Francesc Castella

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Academic Positions

2022–present	Associate Professor, **University of California, Santa Barbara**
2018–2022	Assistant Professor, **University of California, Santa Barbara**
2017–2019	Instructor, **Princeton University**
2016–2017	Associate Research Scholar, **Princeton University**
2013–2016	Hedrick Assistant Professor, **University of California, Los Angeles**

Visiting Positions

Sept 2023	Professeur Invité, **Université Sorbonne Paris Nord**
Spring 2023	Research Member, **MSRI/SLMath**

University Degrees

2013	Ph.D. in Mathematics, **McGill University** (advisor: Prof. Henri Darmon)
2009	M.Sc. in Mathematics, **BarcelonaTech**
2008	B.Sc. in Mathematics, **BarcelonaTech**

Awards and Honors

2024	2024–2025 AMS Centennial Fellowship
2023	CRM-ISM-AMQ Prize
2016	Vicent Caselles Award, FBBVA-Royal Spanish Mathematical Society
2016	Distinguished Teaching Award, UCLA
2008	Évariste Galois Prize, Institut d'Estudis Catalans

Research Grants

2024–2027	PI, NSF Grant DMS-2401321
2021–2024	PI, NSF Grant DMS-2101458
2018–2021	PI, NSF Grant DMS-1801385 (DMS-1946136 after transfer to UCSB)
2016–2018	AMS-Simons Travel Grant

Publications

25. **Derived p-adic heights and the leading coefficient of the Bertolini–Darmon–Prasanna p-adic L-function.**
with C.-Y. Hsu, D. Kundu, Y.-S. Lee, and Z. Liu.
Transactions of the American Mathematical Society, to appear, 35 pp.

24. **Base change and the Iwasawa Main Conjectures for GL_2.**
with A. Burungale and C. Skinner.
International Mathematics Research Notices IMRN, to appear, 13 pp.

23. **On the Iwasawa theory of elliptic curves at Eisenstein primes.**
Proceedings of ICTS workshop 'Elliptic curves and the special values of L-functions', to appear, 15 pp.

22. **Nonvanishing of generalised Kato classes and Iwasawa main conjectures.**
Proceedings for Massimo Bertolini's 60th birthday conference, to appear, 21 pp.

21. **The diagonal cycle Euler system for $\mathrm{GL}_2 \times \mathrm{GL}_2$.**
with R. Alonso and O. Rivero.
Journal de l'Institut Mathématique de Jussieu, to appear, 63 pp.

20. **An anticyclotomic Euler system for adjoint modular Galois representations.**
with R. Alonso and O. Rivero.
Annales de l'Institut Fourier, **75** (2025), no. 1, 291–329.

19. **Perrin-Riou's main conjecture for elliptic curves at supersingular primes.**
with X. Wan.
Mathematische Annalen, **389** (2024), no. 3, 2595–2636.

18. **Iwasawa–Greenberg main conjecture for nonordinary modular forms and Eisenstein congruences on $\mathrm{GU}(3,1)$.**
with Z. Liu and X. Wan.
Forum of Mathematics, Sigma, **10** (2022), e110, 90 pp.

17. **On the anticyclotomic Iwasawa theory of rational elliptic curves at Eisenstein primes.**
with G. Grossi, J. Lee, and C. Skinner.
Inventiones mathematicae, **227** (2022), no. 2, 517–580.

16. **Class groups and local indecomposability for non-CM forms,** with an appendix by H. Hida.
with C. Wang-Erickson.
Journal of the European Mathematical Society JEMS, **24** (2022), no. 4, 1103-1160.

15. **The Iwasawa Main Conjectures for GL_2 and derivatives of p-adic L-functions.**
with X. Wan.
Advances in Mathematics, **400** (2022), 108266, 45 pp.

14. **On the nonvanishing of generalised Kato classes for elliptic curves of rank 2.**
with M.-L. Hsieh.
Forum of Mathematics, Sigma, **10** (2022), e12, 32 pp.

