Laryssa Abdala

Personal Information

Institution:	University of North Carolina, Chapel Hill
Subdivision:	Department of Mathematics
Office:	Phillips Hall 374
Website:	http://bit.ly/laryssaabdala
GitHub:	https://github.com/labdala
Email:	laryssa@live.unc.edu

Interests

Mathematical, statistical and computational methods in medicine and biology, scientific computation, high-performance computing, data science.

Education

Aug. 2019 - May 2024 (expected)
University of North Carolina at Chapel Hill (UNC)
Ph.D. Candidate in Mathematics
Advisor: Boyce Eugene Griffith

Aug. 2016 - Dec. 2018
University of Campinas, Campinas
Master of Science in Applied Mathematics
Thesis: "Heart chamber modeling using Navier-Stokes equations"
Advisor: Carlos Eduardo Keutenedjian Mady
Co-advisor: Maicon Ribeiro Correa
Sponsored by São Paulo Research Foundation (FAPESP).

Feb. 2011 - July 2016
University of Campinas, Campinas
Bachelor of Science in Mathematics with emphasis in Mathematical Physics

Aug. 2014 - July 2015
University of Bergen (UiB), Bergen
Exchange Year
Coursework: Education, Norwegian Language, Quantum Mechanics, Continuum Mechanics.
Sponsored by the Science Without Borders Program.

Relevant Skills

Languages	Portuguese, English, Spanish
Programming Languages	C++, Matlab, Python, Fortran 90, Shell scripting, Javascript, React JS, CSS, LaTeX
Linear Algebra and Finite Element Libraries	PETSc, LAPACK, LibMesh, Deal II
Python Libraries	NumPy, SciPy, Pandas, Matplotlib
High Performance Computing	MPI, Slurm workload manager
Softwares	Paraview, Meshmixer, Coreform Cubit, Blender, fTetWild
Version Control	Git
CI, CD, CT	CMake, Github Actions

Software Development

- PhD's thesis (C++): Whole Heart Electrophysiology Library
- Carolina Data Challenge Hackathon (Jupyter notebook) - second place winner 2023: Hacking into a dataset to find health disparities and bias
- R&D internship with Medical Computing Team at Kitware 2022 (Javascript, React): ITK Viewer

- R&D internship with Medical Computing Team at Kitware 2022 (Python): ITK Widgets
- Master's thesis (Fortran 90) - honorable mention thesis award 2018: Heart chamber modeling using Navier-Stokes equations

Professional Development

August 2019 - Present	*Research Assistant* University of North Carolina at Chapel Hill Advisors: Boyce E. Griffith Sponsored by National Institutes of Health (U01HL143336)
May 2022 - August 2022	Research and Development intern with the Medical Computing Team Kitware Development of a Bootstrap UI for the Insight Toolkit (ITK) Viewer released as an NPM package. Worked in Javascript, React JS, CSS, Python, Git and Github Actions. Documentation using Read the docs, Sphinx, and MyST.
July 2021 - August 2021	Simula Summer School in Computational Physiology Project: A Pipeline for Automated Coordinate Assignment in Anatomically Accurate Biventricular Models
Jan. 2020 - May 2020	NIH Big Data to Knowledge - Big Data in the Context of Biomedical Science, Graduate Training Program at UNC
Summer 2020	*Joint Leader of Scientific Computation Review Session* Department of Mathematics of University of North Carolina at Chapel Hill 18 hours in classroom, 36 hours prep
June 2015 - July 2015	*Summer intern* Statoil, Bergen
Aug. 2013 - July 2014	*Undergraduate research assistant* University of Campinas Project Title: "Discrete symmetry groups in Classical Mechanics". Advisor: Guillermo Cabrera Oyarzun. Sponsored by National Council for Scientific and Technological Development (CNPq).

Distinctions and Awards

Aug. 2019	Honorable Mention Thesis Award 2018 by Instituto de Matemática e Computação Científica, University of Campinas. Award given to one student in the Institute (including the pure, applied and statistics departments) graduate student annually for excellence in the performed work.
Aug. 2018	Unicamp Development Foundation (FAEPEX) 2416/18 - used as *travel award* to ECCM-ECFD 2018.
May 2018	Poster recognition at Brazilian National Conference on Computational and Applied Mathematics (CNMAC) 2018. Title of the poster: *Computational model of a heart chamber through Navier-Stokes Equation*; Ranked as one of the top fifteen in the Session of the General Panels among the 126 presented; Ranked as one of the top four by the public.
Mar. 2017 - July 2018	São Paulo Research Foundation (FAPESP) Master Thesis Fellowship (2016/19126-2).
Aug. 2014 - July 2015	Science Without Borders Program (CAPES) Scholarship to study for a year at University of Bergen.

