

# Kristin Courtney

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## Employment

*Assistant Professor of Mathematics*, University of Southern Denmark, August 2023

*Junior Professor of Theoretical Mathematics (W1)*, WWU Münster, April 2022-August 2023.

*Akademische Rätin auf Zeit* (postdoc with Habilitation track), WWU Münster, April 2020- March 2022.

*Wissenschaftliche Mitarbeiterin* (postdoc), WWU Münster, September 2018- March 2020.

## Education

Bachelor of Science, Mathematics, Summa cum laude and University Honors Scholar,  
Auburn University, 2010.

Bachelor of Arts, Philosophy, Summa cum laude and University Honors Scholar,  
Auburn University, 2010.

Master of Science, Mathematics,  
Auburn University, 2013.

Ph.D. Mathematics,  
University of Virginia, 2018.

Advisor: David Sherman

Thesis Title: "C\*-algebras and their finite-dimensional representations"

## Articles

### *Published*

B. Armstrong, G. G. de Castro, L. Orloff Clark, K. Courtney, Y-F. Lin, K. McCormick, J. Ramagge, A. Sims, and B. Steinberg. "Reconstruction of twisted Steinberg algebras," *Int. Math. Res. Not.* r nab291, 2021. <https://doi.org/10.1093/imrn/r nab291>. arXiv:2101.08556.

B. Armstrong, L. Orloff Clark, K. Courtney, Y-F. Lin, K. McCormick, and J. Ramagge. "Twisted Steinberg algebras," *J. Pure Appl. Algebr.* **226** (2020), Issue 3. <https://doi.org/10.1016/j.jpaa.2021.106853> (arXiv:1910.13005).

K. Courtney. "Universal C\*-algebras with the Local Lifting Property," *Math. Scand.* **127** (2021), 361-381. <https://doi.org/10.7146/math.scand.a-126018> (arXiv:2002.02365).

K. Courtney, T. Shulman. "Free products with amalgamation over central C\*-subalgebras," *Proc. Amer. Math. Soc.* **148** (2020), 765-776. <https://doi.org/10.1090/proc/14746> (arXiv:1809.09134).

K. Courtney, T. Shulman. "Elements of  $C^*$ -algebras attaining their norm in a finite-dimensional representation," *Canad. J. Math.* **71** (2019), Issue 1, 93-111. <http://dx.doi.org/10.4153/CJM-2017-040-x> (arXiv:1707.01949).

K. Courtney, D. Sherman. "The universal  $C^*$ -algebra of a contraction," *J. Operator Theory.* **84** (2020), Issue 1, 153-184. arXiv:1811.04043.

### *Preprints and in Preparation*

K. Courtney, A. Duwenig, M. Georgescu, A. an Huef, M. G. Viola, "Alexandrov groupoids and the nuclear dimension of twisted groupoid  $C^*$ -algebras." arXiv:2211.00547

K. Courtney, W. Winter, "CPC\*-systems."

K. Courtney, "Nuclear  $C^*$ -algebras and cpc systems."

## Grants and Fellowships

(Co-PI) National Science Foundation (US), Groundwork for Operator Algebras Lecture Series # DMS-2154574 (\$49,935), April 01, 2022- August 31, 2023.

(Co-PI) National Science Foundation (US), Groundwork for Operator Algebras Lecture Series # DMS-2000131 (\$42,000), April 01, 2020- September 30, 2021.

Oberwolfach Leibniz Graduate Students Grant recipient, August 2019.

American Mathematical Society, Joint Math Meetings 2018 Travel Grant.

Association for Women in Math, Joint Math Meetings 2018 Workshop Grant.

US Junior Oberwolfach Fellow, September 2017.

Spring Dissertation Fellowship, University of Virginia, Spring 2017.

### *Distinguished Research Program*

Structured Quartet Research Ensembles (SQuaRE) (small research groups), American Institute of Mathematics (AIM), 2019-2023.

Invited Researcher, Intensive Research Program on Operator Algebras: Dynamics and Interactions, Centre de Recerca Matemàtica, Bellaterra, March-July 2017.