13. **p^∞-Selmer groups and rational points on CM elliptic curves.**
with A. Burungale, C. Skinner, and Y. Tian.
Annales Mathématiques du Québec, Special Issue in honor of Bernadette Perrin-Riou, **46** (2022), no. 2, 325–346.
*Awarded the **CRM-ISM-AMQ 2023 prize**

12. **A proof of Perrin-Riou's Heegner point main conjecture.**
with A. Burungale and C.-H. Kim.
Algebra & Number Theory, **15** (2021), no. 7, 1627–1653.

11. **On anticyclotomic variants of the p-adic Birch–Swinnerton-Dyer conjecture.**
with A. Agboola.
Journal de Théorie des Nombres de Bordeaux, Iwasawa 2019 Special Issue, **33** (2021), no. 3.1, 629–658.

10. **On the p-adic variation of Heegner points.**
Journal de l'Institut Mathématique de Jussieu, **19** (2020), no. 6, 2127–2164.

9. **On the p-part of the Birch–Swinnerton-Dyer formula for multiplicative primes.**
Cambridge Journal of Mathematics, **6** (2018), no. 1, 1–23.

8. **Heegner cycles and p-adic L-functions.**
with M.-L. Hsieh.
Mathematische Annalen, **370** (2018), no. 1-2, 567–628.

7. **On the exceptional specializations of big Heegner points.**
Journal de l'Institut Mathématique de Jussieu, **17** (2018), no. 1, 207–240.

6. **p-adic heights of Heegner points and Beilinson–Flach classes.**
Journal of the London Mathematical Society, **96** (2017), no. 1, 156–180.

5. **Variation of anticyclotomic Iwasawa invariants in Hida families.**
with C.-H. Kim and M. Longo.
Algebra & Number Theory, **11** (2017), no. 10, 2339–2368.

4. **A geometric perspective on p-adic properties of mock modular forms.**
with L. Candelori.
Research in the Mathematical Sciences, **4**:5 (2017), 15 pp.

3. **Big Heegner points and special values of L-series.**
with M. Longo.
Annales Mathématiques du Québec, Special Issue in honor of Glenn Stevens, **40** (2016), no. 2, 303–324.

2. **p-adic L-functions and Euler systems: a tale in two trilogies.**
with M. Bertolini, H. Darmon, S. Dasgupta, K. Prasanna, and V. Rotger.
Proceedings of the LMS Durham Symposium 2011, *London Mathematical Society Lecture Note Series*, **414** (2014), 52–101.

1. **Heegner cycles and higher weight specializations of big Heegner points.**
Mathematische Annalen, **356** (2013), no. 4, 1247–1282.

Preprints

10. **An anticyclotomic Euler system of Hirzebruch–Zagier cycles I: Norm relations and p-adic interpolation.**
with R. Alonso and O. Rivero.
submitted for publication, 28 pp.

9. **A formula of Perrin-Riou and characteristic power series of signed Selmer groups.**
submitted for publication, 11 pp.

8. **Exceptional zeros for Heegner points and p-converse to the theorem of Gross–Zagier and Kolyvagin**.
submitted for publication, 12 pp.

7. **Tamagawa number conjecture for CM modular forms and Rankin–Selberg convolutions.**
submitted for publication, 37 pp.

6. **Generalized Kato classes on CM elliptic curves of rank 2.**
submitted for publication, 26 pp.

5. **Diagonal cycles and anticyclotomic Iwasawa theory of modular forms.**
with K. T. Do.
submitted for publication, 50 pp.

4. **Critical Λ-adic modular forms and bi-ordinary complexes.**
with C. Wang-Erickson.
submitted for publication, 75 pp.

3. **Mazur's main conjecture at Eisenstein primes.**
   with G. Grossi and C. Skinner.
   submitted for publication, 32 pp.
2. **Non-vanishing of Kolyvagin systems and Iwasawa theory.**
   with A. Burungale, G. Grossi, and C. Skinner.
   submitted for publication, 31 pp.
1. **On the Iwasawa main conjectures for modular forms at non-ordinary primes.**
   with M. Çiperiani, C. Skinner, and F. Sprung.
   submitted for publication, 33 pp.

