Esteban Gutiérrez

Personal Information

Name	Esteban Gutiérrez
Position	PhD student at MTG, UPF
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Bio

Esteban is a music technologist, musician, mathematician and PhD researcher at the Music Technology Group at Universitat Pompeu Fabra in Barcelona. His work explores computational approaches to sound synthesis, machine listening and musical creativity, focusing on how machine learning and auditory perception can expand the possibilities of musical practice. He conducts his doctoral research under the supervision of Dr. Xavier Serra and Dr. Frederic Font, collaborating closely with Dr. Lonce Wyse and the Freesound team.

His research centers on the development of perceptually and/or semanthically informed synthesis systems and computational instruments based on such models and designed to support creative sound exploration. Among these projects is *DDSP Textures*, a real-time synthesis model capable of generating complex texture sounds using perceptual statistics, demonstrating that sounds sharing similar statistical properties can be perceived as similar by human listeners even when their underlying waveforms differ significantly. Another project, *QDTS*, explores the phenomenon of otoacoustic emissions, where the auditory system produces additional tones in response to specific sonic contexts, to construct rich sonic textures from a complex of sinusoids. This work has been featured in several artistic contexts, including the album *Normification* (2025) by Florian Hecker and Marcin Pietruszewski, the album *H E L L O After-Person* (2025) by RM Francis and Jung An Tagen, and the sound installation *Distortion Product Lattice (Fokker QDTS Wavepackets)* (2024) by Marcin Pietruszewski.

Alongside his research, Esteban is actively engaged in teaching and mentoring within music technology. At Universitat Pompeu Fabra, he teaches the course *Music Technology Lab*, guiding students in developing creative midterm projects that explore sound synthesis, generative systems, interactive music technologies, and experimental approaches to digital musical instruments. In this course, he encourages students to combine technical rigor with artistic experimentation, fostering both skill and creativity. He also teaches the *Signal Processing Lab*, where students apply signal processing concepts to the synthesis of harmonic sounds.

In parallel with his academic life, Esteban maintains an active musical practice as an electric bassist in the Barcelona live music scene. He currently performs with the band *Mukti*, whose music combines jazz, funk, and influences from North Indian classical music, drawing on raga structures as a foundation for melodic development and composition. He also performs with *Amanita Quartet*, a contemporary jazz ensemble that incorporates rhythmic influences from Latin American and African musical traditions. Both projects are active within Barcelona's live music circuit and emphasize improvisation, cross-cultural dialogue, and experimental approaches to rhythm and harmony.

Esteban holds undergraduate and master's degrees in Mathematics from the Pontificia Universidad Católica de Chile, where he conducted research with Dr. Giuseppe De Nittis on K-theory and its connections to edge current phenomena in the Quantum Hall effect. During his undergraduate studies, he also pursued music training: he studied Electroacoustic Music with Dr. Rodrigo Cádiz and Dr. Antonio Carvallo, and electric bass with Natalia Santibañez. He cultivated a self-directed interest in contemporary jazz harmony, developing a broad appreciation for both popular and experimental music. He later completed a Master's in Sound and Music Computing under the supervision of Lonce Wyse, exploring statistics-driven DDSP approaches to texture sound synthesis.

Education

2024–present **PhD in Information and Communication Technologies**, *Universitat Pompeu Fabra*

2023–2024 **Master in Sound and Music Computing**, *Universitat Pompeu Fabra*

2018–2021 **Magister en Matemáticas (MSc equivalent)**, *Pontificia Universidad Católica de Chile*

2012–2017 **Licenciatura en Matemáticas (BSc equivalent)**, *Pontificia Universidad Católica de Chile*

2006–2012 **Penta UC (Academic Talents Program)**, *Pontificia Universidad Católica de Chile*

Selected Teaching/Coordination Experience

2024-2026 **Adjoint Teacher**, *Universitat Pompeu Fabra*

- **(2024-2026)** Music Technology Laboratory (25400, Practical Sessions)
- **(2024-2026)** Discrete Mathematics (26845, Practical Sessions)
- **(2024-2025)** Signals and Systems I (24293, Laboratory Sessions)

2021-2023 **Mathematics Coordinator**, *Universidad de Santiago de Chile*

- **(2021-2023)** Workshops in Algebra II (PAIEP)
- **(2021-2023)** Workshops in Calculus II (PAIEP)
- **(2021-2023)** Workshops in Calculus III (PAIEP)

2022-2023 **Adjoint Teacher**, *Universidad de Santiago de Chile*

- **(2022-2023)** Calculus III (10146)
- **(2022-2023)** Calculus II (10142)

2020-2021 **Adjoint Teacher**, *Pontificia Universidad Católica de Chile*

- **(2021)** Linear Algebra (MAT1203)
- **(2020)** Ordinary Differential Equations (MAT1640)

2020–2021 **Adjoint Teacher**, *Pontificia Universidad Catoólica de Chile*

- **(2021)** Linear Algebra (MAT1203)
- **(2020)** Ordinary Differential Equations (MAT1640)

