Cristian Andrés Inzunza Domínguez

Personal Information

Nationality:	Chilean
Date of Birth:	October 7, 1992
Marital Status:	Married
Address:	Los Mañios 6095, E-417, San Pedro de la Paz
Phone:	+56 9 3033 5689
Email:	crinzunza@udec.cl
website:	crinzunza.github.io

Work Experience

2025 **Postdoctoral Researcher**, Center for Mathematical Modeling (CMM), Universidad de Chile, Santiago, Chile.
Supervisors: Jessika Camaño. contact: jecamano@ucsc.cl.
Sergio Caucao. contact: scaucao@ucsc.cl.

2024 **Part-Time Teacher**, Universidad Católica de la Santísima Concepción, Concepción, Chile.

- *Algebra and Linear Algebra*
- *Calculus*
- *Multivariable Calculus*
- Differential Equations Laboratory Instructor

2019 **Research Assistant**, Center for Research in Mathematical Engineering, Udec, Concepción, Chile.

2018 **Internship**, Department of Physics, Faculty of Physical and Mathematical Sciences, Udec, Concepción, Chile.

Matlab programming of optimization algorithms applied to quantum tomography problems.

2013-2018 **Teaching Assistant**, Faculty of Physical and Mathematical Sciences, Udec, Concepción, Chile.

Tutoring for students in the following courses:

- *Numerical Calculus*
- *Linear Algebra*
- *Algebra and Trigonometry*
- *Introduction to University Mathematics*
- *Calculus*
- *Numerical Methods*

Education

2020- 2024 University of Concepción, Chile
Ph.D. in Applied Sciences with mention in Mathematical Engineering

2011- 2018 University of Concepción, Chile
Mathematical Civil Engineer

Thesis

2024-Grad. Banach spaces-based mixed finite element methods for coupled diffusion problems and related models. Adv. G.N. Gatica. contact: ggatica@ci2ma.udec.cl.

2018-Under. An augmented fully-mixed finite element method for a coupled flow-transport problem. Adv. G.N. Gatica.

Scholarships

2020-2024 | National Doctoral Scholarship, Academic Year 2020, ANID (Chile).

Research Interests

Numerical analysis; finite element methods; mixed finite element methods; coupled and nonlinear PDE problems; poroelasticity and flow in deformable porous media.

PhD Coursework

2020–1	▪ Numerical Analysis ▪ Continuum Mechanics ▪ Functional Analysis
2020–2	▪ Topics in Finite Elements I ▪ Finite Element Theory ▪ Partial Differential Equations
2021–1	▪ Research Seminar I ▪ Discontinuous Galerkin Method: Theory and Applications
2021–2	▪ Research Seminar II

Publications

Submitted

- J. Camaño, S. Caucao, and C. Inzunza, *A five-field mixed formulation for the fully dynamic Biot–Brinkman model*. Preprint 2025-28, Centro de Investigación en Ingeniería Matemática (CI^{2}MA), Universidad de Concepción, 2025.

In preparation

- J. Camaño, S. Caucao, and C. Inzunza, *A mixed formulation for the quasi-static Biot–Brinkman–Forchheimer model*.
- C. Inzunza, *A new fully-mixed finite element method for the coupled Biot and Poisson–Nernst–Planck equations*.

Published

- G.N. Gatica, C. Inzunza and R. Ruiz-Baier, *Primal-mixed finite element methods for the coupled Biot and Poisson–Nernst–Planck equations*. Computers & Mathematics with Applications, vol. 186, pp. 53–83, (2025).
- J. Careaga, G.N. Gatica, C. Inzunza and R. Ruiz-Baier, *New Banach spaces-based mixed finite element methods for the coupled poroelasticity and heat equations*. IMA Journal of Numerical Analysis, vol. 45, pp. 1936–1984, (2025).
- G.N. Gatica, C. Inzunza and F.A. Sequeira, *New Banach spaces-based fully-mixed finite element methods for pseudostress-assisted diffusion problems*. Applied Numerical Mathematics, vol. 193, pp. 148–178, (2023).
- S. Caucao, E. Colmenares, G.N. Gatica and C. Inzunza, *A Banach spaces-based fully-mixed finite element method for the stationary chemotaxis-Navier–Stokes problem*. Computers & Mathematics with Applications, vol. 145, pp. 65–89, (2023).

- G.N. Gatica, C. Inzunza and F.A. Sequeira, *A pseudostress-based mixed-primal finite element method for stress-assisted diffusion problems in Banach spaces*. Journal of Scientific Computing, vol. 92, no. 3, article 103, (2022).
- G.N. Gatica, C. Inzunza, R. Ruiz-Baier and F. Sandoval, *A posteriori error analysis of Banach spaces-based fully-mixed finite element methods for Boussinesq-type models*. Journal of Numerical Mathematics, vol. 30, no. 4, pp. 325–356, (2022).
- G.N. Gatica and C. Inzunza, *On the well-posedness of Banach spaces-based mixed formulations for the nearly incompressible Navier–Lamé and Stokes equations*. Computers & Mathematics with Applications, vol. 102, pp. 87–94, (2021).
- G.N. Gatica and C. Inzunza, *An augmented fully-mixed finite element method for a coupled flow-transport problem*. Calcolo, vol. 57, no. 1, article 8, (2020).

Talks

2025-Oct.	**Encuentro GIANuC^2: Métodos Numéricos para Sistemas Multifísicos – Teorías y Aplicaciones.** Una formulación mixta para el modelo Biot–Brinkman completamente dinámico.
2025-Apr.	**Seminario del Departamento de Matemática y Física Aplicadas, UCSC.** Métodos mixtos en espacios de Banach para poroelasticidad acoplada con calor.
2024-Jan.	**Workshop on Numerical Analysis for PDE (WONAPDE 2024).** Fully mixed methods for the coupled poroelasticity and Poisson–Nernst–Planck equations.
2023-Dec.	**The 67th Annual Meeting of the Australian Mathematical Society (AustMS 2023).** A Banach spaces-based fully-mixed finite element method for the coupled poroelasticity and Poisson–Nernst–Planck equations.
2023-Oct.	**Computational Mathematics Seminar Series, Monash University.** A Banach spaces-based mixed-primal finite element method for pseudostress-assisted diffusion problems.

Organizing Activities

2025–Oct.	**Encuentro GIANuC^2: Métodos Numéricos para Sistemas Multifísicos – Teorías y Aplicaciones.**

Research Visits

2023	**Research Internship**, School of Mathematics, Monash University, Australia. Adv. Ricardo Ruiz-Baier. contact: ricardo.ruizbaier@monash.edu.
2019	**Research Internship**, Department of Mathematics, Simon Fraser University, Burnaby B.C. Canada. Adv. Nilima Nigam. contact: nigam@math.sfu.ca.

Refereeing Experience

2025	**Journal**, *Computers & Mathematics with Applications* **Journal**, *Finite Elements in Analysis and Design*

Programming Languages

RAdvanced Proficiency: LaTeX- Matlab - FreeFem++ - FEniCS