Publications

2023 | "Two-dimensional heart chamber model using a capacitance function combined with the Navier-Stokes equations", *under review*.

2022 | "Rule-based Definition of Muscle Bundles in Patient-Specific Models of the Left Atrium", *Frontiers in Physiology,* 1471, DOI:10.3389/fphys.2022.912947.

2022 | "A Pipeline for Automated Coordinate Assignment in Anatomically Accurate Biventricular Models", *Computational Physiology. Springer, Cham*, 1-11, DOI:10.1007/978-3-031-05164-7_1

2018 | "Heart chamber modeling using Navier-Stokes equations: Modelo computacional de uma câmara do coração a partir das equações de Navier-Stokes", DOI:10.47749/T/UNICAMP.2018.1080794
M.Sc. Dissertation - University of Campinas

2018 | "Computational Model of a Heart Chamber through Navier-Stokes equations"
Anais do CNMAC 2018, 2018.

Oral Presentations

Apr. 2023 | *Fluid-Structure Interaction Model of the Human Heart*. Computational Fluids Conference (CFC). Cannes, France.

Aug. 2018 | *Fluxo sanguíneo através de um ventrículo do coração: uma variação das equações de Navier-Stokes.* Week of Applied Mathematics at University of Campinas. Campinas, Brazil.

June 2018 | *Computational model of a heart chamber*. Joint 6th European Conference on Computational Methods (Solids, Structures and Coupled Problems) and the 7th European Conference on Computational Fluid Dynamics (ECCM-ECFD 2018). Glasgow, Scotland.

Poster presentations

Nov. 2023 | *Unstructured finite element models of cardiac electrophysiology using a deal.II-based library.*
Supercomputing Conference (SC23). Denver, Colorado
Co-authors: Simone Rossi, David Wells, Boyce E. Griffith.

July 2022 | *Rule-based Definition of Muscle Bundles in Patient-Specific Models of the Left Atrium.*
SIAM Conference on the Life Sciences (LS22). Pittsburgh, Pennsylvania
Co-authors: Simone Rossi, Andrew Woodward, John P. Vavalle, Craig S. Henriquez, Boyce E. Griffith.

June 2022 | *Rule-based Definition of Muscle Bundles in Patient-Specific Models of the Left Atrium.*
Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3c). Cambridge, Maryland
Co-authors: Simone Rossi, Andrew Woodward, John P. Vavalle, Craig S. Henriquez, Boyce E. Griffith.

Sept. 2018 | *Computational model of a heart chamber through Navier-Stokes Equation.*
Brazilian National Conference on Computational and Applied Mathematics (CNMAC). Campinas, Brazil.
Co-authors: Carlos Eduardo Keutenedjian Mady, Maicon Ribeiro Correa.

Feb. 2018 | *Computational model of a heart chamber*. II Biomathematics Meeting (EncBioMat). Campinas, Brazil.
Co-authors: Carlos Eduardo Keutenedjian Mady, Maicon Ribeiro Correa.

Oct. 2014 | *Discrete symetry groups in Classical Mechanics*. XXII Congresso Interno de Iniciação Científica da Unicamp. Campinas, Brazil.
Co-autor: Guillermo Cabrera Oyarzun.

Journal and Conference Reviewer

Apr. 2023 | Springer Computational and Applied Mathematics.

Mar. 2023 | MDPI Pathophysiology.

Mar. 2018 | 6th Brazilian National meeting of Biomechanical Engineering (ENEBI 2018).

Leadership

Aug. 2022 - May 2023 | *Graduate Mathematics Association seminar organizer*
UNC, Chapel Hill
This is a weekly seminar designed to familiarize graduate students to the work being done in the department.

Aug. 2021 - July 2023 | *Committee member of the Directed Reading Program*
UNC, Chapel Hill
This program exposes undergraduate students to advanced level mathematics that are not featured in regular classes. They get connected to graduate students that mentor them for a semester.

Aug. 2021 - July 2022 | *Social Chair*
UNC, Chapel Hill
The social chair is responsible for creating social environments that are welcoming to all graduate students throughout the year. During the COVID-19 pandemic, precautions and creativity have been part of planning the events.

May 2021 - May 2022 | *Graduate student representative (GSR)*
Math department - UNC, Chapel Hill
This is a new Graduate Mathematics Association (GMA) officer position elected by the graduate student population. The two GSRs serve as a point of communication between graduate students and faculty.

