

# Julianne M. Vega

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## EDUCATION

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UNIVERSITY OF KENTUCKY, Lexington, KY

**Doctor of Philosophy in Mathematics – Topological Combinatorics**

Expected May 2020

**Graduate Certificate in Instructional Coaching**

Expected May 2020

**Masters of Arts in Mathematics**

December 2017

SUSQUEHANNA UNIVERSITY, Selinsgrove, PA

May 2012

**Bachelor of Arts in Mathematics**

**Summa Cum Laude**

Minor in **Computer Science**

GPA: **3.878/ 4.0**

**PA Certification, Secondary Education Mathematics (7-12)**

July 2012

## RESEARCH INTERESTS

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Topological and enumerative combinatorics, simplicial complexes, posets, graphs, and equivariance.

## TEACHING APPOINTMENTS

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UNIVERSITY OF KENTUCKY, Lexington, KY

**Primary Instructor**

June 2018 - Present

**Teaching Assistant**

August 2015 – June 2018

KENTUCKY STATE UNIVERSITY, Frankfort, KY

**Dual-Credit Coordinator**

January 2019 – May 2019

BURGUNDY FARM COUNTRY DAY SCHOOL

**Middle School Mathematics Teacher - Grade 6 through Grade 8**

August 2012 – July 2015

**7th Grade Homeroom Leader and Advisor**

August 2012 – July 2015

SUSQUEHANNA UNIVERSITY

**Supplemental Instructor**

August 2010 – May 2011

## PUBLICATIONS

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- Two-matching complexes  
(*Submitted, arXiv:1909.10406*)
- Hajós-type constructions and neighborhood complexes, joint with Benjamin Braun  
(*Submitted, arXiv:1812.07991*)
- Matching complexes of trees and applications of the matching tree algorithm, joint with Marija Jelić Milutinović, Helen Jenne, and Alex McDonough  
(*Submitted, arXiv:1905.10560*)
- A positivity phenomenon in Elser's Gaussian-cluster percolation model, joint with Galen Dorpalen-Barry, Cyrus Hettle, David Livingston, Jeremy Martin, George Nasr, and Hays Whitlatch  
(*Submitted, arXiv:1905.11330*)

## SELECT PRESENTATIONS

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- (*Upcoming*) Lattice Polytopes arising from Schur Polynomials and Symmetric Grothendick Polynomials  
AWM Workshop: Poster Presentations by Women Graduate Students  
Joint Math Meetings
- January 2020

- (*Upcoming*)  $k$ -matching sequences of simplicial complexes  
American Mathematical Society Special Session: Women in Topology  
Joint Math Meetings January 2020
- (*Upcoming*) A positivity phenomenon in Elser’s Gaussian-cluster percolation model  
American Mathematical Society Special Session: Great Plains Graduate Research Workshop in Combinatorics  
Joint Math Meetings January 2020
- 2-matching complexes of clawed graphs  
American Mathematical Society Special Session: Madison, Wisconsin September 2019
- Techniques for determining the homotopy type of matching complexes  
USTARS: Ames, Iowa April 2019
- Hajós-type Constructions and Neighborhood Complexes
  - American Mathematical Society Special Session: Hartford, Connecticut April 2019
  - University of Nebraska-Lincoln, Discrete Seminar March 2019
  - Einstein Workshop - Poster Session: Berlin, Germany October 2018
- Matching complexes of caterpillar graphs  
University of Kentucky, GSM Colloquium March 2019
- Chromatic Numbers, Hom Complexes, and Topological Obstructions  
University of Kentucky, Qualifying Presentation April 2018
- Does not commute: A journey through persistent homology  
University of Kentucky, Topology Seminar March 2018
- “You are not anonymous... Wait, what’s your name again?”  
University of Kentucky, Teaching and Learning Seminar October 2017
- From Repose to Animation: A Look at Homotopy Types of Posets  
University of Kentucky, Masters Presentation September 2017
- Topological Psychology: How topology can be the cumbersome solution to all of life’s questions  
University of Kentucky, Math Club April 2017
- Topological Techniques in Combinatorics  
University of Kentucky, Topology Seminar November 2016
- Just your average American: How NPR inspired me to learn about Orbifolds  
University of Kentucky, Graduate Student Colloquium September 2016

## RESEARCH EXPERIENCE

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**Student Researcher**, Ames, IA June 2018-Present

Rocky Mountain - Great Plains Graduate Research Workshop in Combinatorics

- Proposed an open problem on the topology of matching complexes, revised and presented the problem, led a research collaboration, maintained collaboration through video meetings and emails.