## Presentations

### *Invited: Conferences, Global Seminars, Colloquia*

1.  $C^*$ -Algebras: Tensor Products, Approximation & Classification, WWU Münster, July 2023.
2. Groups and operator algebras, Institute of Mathematics of Orsay, June 2023.
3. Noncommutative Geometry Festival, Washington University in St. Louis, June 2023.
4. Barcelona Weekend in Operator Algebras, Universitat Autònoma de Barcelona, January 2023.

5. Oberwolfach Workshop 2232:  $C^*$ -algebras, Mathematisches Forschungsinstitut Oberwolfach (MFO), August 2022.
6. Institutskolloquium, Institut für Mathematik Universität Potsdam, May 2022.
7. University Quantum Symmetries Lectures, Online, February 2022.
8. Automorphisms and Invariants of Operator Algebras, University of Copenhagen, October 2021.
9. 8<sup>th</sup> European Congress of Mathematics Operator Algebras Mini-Symposium, Online, June 2021.
10. Conference on Operator Algebras & Related Topics: In memory of Vaughan Jones, Istanbul Center for Mathematical Sciences, June 2021.
11. 37<sup>th</sup> Southeastern Analysis Meeting (Semiplenary), Online, March 2021.
12. Global Noncommutative Geometry Seminar (Europe), Online, March 2021.
13. IPAM (Institute for Pure and Applied Mathematics) Virtual Workshop: "Actions of Tensor Categories on  $C^*$ -algebras," Minicourse on "The abstract approach to classifying  $C^*$ -algebras," UCLA, January 2021.
14. Joint Mathematics Meetings – Special Session on Advances in Operator Algebras, Online, January 2021.
15. Winter Canadian Math Society Meeting, Online, December 2020.
16. Global Noncommutative Geometry Seminar (US), Online, September 2020.
17. Special Week on Operator Algebras, East China Normal University, Shanghai, August 2020.
18. UK Virtual Operator Algebras Seminar, May 2020.
19. Workshop on K-theory, Honolulu, Hawai'i, December 2019.
20. Mathematics Colloquium, Queens University Belfast, November 2019.
21. BIRS Workshop 19w5134 Classification Problems in von Neumann Algebras, Banff International Research Station for Mathematical Innovation and Discovery (BIRS), September 2019.
22. BIRS Workshop 19w5073 Topology and Measure in Dynamics and Operator Algebras, BIRS, September 2019.
23. Oberwolfach Workshop 1933:  $C^*$ -algebras, MFO, August 2019.
24. Groupoids, Graphs, and Algebras, University of Sydney, July 2019.
25. East Coast Operator Algebras Symposium, Texas Christian University, October 2018.
26. International Congress of Mathematicians-Satellite Conference in Operator Algebras, Florianópolis, Brazil, July 2018.
27. (Sub)factors in Maui, University of Hawaii Maui College, May 2018.
28. AMS Sectional Meeting – Special Session on Advances in Operator Algebras, Vanderbilt University, April 2018.
29. University of New Hampshire Mathematics Colloquium, April 2018.
30. Workshop on computability of K-theory for  $C^*$ -algebras, Texas A& M University, February 2018.

31. Joint Mathematics Meetings – Special Session on Advances in Operator Algebras, San Diego, CA, January 2018.
32. Brazos Analysis Seminar, University of Houston, November 2017.
33. Oberwolfach Mini-Workshop: MASAs and Automorphisms of  $C^*$ -Algebras, MFO, September 2017.
34. Noncommutative Geometry and Operator Algebras Spring Institute (NCGOA), Vanderbilt University, May 2017.

*Invited: Local Seminars*

1. Research Training Group “Fourier Analysis and Spectral Theory” Colloquium, University of Göttingen, October 2022.
2. Operator Algebra and Noncommutative Geometry Seminar, University of Wollongong, September 2021.
3. University of Virginia Operator Theory Seminar, March 2021.
4. Purdue Operator Algebras Seminar, Online, October 2020.
5.  $C^*$ -web Seminar, Universidade Federal de Santa Catarina, October 2020.
6. Operator Algebra Seminar, Université de Paris, March 2020.
7. Operator Algebra and Noncommutative Geometry Seminar, University of Wollongong, March 2020.
8. Seminar “Groups and Analysis”, Université de Neuchâtel, November 2019.
9. University of Virginia Operator Theory Seminar, September 2019.
10. KU Leuven Operator Algebra Seminar, May 2019.
11. University of Sydney Algebra Seminar, March 2019.
12. University of Glasgow Analysis Seminar, February 2019.
13. University of New Hampshire Analysis Seminar, November 2018.
14. University of Glasgow Analysis Seminar, January 2018.
15. WWU Münster Oberseminar  $C^*$ -Algebren, January 2018.
16. Pennsylvania State University Noncommutative Geometry Seminar, October 2017.
17. University of Manitoba Functional Analysis Seminar Series, October 2017.
18. United States Naval Academy Operator Algebras and Dynamics Seminar, April 2017.
19. Virginia Commonwealth University Analysis, Logic, and Physics Seminar, April 2017.
20. Technische Universität Dresden Seminar Geometrie, March 2017.
21. University of New Hampshire Analysis Seminar, February 2017.