Invited Talks

· Iwasawa 2025, Taipei	June 2025
· ICTS Workshop: "Automorphic Forms and the Bloch–Kato Conjecture, Bengaluru	May 2025
· NCTS Number Theory Seminar, Taipei	February 2025
· 2025 RIMS Conference: "Automorphic forms and its arithmetic applications", Kyoto	January 2025
· UCLA, Number Theory Seminar	April 2024
· TSIMF Workshop: "Special values of L-functions", Sanya, China	January 2024
· Colloquium, Wayne State University	December 2023
· Number Theory Seminar, Wayne State University	December 2023
· Southern California Number Theory Day, UC Irvine	October 2023
· Université de Lille, Number Theory Seminar	September 2023
· Université Sorbonne Paris Nord, Number Theory Seminar (2 lectures)	September 2023
· Conference: "Galois Representations and Automorphic Forms", Bedlewo, Poland	August 2023
· Morningside Center of Mathematics, Beijing	June 2023
· MSRI/SLMath, Euler Systems Program Research Seminar	May 2023
· University of Pittsburgh, Number Theory Seminar	April 2023
· KIAS Instructional Workshop: "Iwasawa Theory for Automorphic Forms" (online, 3 lectures)	December 2022
· UCLA, Number Theory Seminar	November 2022
· The University of Texas at Austin, Number Theory Seminar	November 2022
· AMS Sectional Meeting, Special Session: "Iwasawa Theory", UMass Amherst	October 2022
· ICTS Workshop: "Elliptic Curves and Special Values of L-functions" (online, 3 lectures), Bengaluru	August 2022
· Joint Columbia-CUNY-NYU Number Theory Seminar	April 2022
· The University of British Columbia, Iwasawa theory Virtual Seminar (online)	March 2022
· UCLA, Number Theory Seminar	January 2022
· University College Dublin, Algebra and Number Theory Seminar (online)	December 2021
· Conference: "L-functions and Iwasawa Theory", Roscoff, France (online)	November 2021

· Caltech, Number Theory Seminar	October 2021
· The University of British Columbia, Number Theory Seminar (online)	September 2021
· ICTS Workshop: "BSD Conjecture and Related Topics" (online, 4 lectures)	August 2021
· Mathematical Congress of the Americas (MCA) 2021, Special Session: "Galois Representations and Automorphic Forms", Buenos Aires (online)	July 2021
· 2020 CMS Summer Meeting, Special Session: "Arithmetic Geometry" (online)	June 2021
· 2020 CMS Summer Meeting, Special Session: "Algebraic Number Theory" (online)	June 2021
· LATeN, Seminario Latinoamericano de Teoría de Números (online)	April 2021
· University of Vienna, Number Theory Seminar (online)	March 2021
· Korea Institute for Advanced Study, Special Seminar (2 lectures, online)	December 2020
· University of Arizona, Number Theory Seminar (online)	October 2020
· MIT, Number Theory Seminar (online)	October 2020
· AMS Sectional Meeting, Special Session: "Automorphic Forms and Galois Representations", University Park (online)	October 2020
· 2020 CMS Summer Meeting, Special Session: "Arithmetic Geometry" (online)	June 2020
· 2020 CMS Summer Meeting, Special Session: "Algebraic Number Theory" (online)	June 2020
· BarcelonaTech, Number Theory Seminar (online)	May 2020
· University of Oregon, Number Theory Seminar	February 2020
· UCLA, Number Theory Seminar	February 2020
· Caltech, Number Theory Seminar	January 2020
· Workshop: "Congruence Ideals and p-adic L-functions", NCTS, Taipei	December 2019
· Colloquium, University of Oklahoma	November 2019
· Johns Hopkins University, Number Theory Seminar	October 2019
· Conference: "Recent Advances in the Arithmetic of Galois Representations", Genoa	July 2019
· Workshop: "Eisenstein Ideal and Iwasawa Theory", Morningside Center of Mathematics, Beijing	June 2019
· AMS Sectional Meeting, Special Session: "Special Values of L-functions and Arithmetic Invariants in Families", Hartford	April 2019
· AMS Sectional Meeting, Special Session: "Advances in Iwasawa Theory", Honolulu	March 2019
· AMS Sectional Meeting, Special Session: "Algebraic Points", Honolulu	March 2019
· Québec-Vermont Number Theory Seminar, Montréal	January 2019
· Seminar, Fudan University	December 2018
· Colloquium, UC Santa Barbara	January 2018
· Colloquium, Rice University	December 2017
· Colloquium, Michigan State University	November 2017
· Colloquium, UC San Diego	November 2017
· Purdue University, Automorphic Forms Seminar	November 2017
· Princeton University/IAS Number Theory Seminar, Princeton	October 2017