**Teacher Researcher**, Willamette Valley REU-RET, Linfield College June-August 2014

Dr. Charles Dunn, Professor and Chair and Dr. Jennifer Nordstrom, Professor

- Researched relaxed variations of the total coloring game on trees and chordal graphs. Composed a paper to summarize findings and presented results at Mathfest 2014. Created a teaching resource that connects undergraduate mathematics to middle school mathematics concepts. Presented graph coloring to school community through guided discussions.

**Research Assistant**, Susquehanna University, Computer Science Department August 2011-May 2012

Dr. Toshiro Kubota, Associate Professor

- Researched best practices for teaching introductory programming courses through communication with secondary and undergraduate level educators, reviewed college textbooks, and summarized current research findings through a white paper.

**Research Assistant**, Susquehanna University, Education Department May 2011-May 2012

Dr. Michael Hayes, Assistant Professor

- Scored surveys and tests through creating and running scoring programs and organized and analyzed data using Microsoft Excel and Microsoft Access. Presented education poster at Pennsylvania Psychological Association June 2011.

## COMPETITIVE AWARDS, GRANTS, AND HONORS

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### **Joint Mathematics Meeting Travel Grant** September 2019

Association for Women in Mathematics

- Awarded \$810 for travel to the 2020 Joint Mathematics Meeting and to participate in the Association for Women in Mathematics poster session.

### **Women and Mathematics Graduate Ambassadorship** August 2019

Institute for Advanced Study

- Awarded \$1,000 for the 2018-2019 school year to build a support structure for undergraduate math majors at UK through “A Night of Mathematical Musings” and to extend the Appalachian Initiative for Mathematics to include outreach to high schools.

### **AWM Student Chapter Award for Community Outreach** June 2019

Association for Women in Mathematics – Standing position: Student Chapter Vice-President

- A national award that highlights and rewards a student chapter for its outstanding engagement with the local community by highlighting women in mathematics or by demonstrating the power and fascination of mathematics.

### **Year of Equity Initiative Grant** June 2019

University of Kentucky - The Graduate School

- Awarded \$400 for the fall semester, with renewal available for spring semester, to support Inclusive Community Lunches to provide lunch, invite speakers, and broaden our efforts to be university wide.

### **Pillar Award for Belonging and Engagement** April 2019

University of Kentucky - Graduate Student Council

- Awarded to a student who contributes significantly toward creating a sense of community for graduate students by supporting their growth, challenging viewpoints, and building lasting relationships.

### **Summer Research Fellowship** April 2019

University of Kentucky - Mathematics Department

- Graduate student award of \$3000 for continued research development. Given to 3 out of 60 students.

### **Professional Development Grant** November 2018

University of Kentucky - Center for Graduate and Professional Diversity Initiatives

- Awarded \$750 for student professional development and networking activities, and used to fund collaborator travel to finish paper.

### **Graduate Scholar in Mathematics** August 2015 - August 2017

University of Kentucky - Mathematics Department

- A two year scholarship that provides support to minorities in the Mathematics community.

### **Royster Graduate Scholarship** August 2015

University of Kentucky - Mathematics Department

- Awarded to students that demonstrate outstanding performance in teaching and scholarship, and show research promise.

### **Jack Reade Award** May 2012

Susquehanna University - Mathematics Department

- Awarded to students that demonstrate achievement in Mathematics.