## Professional Experience, Development, and Service

Organizer for Twinned Conference on  $C^*$ -algebras and Tensor Categories (Jointly at ICMS and Fields), November 2023.

Organizer and Lecturer, Groundwork for Operator Algebras Lecture Series (GOALS) Summer School for graduate students, June-July 2020, July 2021, and July 2022.

Executive Board Member, CRC 1442 Geometry: Deformations and Rigidity, 2020 – present.

Member, Mathematics Münster Excellence Cluster Equal Opportunity Committee, WWU Münster, 2021-present.

Organizer, Young Mathematicians in  $C^*$ -algebras (YMC<sup>\*</sup>A) 2021, WWU Münster, August 2021.

Organizer, Focus Programme “Operator algebras and topological dynamics: amenability and beyond”, WWU Münster, 2021.

Panelist, National Science Foundation (NSF) panel, 2021.

Member, Professor (W2) Hiring Committee, WWU Münster, 2020 and 2021.

Member, Professor (W2) Hiring Committee, WWU Münster, 2019.

Founding Member and Junior Mentor, Operator Algebras Mentor Network, August 2019 – present.

Organizer, YMC<sup>\*</sup>A 2019, University of Copenhagen, August 2019.

Organizer, Young Women in  $C^*$ -algebras (YWC<sup>\*</sup>A) 2018, KU Leuven, August 2018.

Organizer, Teaching for Diversity Workshop, University of Virginia (UVA), August 2017.

Organizer, Three Minute Math Thesis Competition, UVA, January 2017.

Organizer, Graduate Student Seminar, UVA, Fall 2016-Spring 2018.

Guest Speaker, Seminar on College Teaching (Mathematics), UVA, Fall 2017.

Teaching Mentor for Junior Mathematics Graduate Teaching Assistants, UVA, Fall 2016, Fall 2017.

Mentor, Association of Women in Mathematics, UVA, Fall 2016-Spring 2018.

Chapter Officer, Association of Women in Mathematics UVA, Fall 2016-Spring 2017.

Volunteer, Math Ambassadors Outreach Program, UVA, Fall 2014-Spring 2018.

Participant, Flipped-Classroom: Calculus-Instruction Workshop, UVA, May 2016.

Panelist, Women Leadership Symposium, Auburn University, May 2013.

## Honors and Awards

All-University Graduate Teaching Award, University of Virginia, April 2017.

Auburn University Outstanding Masters Student, May 2013.

College of Science and Math Graduate Teaching Assistant Award Department Nominee, March 2013.

College of Science and Math Dean’s Research Award for Masters Students Department Nominee, March 2013, March 2012.

Auburn University Department of Math and Statistics Excellence in Research Award, December 2012, December 2011.

*Invited Workshop Participation*

BIRS workshop 23w5089 Women in Operator Algebras III, BIRS, June 2023.

Oberwolfach Workshop 2232:  $C^*$ -algebras, MFO, August 2022.

BIRS Workshop 21w5199 Women in Operator Algebras II, hybrid event, December 2021.

BIRS Workshop 19w5134 Classification Problems in von Neumann Algebras, BIRS, September 2019.

BIRS Workshop 19w5073 Topology and Measure in Dynamics and Operator Algebras, BIRS, September 2019.

Oberwolfach Workshop 1933:  $C^*$ -algebras, MFO, August 2019.

BIRS Workshop 18w5155 Model Theory and Operator Algebras, BIRS, November 2018.

BIRS Workshop 18w5168 WOA: Women in Operator Algebras, BIRS, November 2018.