· Conference: "Special Cycles on Shimura Varieties and Iwasawa Theory", EPFL	August 2017
· Workshop: "Euler Systems and Special Values of L-functions", EPFL (3 lectures)	August 2017
· Jornadas de Teoría de Números, Lleida (plenary speaker)	June 2017
· Conference: "p-adic Methods for Galois Representations and Automorphic Forms", Barcelona	February 2017
· Colloquium, UC San Diego	January 2017
· Montréal-Toronto Workshop in Number Theory: "Mock Modular Forms and Their Relatives", Montréal	December 2016
· Columbia University, Arithmetic and Automorphic Forms Seminar	December 2016
· University of Pennsylvania, Algebra Seminar	October 2016
· BIRS Workshop: "New Directions in Iwasawa Theory", Banff	June 2016
· UCSD, Number Theory Seminar	May 2016
· Morningside Center of Mathematics, Beijing (2 lectures)	March 2016
· Colloquium, University of Arizona	January 2016
· Workshop: "Arithmetic of Euler Systems", Benasque	August 2015
· University of Chicago, Number Theory Seminar	April 2015
· Northwestern University, Number Theory Seminar	April 2015
· Workshop: "p-adic Methods in the Theory of Classical Automorphic Forms", Montréal	March 2015
· Joint Mathematics Meetings, Special Session: "Selmer Groups", San Antonio	January 2015
· UC Irvine, Number Theory Seminar	October 2014
· Columbia University, Arithmetic and Automorphic Forms Seminar	September 2014
· ICM Satellite Conference: "Automorphic Forms and Arithmetic", Pohang	August 2014
· p-adic Variation in Number Theory (Glenn Stevens' 60th), Boston University	June 2014
· Caltech, Number Theory Seminar	May 2014
· National Taiwan University (3 lectures)	February 2014
· IAS Program: "Special Cycles and p-adic L-functions", Hong-Kong	January 2014
· Princeton University, Number Theory Seminar	November 2013
· UCLA, Number Theory Seminar	October 2013
· Workshop: "Effective Methods for Darmon Points", Benasque	August 2013
· FRG/RTG mini-Conference: "p-adic Modular Forms, L-functions and Galois Representations", UCLA	May 2013
· The University of Texas at Austin, Number Theory Seminar	April 2013
· Workshop: "Iwasawa Theory and p-adic Families of Automorphic Forms", Kyoto University (4 lectures)	April 2013
· 2012 CMS Winter Meeting, Special Session: "Algebraic Number Theory", Montréal	December 2012
· Workshop: "p-adic Langlands Program: Recent Developments and Applications", Fields Institute, Toronto	April 2012