Graduate Coursework

Math Classes

- Scientific Computation I&II (MATH661, 662)
- Methods of Applied Mathematics I&II (MATH668, 669)
- Numerical ODE/PDE I (MATH761)
- Numerical ODE/PDEs: Introduction to Finite Elements (MATH762)
- Numerical Analysis (MT403)
- Matrices (MT402)

Interdisciplinary Classes

- Introduction to Statistical Modeling (BCB720)
- Computational Modeling Laboratory (BCB718)
- Computational and Experimental Models of Prosthetic Heart Valves (MATH891.003)
- Chromosome Conformation and Dynamics (MATH891.004)
- Introduction to Machine Learning (COMP562)
- Applied Statistics I (STOR664)
- The Immersed Boundary Method for Fluid-Structure Interaction (MATH892)

Educational Outreach

Sept. 2019 | Monitor at FEMMES UNC Camp 2019
Event designed for young girls to enhance their love for STEM fields.
Exhibit: Hydrodynamic quantum analogs - bouncing fluid droplets

May 2018 | Monitor at the University of Campinas open doors event

Dec. 2012 | Monitor on VI Brazilian Biennial of Mathematics

Feb. 2012 - June 2013 | Organizer of the Freshman's Support Group (GAp)
Brief description: GAp was created in 2012 by a group of undergraduate students to help first-semester undergraduate students majoring in Mathematics and Physics with problems of basic Mathematics follow undergraduate courses.

Teaching

Jan. 2023 - May. 2023	*Recitation Leader* - University of North Carolina at Chapel Hill Class: MATH231 - Calculus of Functions of One Variable I 1 credit hour
Aug. 2022 - Dec. 2022	*Recitation Leader* - University of North Carolina at Chapel Hill Class: MATH233H - Calculus of Functions of Several Variables (Honors Version) 1 credit hour
Aug. 2022 - Dec. 2022	*Recitation Leader* - University of North Carolina at Chapel Hill Class: MATH233 - Calculus of Functions of Several Variables 1 credit hour
Aug. 2022 - Dec. 2022	*Instructor* - University of North Carolina at Chapel Hill Class: MATH383L - First Course in Differential Equations Laboratory 2 credit hour
Aug. 2021 - Dec. 2021	*Instructor* - University of North Carolina at Chapel Hill Class: MATH383L - First Course in Differential Equations Laboratory 3 credit hours
Aug. 2019 - Dec. 2019	*Teaching Assistant* - University of North Carolina at Chapel Hill Class: MATH381 - Discrete Mathematics 6 hours weekly
Feb. 2019 - Aug. 2019	*Lecturer* - Paulista University at Jundiaí Classes: Topics in General and Experimental Physics; Topics in Mathematics; Basic Electricity; Fluid Mechanics: Theory and Laboratory. Teaching, preparation of material, elaboration of homework and exams, grading. 12 credit hours (12 hours in classroom, 30 hours prep).
Aug. 2018 - Dec. 2018	*Undergraduate teaching assistant* - University of Campinas Class: MA327 - Linear Algebra. Professor: Francesco Matucci. 8 hours weekly
Feb. 2016 - July 2016	*Undergraduate teaching assistant* - University of Campinas Class: MA141 - Analytic Geometry. Professor: Simone Marchesi. 8 hours weekly
Aug. 2015 - Dec. 2015	*Undergraduate teaching assistant* - University of Campinas Class: MA111 - Calculus I. Professor: Maria Lúcia B. Queiroz. 8 hours weekly
Feb. 2013 - July 2013	*Undergraduate teaching assistant* - University of Campinas Class: MA327 - Linear Algebra. Professor: Sueli Irene R. Costa. 8 hours weekly

References

Boyce E. Griffith, Associate Professor of Mathematics, Adjunct Associate Professor of Applied Physical Sciences, Adjunct Associate Professor of Biomedical Engineering, University of North Carolina, Chapel Hill, (919)962-1294, boyceg@email.unc.edu

Simone Rossi, Ph.D., 3D Software Engineer at Align Technology. simone.rossi.phd@gmail.com

David Wells, Ph.D., Research Scientist in the Department of Mathematics, University of North Carolina, Chapel Hill. drwells@email.unc.edu

Greg Forest, Grant Dahlstrom Distinguished Professor of Mathematics, Joint Appointments: Applied Physical Sciences & Biomedical Engineering. Director, Carolina Center for Interdisciplinary Applied Mathematics. University of North Carolina, Chapel Hill. Associate Director, NSF Statistical and Applied Mathematical Sciences Institute, forest@unc.edu