## TEACHING

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UNIVERSITY OF KENTUCKY, Lexington, KY

August 2015-Present

### **PRIMARY INSTRUCTOR**

**Geometry for Middle School Teachers (MA 241)** Fall 2019

**Problem Solving for Middle School Teachers (MA 308)** Spring 2019

- Designed course learning objectives

- Developed course curriculum that aligned objectives, assignments, and assessments
- Maintained continuous course communication and individualized feedback through Canvas Learning Management System

**College Algebra (MA 109)**

Fall 2018

- Instructed a class of 75 students
- Supervised Undergraduate Assistant and mentored teaching practices
- Implemented engaging, group-based lessons tailored to learning objectives and student understanding

**Elementary Calculus – Distance Learning Course (MA123)**

Summer 2018

- Instructed 58 students through Canvas Learning Management System
- Held virtual office hours through Piazza
- Developed and implemented group projects through Piazza
- Proctored on-campus exams and communicated with several proctoring centers

**RECITATION LEADER**

Fall 2015 - Spring 2018

**Calculus II (MA114) , Calculus II - Life Sciences (MA 138), Algebra and Trigonometry for Calculus (MA 110), Calculus I - Life Sciences (MA 137)**

- Maintained positive and collaborative learning environment
- Graded and provided feedback on formative and summative assessments
- Led review discussions of lecture material
- Prepared example problems and worksheets

KENTUCKY STATE UNIVERSITY, Lexington, KY

**DUAL CREDIT COORDINATOR**

January 2019-May 2019

**College Algebra (MA 115)**

- Supervised seven high school offerings of college algebra
- Compiled and recorded midterm and final grades
- Maintained email communication with teachers, parents, and administrators

BURGUNDY FARM COUNTRY DAY SCHOOL, Alexandria, VA

**MIDDLE SCHOOL MATHEMATICS TEACHER**

August 2012-July 2015

**Grade 6 through Grade 8**

- Created and maintained individualized student mathematics portfolios with student reflections
- Designed and led architecture unit and mathematics in music unit
- Incorporated meaningful activities and projects into curriculum
- Provided ample and timely feedback to students
- Implemented assessment reflection system
- Created and implemented multiple projects that introduce students to higher mathematics

**7th Grade Homeroom Leader and Advisor**

August 2012-July 2015

- Developed 3- and 4-day curricula on sustainability, community service, and diversity
- Held portfolio-based conferences twice a semester that emphasized student progress
- Maintained communication between families and school through email, phone calls, and regular student meetings
- Led graduation decoration committee and Festival of Lights play committee

SUSQUEHANNA UNIVERSITY, Selinsgrove, PA

**SUPPLEMENTAL INSTRUCTOR**

August 2010-May 2011

**Calculus I**

- Instructed two 60 minute classes per week
- Assisted students during class instruction
- Proctored exams and evaluated student quizzes
- Collaborated with instructor on student progress

## SERVICE TO THE PROFESSION

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### DEPARTMENTAL SERVICE AT UNIVERSITY OF KENTUCKY

**Departmental Self-Study Committee – Graduate Student Representative** April 2019 - Present

**Appalachian Initiative for Mathematics – Co-founder** June 2018 - Present

- Maintain email communication with faculty and organize student visits to various universities with the long-term goal to increase diversity in the mathematical community.

**Inclusive Community Lunches – Co-organizer** June 2018 - August 2019

- Planned and coordinated monthly lunch and learn lessons around diversity, inclusion, and equity with a focus on learning more about our community and our contributions to it.

**Inclusive Pedagogies Learning Community – Graduate Member** August 2018 - April 2019

- Worked with graduate students and faculty from multiple departments to develop inclusive practices learning modules on Brave and Safe spaces.

**GSM Orientation Leader** August 2018

- Implemented a 4-day program for incoming graduate students on studying and learning mathematics with an emphasis on challenging oneself to be an independent learner through a guided mathematical reading and reflection.

**Fast Track Teaching Assistant** August 2017

- Assisted lecturer in a week-long introduction to College Algebra summer orientation by developing good study habits and strong foundational understanding in incoming undergraduate students.

**MicroTeaching Leader** August 2017

- Fostered quality teaching practices in incoming graduate student teaching assistants through class discussions and feedback on lessons.

**First-Year Representative (Graduate Student Council)** January 2016-December 2016

- Collaborated on departmental-wide mentorship program and organized social functions such as departmental teas.