Oberwolfach Mini-Workshop: MASAs and Automorphisms of  $C^*$ -Algebras, MFO, September 2017.

## Teaching Experience

*Groundwork for Operator Algebras Lecture Series (GOALS)*

Summer School for PhD students

**Lecturer**  $C^*$ -mini-course, Summer 2020, Summer 2021, Summer 2022.

*WWU Münster*

**Co-organizer (with Dr. Sam Evington)** Master Seminar: Tensor Products and Kirchberg's Conjectures, SS23.

**Lecturer: Funktionentheorie für Lehramtstudierende, WS22-23. (Taught in German)**

**Co-organizer (with Dr. Giles Gardam)** Bachelor/ Master Seminar: Sofic Groups, SS22.

**Teaching Assistant** Mathematik III für Studierende der Physik WS21-22.

*Wrote and coordinated exercises/exams.*

**Co-organizer (with Jun. Prof. Tim de Laat)** Bachelor Seminar: Mathematik der Demokratie, WS21-22

**Teaching Assistant** Spezielle Themen der Mathematik SS 2021.

*Wrote and coordinated exercises/exams.*

**Teaching Assistant** Operator Algebras I- WS20-21. *Wrote and coordinated exercises/exams.*

**Co-organizer (with Prof. Siegfried Echterhoff)** Bachelors Seminar on Functional Analysis, SS20.

**Teaching Assistant** Functional Analysis WS19-20. *Wrote and coordinated exercises/exams.*

**Teaching Assistant** Operator Algebras II- SS19. *Wrote and coordinated exercises/exams.*

### University of Virginia

**Instructor (i.e., Lecturer):** Financial Math- Sp18. Proofs in Analysis (Graduate Course)- Summer 17. Calculus I- F15, F17. Applied Calculus I- F14, Sp16. Applied Calculus II- Sp15, F16.  
*Wrote and delivered lectures, exams, and exercises.*

**Teaching Assistant** Calculus I- Sp14. Calculus II- F13. *Supervised exercise sessions.*

**Grader** Graduate Complex Analysis- F16. Introduction to Abstract Algebra- Sp14. Ordinary Differential Equations- F13.

### Auburn University

**Instructor (i.e., Lecturer):** Calculus III- Summer 13. Pre-Calculus with Algebra and Trigonometry- Sp13 (2 sections). Calculus II- F12 (2 sections). Calculus I- Summer 12, Sp12 (2 sections), F11 (2 sections).  
*Wrote and delivered lectures, exams, and exercises.*

**Teaching Assistant:** Introduction to Abstract Algebra- Sp11. College Algebra - F10. College Algebra Trigonometry- F10. *Supervised exercise sessions.*

**Coordinator Assistant:** Pre-Calculus with Trigonometry- Sp11.

### Supervision

#### Doctoral Students

Lukas Obermeyer, WWU Münster (beginning October 2023).

#### Bachelors Students

Muhamedwessam Agha, "Fairness in Form- Aufdeckung von Gerrymandering im Redistricting." WWU Münster, 2022.

Daniel Schmidt, "Können kollektive Entscheidungsprozesse fair sein? Eine Einführung in die mathematischen Aspekte der Sozialwahltheorie." WWU Münster, 2022.

Herrn Almaz, "Gerechte Aufteilung." Münster, 2022. (co-supervised)

Henning Raabe, "Umlaufzahlen stückweise stetig differenzierbarer Wege und der Residuensatz." WWU Münster, 2021. (co-supervised)

Enes Kurt, "Die Kazhdan Eigenschaft (T)." WWU Münster, 2021. (co-supervised)

Christian Uebbing, "Gruppen mit Kazhdans Eigenschaft (T) versus Mittelbarkeit." WWU Münster, 2021. (co-supervised)

Morris Kopelke, "Minimale paradoxe Zerlegungen in höheren Dimensionen." WWU Münster, 2020. (co-supervised)

Philipp Sibbel, "Mittelbare Lokalkompakte Gruppen." WWU Münster, 2020.

Lukas Obermeyer, "C\*-Gruppenalgebren mittelbarer Gruppen und unitäre Darstellungen." WWU Münster, 2020. (co-supervised)

Ralf Küpper, "Thompsons Gruppe  $F$ ." WWU Münster, 2020.

### Personal

Languages: English (Native), German (B2)