Teaching Experience

UCSB

2025 Spring · Math 4A: Linear Algebra with Applications
2025 Spring · Math 220C: Modern Algebra III
2024 Fall · Math 220A: Modern Algebra I
2024 Winter · Math 225B: Topics in Number Theory: Introduction to Iwasawa Theory
2023 Fall · Math 225A: Topics in Number Theory: Elliptic Curves and Modular Forms
2023 Fall · Math 108B: Advanced Linear Algebra
2023 Winter · Math 260Q: Seminar in Mathematics: Iwasawa Theory of Elliptic Curves
2023 Winter · Math 220B: Modern Algebra II
2022 Fall · Math CS 120FN: Number Systems
2022 Winter · Math 220B: Modern Algebra II
2021 Fall · Math 4A: Linear Algebra with Applications
2021 Spring · Math 225C: Topics in Number Theory: Rational Points on Elliptic Curves
2021 Winter · Math 225B: Topics in Number Theory: Introduction to Elliptic Curves
2021 Winter · Math 111B: Abstract Algebra II
2020 Fall · Math 8: Transition to Higher Mathematics
2020 Spring · Math 220C: Modern Algebra III
2020 Winter · Math 220B: Modern Algebra II
2019 Fall · Math 220A: Modern Algebra I

Princeton

2019 Spring · MAT 419: Topics in Number Theory: Algebraic Number Theory
2018 Fall · MAT 419: Topics in Number Theory: Arithmetic of Elliptic Curves
2018 Spring · MAT 202: Linear Algebra with Applications
2017 Fall · MAT 511: Class Field Theory
2017 Spring · MAT 175: Multivariable Calculus for Economics
2016 Fall · MAT 175: Multivariable Calculus for Economics

UCLA

2016 Winter · Math 132: Complex Analysis for Applications
2015 Fall · Math 33A: Linear Algebra and Applications
2015 Fall · Math 132: Complex Analysis for Applications
2015 Spring · Math 117: Algebra for Applications
2015 Winter · Math 110A: Algebra
2015 Winter · Math 31B: Integration and Infinite Series
2014 Fall · Math 207A: Topics in Number Theory: Euler Systems and BSD Conjecture
2014 Spring · Math 33A: Linear Algebra and Applications
2013 Fall · Math 115A: Linear Algebra
2013 Fall · Math 31A: Differential and Integral Calculus

Mentoring Experience

UCSB

2024 Spring	· Pico Gilman '26. Reading course on p-adic modular forms
2024 Winter	· Pico Gilman '26. Reading course on Eisenstein congruences
2023 Spring	· Matthew Verheul '24. Reading course on Kato's Euler system
2023 Spring	· Justin Wu '26. Reading course on p-adic Hodge theory
2022 Fall	· Sarah Mantell *27 and Milo Moses '26. Reading course on Iwasawa theory
2022-2023	· Aleix Torres *23 (UPC-CFIS Visiting Student). Senior thesis: "Greenberg's methods on the Iwasawa theory for elliptic curves"
2021 Summer	· Neel Murthy '22. Reading course on the work of Dasgupta–Kakde
2021 Spring	· Neel Murthy '22. Reading course on class field theory
2021 Spring	· Kyle Hansen *24, Mychelle Parker *24, Zach Wagner *24, Mulun Yin *24. Reading course on algebraic number theory
2020-2021	· Mychelle Parker *24. Reading course on arithmetic of elliptic curves
2020 Summer	· Dylan Adams '21. Project on codimension two Iwasawa theory
2020 Summer	· Travis Steele '21. Project on Iwasawa theory of supersingular elliptic curves
2020 Spring	· Dylan Adams '21. Reading course on homological algebra
2020 Winter	· Ansuman Barbalai '21. Reading course on p-adic Hodge theory

Princeton

2019 Spring	· Gary Hu '20. Junior paper: "Towards the 2-converse of Gross–Zagier–Kolyvagin"
2019 Spring	· Casimir Kothari '20. Junior paper: "Around Goldfeld's conjecture"
2019 Spring	· Dylan Galt '20. Reading course on the arithmetic of elliptic curves
2018 Summer	· Gary Hu '20. Reading course on p-adic singular moduli
2018 Summer	· Cooper Young '20. Reading course on p-adic singular moduli
2018 Spring	· Murilo Zanarella '19. Junior paper: "Kolyvagin's conjecture for supersingular primes"
2018 Spring	· Alec Leng '21. Reading course on the arithmetic of elliptic curves
2017 Summer	· Ishan Levy '19. Reading course on Stark's conjectures and p-adic analogs
2017 Summer	· Samuel Marks '19. Reading course on Stark's conjectures and p-adic analogs

