

# Colleen Robichaux

## Curriculum Vitae

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### Education

- In progress **Ph.D. in Mathematics**, *University of Illinois at Urbana-Champaign*, Urbana, IL, Honors: NSF Graduate Research Fellow.
- 2016-2018 **M.S. in Mathematics**, *University of Illinois at Urbana-Champaign*, Urbana, IL.
- 2011-2016 **B.S. in Mathematics with a concentration in Secondary Education**, *Louisiana State University*, Baton Rouge, LA, Honors: University Medalist, Astronaut Scholar.

### Research Interests

Combinatorics in relation to commutative algebra, geometry, and algorithms

### Publications

#### Peer-Reviewed Journals

- May 2019 (with Anshul Adve, Alexander Yong) *Vanishing of Littlewood-Richardson polynomials in  $P$* , *Computational Complexity*, Vol. 28(2) (2019), 241–257.
- March 2016 (with Christian Gaetz, Michelle Mastrianni, Rebecca Patrias, Hailee Peck, David Schwein, Ka Yu Tam) *K-Knuth Equivalence for Increasing Tableaux*, *Electronic Journal of Combinatorics*, Vol. 23(1) (2016), P1.40.

#### Refereed Conference Proceedings

- April 2019 (with Anshul Adve, Alexander Yong) *Complexity, Combinatorial Positivity, and Newton Polytopes*, The 31st International Conference on Formal Power Series and Algebraic Combinatorics, Ljubljana, Slovenia (FPSAC 2019). To appear in *Séminaire Lotharingien de Combinatoire*.

#### Preprints

- December 2019 (with Jenna Rajchgot, Yi Ren, Avery St. Dizier, and Anna Weigandt) *Degrees of symmetric Grothendieck polynomials and Castelnuovo-Mumford regularity*, arXiv:1912.04477.
- August 2019 (with Harshit Yadav, Alexander Yong) *Equivariant cohomology, Schubert calculus, and edge labeled tableaux*, arXiv:1908.11224.
- June 2019 (with Harshit Yadav, Alexander Yong) *The  $A \cdot B \cdot C$ -Ds of Schubert calculus*, arXiv:1906.03646.
- October 2018 (with Anshul Adve, Alexander Yong) *Complexity, Combinatorial Positivity, and Newton Polytopes*, arXiv:1810.10361.

## Talks and Poster Presentations

- **The A·B·C·Ds of Schubert calculus.** Western Sectional Meeting, Combinatorics of Reduced Decompositions of Elements of Coxeter Groups and Related Topics, California State University, Fresno, Fresno CA. Cancelled due to COVID-19 (May 2, 2020)
- **Equivariant cohomology, Schubert calculus, and Edge labeled tableaux.** Spring Eastern Sectional Meeting, Recent Advances in Schubert Calculus and Related Topics, II, Tufts University, Medford, MA. Cancelled due to COVID-19 (March 21, 2020)
- **The A·B·C·Ds of Schubert calculus.** AMS Spring Southeastern Sectional Meeting, Combinatorics Related to Geometry and Representation Theory, IV, University of Virginia, Charlottesville, VA. Cancelled due to COVID-19 (March 15, 2020)
- **CM regularity and Kazhdan-Lusztig varieties.** MAAGC 2020 Poster Session, University of Virginia, Charlottesville, VA. Cancelled due to COVID-19 (March 13, 2020)
- **CM regularity and Kazhdan-Lusztig varieties.** ALGECOM Poster Session, University of Illinois at Urbana-Champaign, Urbana, IL. (March 7, 2020)
- **Degree of Grothendieck polynomials and Castelnuovo-Mumford regularity.** AWM Mini Symposium, University of Illinois at Urbana-Champaign, Urbana, IL. (February 8, 2020)
- **Degree of Grothendieck polynomials and Castelnuovo-Mumford regularity.** Combinatorial Algebraic Geometry session, CMS Winter Meeting 2019, Toronto, ON. (December 8, 2019)
- **Degree of Grothendieck polynomials and Castelnuovo-Mumford regularity.** Algebra, Geometry, and Combinatorics Seminar, University of Illinois at Urbana-Champaign, Urbana, IL. (November 21, 2019)
- **Schubert Polynomials and Computational Complexity.** Undergraduate Seminar, University of Illinois at Urbana-Champaign, Urbana, IL. (October 25, 2019)
- **Schubert Polynomials and Computational Complexity.** New Facets of Algebraic Geometry Contributed talk, University of Michigan, Ann Arbor, MI. (October 18, 2019)
- **A conversation about Algebraic Combinatorics and Computational Complexity.** GROW 2019 Plenary Talk, University of Illinois at Urbana-Champaign, Urbana, IL. (October 6, 2019) (joint with Alexander Yong)
- **The A·B·C·Ds of Schubert calculus.** ALGECOM Poster Session, Washington University in St. Louis, St. Louis, MO. (September 21, 2019)
- **Complexity, Combinatorial Positivity, and Newton Polytopes.** FPSAC Poster Session 1, Ljubljana, Slovenia. (July 1, 2019)
- **Enumerative Geometry and Combinatorics.** Summer Illinois Mathematics Camp Talk, University of Illinois at Urbana-Champaign, Urbana, IL. (June 17, 2019)
- **Complexity, Combinatorial Positivity, and Newton Polytopes.** ALGECOM Poster Session, Loyola University Chicago, Chicago, IL. (May 25, 2019)
- **Complexity, Combinatorial Positivity, and Newton Polytopes.** Combinatorics Seminar, Washington University in St. Louis, St. Louis, MO. (April 12, 2019)