**Math Circle Outreach Program Leader**

- Cryptography December 2018
- Quotient Spaces October 2017
- Euler Characteristic October 2016

### PROFESSIONAL BOARD EXPERIENCE AT BURGUNDY FARM COUNTRY DAY SCHOOL

**Faculty Representative on the Board of Trustees** September 2014-July 2015

- Served as a liaison between faculty and the board
- Attended monthly board meetings
- Spoke on behalf of the lower and middle school teachers
- Summarized and communicated board minutes with faculty
- Enhanced communication between administrators and faculty

**Professional Growth Advisory Board** September 2014-July 2015

- Created peer observation review system
- Collaborated with administrators on guest speakers
- Gathered faculty meeting discussion topics and presented to administrators
- Visited teacher classrooms and provided feedback to colleagues
- Maintained a peer to peer teaching journal with Kindergarten teacher

**Mathematics Curriculum Board** January 2014-July 2015

- Reviewed mathematics curriculum from Junior Kindergarten through Grade 8
- Contacted local schools for feedback on current mathematics programs
- Analyzed surveys and feedback to find appropriate programs that fit school standards
- Presented results to faculty and parents

**Communication Focus Group** January 2013-May 2013

- Attended discussion groups on emergency procedures and improving daily campus communication

- Provided input to better communication among faculty and school community

### **Middle School Advisory Board**

August 2012-September 2013

- Evaluated Middle School procedures and systems
- Communicated with parents on a regular basis through monthly meetings
- Edited school-wide report that summarized the expectations and procedures of the middle school
- Instrumental in creating and meeting expectations and deadlines

### **COMMUNITY INVOLVEMENT**

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LIVING ARTS AND SCIENCE CENTER, Lexington, KY

#### **General Volunteer**

January 2018 - Present

EXPANDING YOUR HORIZONS, Lexington, KY

#### **Workshop Leader: Group Theory**

April 2019

#### **Workshop Leader: Power Sets**

April 2018

NERD SQUAD, Lexington, KY

#### **4th and 5th Grade After School Club – Competitive Graph Coloring**

November 2018

#### **Demonstration Leader**

June - August 2016

CHILDREN'S SCIENCE CENTER, Northern VA

#### **Education Subcommittee Member**

June 2013-June 2014

### **ACTIVITIES AND MEMBERSHIPS**

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#### **Panel Experience**

- Applying for and Attending Graduate School – Appalachian Initiative for Mathematics October 2018
- Becoming a Professional – Graduate Orientation August 2018
- First and Second Year Experience – Association for Women in Mathematics October 2017
- Deciding on Graduate School – Math Club October 2016
- Recitation and Teaching – Teaching and Learning Seminar October 2016
- First-Year Experience – Incoming Student Orientation August 2016

Society for Industrial and Applied Mathematics-Member

August 2018-Present

American Mathematical Society-Member

August 2015-Present

Mathematical Association of America - Member

August 2015-Present

Association for Women in Mathematics UK Chapter- Vice President

May 2018-April 2019

Julia Robinson Mathematics Festival - UK Volunteer

November 2017

Graduate Scholar in Mathematics - UK

August 2015-August 2017

UK Math Day for Women

October 2016

Field of Dreams-UK representative

November 2015

National Council of Teachers of Mathematics-Member

January 2011-September 2015

Institute for Educational Development: Flipped Classroom -Attendee

December 2013

Independent Education's Institute for Beginning Teachers and Mentors-Teacher

August 2012-May 2013

University Dean's List - Susquehanna University

August 2008-May 2012

Kappa Mu Epsilon Mathematics Honors Society

January 2010-May 2012

- Vice President

January-May 2012

Kappa Delta Pi International Education Honors Society

January 2010-May 2012

Alpha Lambda Delta Freshman Honors Society

August 2009-May 2012

University Scholar

August 2010-May 2012

Math Club - Susquehanna University

August 2008-May 2012

- President

January 2010-January 2011

- Secretary

January 2009-January 2010

Recognition of Excellence on Mathematics-Content Knowledge Praxis

July 2011

ACM Programming Contest-Participant

October 2011

Presidential Fellow - Susquehanna University

August 2009-January 2010