UCLA

2016 Spring	· Jaehoon Lee *19. Reading course on Euler Systems
2015 Fall	· Van Latimer '16. Senior paper: "2-adic modular forms and Maeda's conjecture"
2014 Spring	· Yishu Gong '16. Junior paper: "Towards a p-adic theory of mock modular forms"
2014 Spring	· Ziyi Zhuang '15. Senior paper: "p-adic properties of Taylor coefficients of modular forms"
2013 Fall	· Zuhair Mullath *17. Reading course on Algebraic Geometry

Postdoctoral Mentees

· Kim Tuan Do, 2025–present.

· Raúl Alonso, 2023–present.

· Rusiru Gambheera, 2023–present.

· Syed Waqar Ali Shah, 2022–present.

· Zuhair Mullath, 2021–2024.

PhD Students

· Paul-Antoine Seitz, 2023–present.

· Yi-Li Wu, 2023–present.

· Mulun Yin, 2021–present (expected graduation: 2025).

· Christine Alar, 2021–present (expected graduation: 2025).

· Mychelle Parker, 2021–present (expected graduation: 2025).

Professional Service

· Organizer (with Ashay Burungale, Antonio Lei, and Christopher Skinner), BIRS Workshop: "Iwasawa Theory for GL(2) and Applications", Casa Matematica Oaxaca (August 30–September 4, 2026).

· Organizer (with Samit Dasgupta, Eyal Goren, Adrian Iovita, Antonio Lei, Alice Pozzi, Giovanni Rosso, and Jan Vonk), Conference: "Arithmetic cycles, Modular forms, and L-functions", Centre de Recherches Mathématiques (August 18–22, 2025).

· Co-organizer, UCSB Seminar on Geometry and Arithmetic (2019–present).

· Project co-leader with Zheng Liu, APAW 2022 Collaborative Research Workshop.

· ANID-Chile grant external reviewer.

· ERC grant external reviewer.

· IRC grant external reviewer.

· NSERC grant external reviewer.

· NSF panelist.

· External reviewer for the Marie Curie COFUND project "WINNINGNormandy".

· External reviewer for the María de Maeztu post-doctoral call.

· Second reader for the PhD thesis of Raúl Alonso *23 (advisor: Chris Skinner), Princeton University.

· Second reader for the PhD thesis of Kim Tuan Do *22 (advisor: Chris Skinner), Princeton University.

· Chair, UCSB Algebra Hiring Committee (Fall 2024).

· Department graduate advisor (2021–present).

· Member, UCSB VAP Hiring Committee (Winter 2022, Winter 2023).

· Member, UCSB Hiring Practices Committee (Winter 2021).

· Co-organizer, Student learning seminar on Iwasawa theory for elliptic curves (Fall 2021).

· Organizer, UCSB Mathematics Department Colloquium (Fall 2019).

· Co-organizer, Princeton Mathematics Department Colloquium (Spring 2019).

· Co-organizer, Princeton University/IAS Number Theory Seminar (2018–2019).

· Projects assistant for Christopher Skinner, Arizona Winter School 2018: Iwasawa Theory.

· Second reader for the PhD thesis of Maya Thackeray *20 (advisor: Chris Skinner), Princeton University.

· Second reader for the senior thesis of Murilo Zanarella '19 (advisor: Chris Skinner), Princeton University.

· Second reader for the senior thesis of Matt Tyler '19 (advisor: Manjul Bhargava), Princeton University.

· Reader/examiner for the senior thesis of Miranda Moore '17, Princeton University.

· Co-organizer, UCLA Number Theory Seminar (2013–2016).

· Organizer, UCLA Participating Number Theory Seminar (Fall 2014).

Personal

· Birthdate: July 28, 1986

· Spanish citizen and US permanent resident

Last updated: March 2025