- **Complexity, Combinatorial Positivity, and Newton Polytopes.** Graduate Student Combinatorics Conference, University of Pennsylvania, Philadelphia, PA. (April 6, 2019)
- **Complexity and Combinatorial Positivity.** AWM Mini Symposium, University of Illinois at Urbana-Champaign, Urbana, IL. (February 9, 2019)
- **Complexity, Combinatorial Positivity, and Newton Polytopes.** Algebra, Geometry, and Combinatorics Seminar, University of Illinois at Urbana-Champaign, Urbana, IL. (March 28, 2019)
- **Vanishing of Littlewood-Richardson polynomials is in P.** Workshop on Representation Theory, Combinatorics, and Geometry Contributed Talk, University of Virginia, Charlottesville, VA. (October 20, 2018)
- **Vanishing of Littlewood-Richardson polynomials is in P.** ALGECOM Poster Session, University of Michigan, Ann Arbor, MI. (March 24, 2018)
- **Vanishing of Littlewood-Richardson polynomials is in P.** Algebra, Geometry, and Combinatorics Seminar, University of Illinois at Urbana-Champaign, Urbana, IL. (November 15, 2017)

## Teaching

### University of Illinois at Urbana-Champaign

Spring 2018 Teaching Assistant in Calculus II (MATH 231) Merit Program

- Active learning environment
- Designed worksheet and activities for each lesson

Fall 2017 Teaching Assistant in Calculus I (MATH 220) Merit Program

- Active learning environment
- Designed worksheet and activities for each lesson

### East Ascension High School

Spring 2016 Student Teacher in Geometry, Algebra II

- Inquiry-based learning environment
- Planned curriculum and lessons
- Wrote assessments and materials

### Louisiana State University

Summer 2015 Instructor

- MATH Circle Camp for middle and high school students
- Designed and led activities

## Service and Outreach

- Association of American Universities (AAU) PhD Initiative Mathematics Committee Member, (2020–)
- IGL Undergraduate Outreach, Graduate Mentor (2018–)
  - Organized Four Color Theorem activity at International Prep Academy (March 2020)
  - Led SACNAS and Friends activity, 3D printing and modeling (February 2020)

- Led Julia Robinson Day activity, Grape Codes (February 2020)
- Led Franklin STEAM academy science night activity, Brunnian links (August 2019)
- Training of Undergraduates (Fall 2019), automata, Brunnian links, platonic solids, 4-color theorem
- Led Illinois Council of Teachers of Mathematics math contest activity, Comparing Algorithms (May 2019)
- Assisted with Franklin STEAM Academy Family STEAM Night activity, Platonic Solids (April 2019)
- Led Tri-Point High School STEM day activity, Decoding an Automaton (April 2019)
- Led Rantoul High School field trip activity, Can It Tessellate (March 2019)
- Assisted with Southern Illinois High school field trip activity, Decoding an Automaton (March 2019)
- Training of Undergraduates (Spring 2019), automata, algorithms, tessellations activities
- Training of Undergraduates (Fall 2018), platonic solids, fractals, Brunnian links activities
- IGL Outreach, Founded IGL Undergraduate Outreach (August 2018)
- Sloan University Center of Exemplary Mentoring, Graduate Student Mentor (August 2018-May 2019)
- Illinois Geometry Lab (IGL), Outreach Manager and Leadership Team Member (2017-)
- Girls Engaged in Math and Science (GEMS), Led origami activity with (9-12) students (March 2018)
- Sonia Math Day, Planned and led Brunnian links and hexaflexagons activities with for (9-12) students (November 2017, April 2018)
- iSTEM, Led partitions activity with (9-12) students (August 2017)
- First Lego League Robotics Competition, Led platonic solids activity with K-3 aged children (January 2017, 2018)
- Science at the Market, Led platonic solids activity with K-3 aged children (October 2016)

## — Awards, Honors, and Fellowships

- 2018-2022 NSF Graduate Research Fellowship
- 2019-2020 Irving Reiner Memorial Award in Algebra
- 2016-2017 GAANN Fellowship
- 2015-2016 Astronaut Scholarship

## — Computer skills

Programming Java, Python, SAGE