2015–2020 **Teaching Assistant**, *Pontificia Universidad Católica de Chile*

- **(2020)** Functional Analysis (MAT2555)
- **(2019)** Functional Analysis (MAT2555)
- **(2019)** Calculus I (MAT1116)
- **(2019)** Calculus II (MAT1220)
- **(2018)** Calculus I (MAT1610)
- **(2018)** Applied Stochastic Processes (EYP1026)
- **(2018)** Leveling Program (PIMU A)
- **(2017)** Applied Stochastic Processes (EYP2106)
- **(2016)** Calculus II (MAT220E)
- **(2016)** Geometry I (MAT1389)
- **(2015)** Workshops in Mathematics (MAT0006)
- **(2015)** Introduction to Algebra (MAT110E)
- **(2015)** Introduction to Calculus (MAT1600)

2016–2021 **Academic Tutor**, *Pontificia Universidad Católica de Chile*

- **(2021)** Ordinary Differential Equations (MAT1640), *Programa Talento e Inclusión*
- **(2020)** Calculus II (MAT1220), *Programa Talento e Inclusión*
- **(2020)** Calculus I (MAT1610), *Programa Talento e Inclusión*
- **(2020)** Linear Algebra (MAT1203), *Programa Talento e Inclusión*
- **(2019)** Linear Algebra (MAT1203), *Programa Talento e Inclusión*
- **(2019)** Probabilistic Models (EYP1026), *Programa de Tutorías de la Facultad de Pedagogía*
- **(2019)** Calculus I (MAT1610), *PIMU*
- **(2019)** Calculus I (MAT1100), *PIMU*
- **(2019)** Linear Algebra (MAT1203), *Programa Talento e Inclusión*
- **(2018)** Calculus II (MAT220E), *Programa Talento e Inclusión*
- **(2017)** Linear Algebra (MAT1209), *Programa Talento e Inclusión*
- **(2016)** Introduction to Calculus (MAT1600), *Programa Talento e Inclusión*

Research Experience

2022–present **Music Technology Research**, *Pontificia Universidad Católica de Chile*
Research on Music Technology topics with collaborators from the United Kingdom, Chile and Spain. From this research we have published one paper, there is one paper accepted in the Computer Music Journal and we just submitted a third one.

2019-2020 **Mathematical Physics Research**, *Pontificia Universidad Católica de Chile*
Im my master degree I was fortunate to work under the supervision of Dr. Giuseppe de Nittis in a joint work about Mathematical Physics. This work got published on 2021.

Selected Publications

- **(2026)** Gutiérrez, E., Font, F., Serra, X. and Wyse, L. SCAPES: Semantically Conditioned Autoregressive Prior for Environmental Sounds. Proceedings of the 29th International Conference on Digital Audio Effects (DAFx). Cambridge, USA 2026.
- **(2025)** Gutiérrez, E., Font, F., Serra, X. and Wyse, L. A Statistics-Driven Differentiable Approach for Sound Texture Synthesis and Analysis. Proceedings of the 28th International Conference on Digital Audio Effects (DAFx). Boston, USA 2025.
- **(2025)** Gutiérrez, E., Cádiz, R., Sing-Long, C., Font, F. and Serra, X. Fractional Fourier Synthesis. Proceedings of the International Computer Music Conference 2025: Curiosity Play Innovation. Michigan Publishing Services, 2025.
- **(2024)** Gutiérrez, E., Haworth, C. and Cádiz, R. F. Generating Sonic Phantoms with Quadratic Difference Tone Spectrum Synthesis. Computer Music Journal, 2024.
- **(2024)** Cádiz, R. F. and Gutiérrez, E. Stochastic Resonance: Molding Sounds from Noise. Proceedings of the Sound and Music Computing (SMC) Conference 2024: Immersive. Porto, Portugal, 2024.
- **(2023)** Cádiz, R. F., Gutiérrez, E. and Haworth, C. Generating Quadratic Difference Tone Spectra for Auditory Distortion Synthesis. Proceedings of the International Computer Music Conference 2023: The Sound of Changes. Chinese University of Hong Kong, Shenzhen, 2023. **(Best Paper Award)**
- **(2021)** De Nittis, G. and Gutiérrez, E. Quantization of Edge Currents Along Magnetic Interfaces: A K-Theory Approach. Acta Applicandae Mathematicae, 175, 6, 2021.

Software and Programming Languages

- **PD & Max:** Advanced level in sound synthesis and processing using PD and Max. Also, I'm proficient in building externals using the min development kit for Max through C++.
- **Ableton:** Advanced level of sound production in Live.
- **Python:** Advanced level of Python with proficiency in its use for machine learning applications
- **C++:** Intermediate level of C++ with proficiency in the use of the library Eigen.
- **LaTeX:** Advanced level in writing academic articles using LaTeX.
- **Adobe:** Advanced level in edition of images and sounds using Photoshop and Audition respectively.

Other Habilities

- **Music:** I've been a bass player since I was 12 years old, I've had private classes in Jazz and during my undergraduate and graduate studies I took several courses related to composition and electroacoustic music. Currently, I'm the bass player of two active bands in the scene of Jazz and Funk in Barcelona.
- **Photography:** During my graduate studies I took two courses in digital photography.