William Lowell Putnam Competition 2011**, *Result : 31/120, Rank : 111^{th}*.

Conferences

Winter 2016/17 **Seminar on Toric Varieties**, *FU Berlin, Germany*.

- Weekly seminar held by Prof. Dr. Klaus Altmann on various topics surrounding toric varieties.
- I held three two-hour sessions entitled "Introduction to Root systems in Lie algebras".

Summer 2016 **Seminar on Geometric Invariant Theory (GIT)**, *FU Berlin, Germany*.

- Exploration of the link between toric geometry and GIT.

October 16th, 2015 **What is? Seminar**, *Berlin, Germany*, Introduction to Representation theory.

- The What is? seminar has the objective of introducing the BMS students to different areas of mathematics which are discussed during the BMS Fridays, held directly after. The talk is available online here : https://vimeo.com/148783696.

August 2015 **Recent advances in algebraic and arithmetic geometry**, *Siena, Italy*.
Summer school of the research training group "Moduli and automorphic forms"

October 2013 - January 2014 **Seminar on FI-modules**, *Będlewo, Poland*, Organisers : Prof. Dr. Gavril Farkas, Prof. Dr. Holger Reich.

- Group of 25 students reunited to study a recent paper of Thomas Church, Jordan S. Ellenberg and Benson Farb on the representation theory of the symmetric group. Talks were separated among the students in Berlin and held in Będlewo with the participation of the Institute of Mathematics of the Polish Academy of Sciences and their research group. I gave a talk on the categorical properties of FI-modules.

Summer 2012 **Canadian Undergraduate Mathematical Conference**, *Kelowna, British Columbia*, Manjul Bhargava's factorial function.

- I found a new proof of a theorem in M. Bhargava's paper which motivated this talk. The basic theorems and proofs (together with mine) concerning M. Bhargava's generalized factorial function were explained.

Summer 2011 **Canadian Undergraduate Mathematical Conference**, *Quebec City, Quebec*, Straightedge-and-compass constructions and field theory.

- Proofs of the impossibility of the trissection of an angle, duplication of the cube and circle quadrature using field theory. It is a short introduction to field theory so that people with a linear algebra background can understand.

Teaching & Academic Work

November 2016 **Mathematics translator for MATHEON**, *MATHEON Research Center*, Employer : Rico Berner, https://www.matheon.de/.

Translation of the annual MATHEON Christmas calendar from German to English. The MATHEON Christmas calendar consists of one math exercise per day for each day of December preceding Christmas, for a total of 24 exercises.

Winter 2016 **Teaching assistant (Lehrbeauftragter)**, *TU Berlin, Analysis I für Ingenieure*, Professor : Christian Mehl, http://page.math.tu-berlin.de/~mehl/.

- Introduction to elementary calculus for engineering : basic arithmetic and analysis, differential and integral calculus, decomposition of functions into Fourier series.

Winter 2013 **Teaching assistant**, *Université de Montréal, MAT2100 - Analysis III*, Professor : Michel Delfour, delfour@dms.umontreal.ca.

- This is a third course in mathematical analysis for undergraduate students in analysis (metric spaces, normed spaces, L^p spaces, etc.). The teaching assistant solves exercises in weekly two-hour classes for students and participates in grading exams.

Autumn 2012 **Teaching assistant**, *Université de Montréal, MAT1600 - Linear Algebra*, Professor : Yvan Saint-Aubin, saint@dms.umontreal.ca.

- This is a first-year course for undergraduate students in linear algebra. The teaching assisants solve exercises in weekly two-hour classes for students and participate in grading exams.

2011 - now **Active member on math.stackexchange.com**, *User ID : Patrick Da Silva*.

- MathStackExchange is a website where users create an account for free, can post questions on the public wall, browse questions, discuss them in comments sections and answer questions. Users award reputation points to questions/answers they consider relevant. Active user for over three years with 28000 reputation points.

2010 - 2011 **Tutoring for athletes**, *Université de Montréal*.

- The sports center of Université de Montréal (CEPSUM) hires tutors for elite athletes on the university sports teams (usually because they travel and train a lot).

Scientific event organization

February 2015 **Participant at the BMS Math Slam**, *BMS*.

- Gave a 7-minute talk introducing the monster group as the automorphism group of the Leech lattice (the goal was to do it fast in a way people can still appreciate).

2011-2012 **Co-organization of UdeM Math Club**, *Université de Montréal*.

- Involves contacting teachers to present talks, organizing the schedule, updating website and Facebook page calendars, etc. The UdeM Math Club organizes weekly talks during lunch about mathematics. It is a perfect opportunity to learn more about theory, history and applications of mathematics. The talks are usually accessible for an undergraduate student, but everyone is invited and admission is free.

Computing skills

Typesetting : Using LaTeX with eight years of experience.

Mathematical tools : Mathematica, MATLAB, Sage

Coding : C, C++, python, R

See my GitHub page (http://github.com/Patrick-DS/) for examples of neural networks that I coded.

Languages

Languages mastered

- German, fluent
- English, fluent
- French, native language
- Danish, Level : B2
- Spanish, Level : B1
- Portuguese, Level : B1