

# Alayna M. Johnson

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## Education

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**University of Illinois, Urbana Champaign** Urbana, IL (expected: May 2020)  
Bachelor of Science in Chemistry GPA: 3.96/4.00  
Minors in Physics and Materials Science and Engineering  
James Scholar, Chancellor's Scholar

## Honors and Scholarships

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- Best Oral Presentation–2nd Annual Eastern Central Illinois American Chemical Society Undergraduate Conference
- Outstanding Young Researcher–Illinois Summer Research Symposium
- Selected to participate in NSF-funded Research Experience for Undergraduates (REU) programs at the University of Illinois and Princeton University (declined)
- Dr. John E. Collins Community Excellence Award
- Illinois PTA Volunteer of the Year 2016-2017 (co-recipient)
- Chancellor's Scholar: Campus-wide honors program (125 students/class)
- James Scholar: College-level honors program (top 12% of class)
- Dean's List, all semesters (top 20% of college)

## Publications

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1. Bregante, D.T.; **Johnson, A.M.**; Patel, A.Y.; Flaherty, D.W.; "Influence of Catalyst Physicochemical Properties for Olefin Epoxidation with Hydrogen Peroxide over Group IV and V Metal Oxide Catalysts and Zeolites" *J. Am. Chem. Soc.*, *To be submitted*.
2. Bregante, D.T.; Patel, A.Y.; **Johnson, A.M.**; Flaherty, D.W.; "Periodic Trends in the Oxidative Desulfurization of Thiophenes by Group IV and V Framework-Substituted Zeolites with Hydrogen Peroxide" *Green Chem.*, *Submitted*

## Conferences and Presentations

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- "Influence of Catalyst Physicochemical Properties for Olefin Epoxidation over Group IV and V Metal Oxide Catalysts." **Johnson, A. M.**; Bregante, D. T.; Flaherty, D.W.; Oral presentation at the *2nd Annual Eastern Central Illinois American Chemical Society Undergraduate Conference*; October 14, 2017; Champaign, Illinois.
- "Effects of Hydrophobicity of Group IV and V Framework-Substituted Zeolite Catalysts on Rates and Selectivities for Olefin Epoxidation." **Johnson, A. M.**; Bregante, D. T.; Flaherty, D.W.; Oral presentation and poster at the *Illinois Summer Research Symposium*; July 21, 2017; Champaign, Illinois.

## Research Experience

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**University of Illinois, Urbana Champaign** [2017-present]  
**Department of Chemical and Biomolecular Engineering under Professor David W. Flaherty**

*Materials Chemistry Undergraduate Research Assistant*

- Synthesize and analyze group IV and V transition metal-substituted catalysts that activate hydrogen peroxide for olefin epoxidation to understand how metal identity and silanol density affect a catalyst's affinity for epoxidation reactions.
- Refine laboratory skills including inductively coupled plasma-optical emission spectroscopy (ICP-OES), powder X-ray diffraction (p-XRD), diffuse reflectance UV-vis spectroscopy, in situ UV-vis spectroscopy, attenuated total reflectance IR (ATR-IR), Fourier transform infrared spectroscopy (FTIR), and gas chromatography.
- Develop a kinetic model to quantitatively describe experimentally determined rates of olefin epoxidation.

**University of Minnesota, Twin Cities** [2016]  
**Department of Chemistry under Professor Christopher Cramer**

*Computational Chemistry Undergraduate Research Assistant*

- Conducted independent research on the mechanism for apparent 1,3-sigmatropic shifts in various allyl azides as a function of molecular structure.
- Collaborated with research group in order to present findings to a panel of graduate and postgraduate students.
- Utilized the GaussView computational tool, ChemDraw Professional, and the Unix environment.

## Work Experience

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**University of Illinois at Urbana-Champaign** [2017-present]  
*Computer Science Teaching Assistant*

- Create and assist students in completing a wide variety of machine problems in areas such as encryption/decryption, Graphical User Interfaces, abstraction, reverse engineering, data structures, and recursive methods.
- Provide individual assistance to students during weekly lab periods and office hours.
- Work with a group of other teaching assistants and professors to create test cases and configure a computing environment for students to complete their projects.

**Illinois Office of Undergraduate Research (OUR)** [2017-present]  
*Illinois Undergraduate Research Ambassador*

- Advise, support, and guide undergraduate students on getting started and engaging in research, scholarship, and/or creative projects.
- Represent and promote OUR during formal on-campus recruiting events and informational events.
- Serve on OUR's Student Advisory Board and serve as a liaison between academic/departamental advisor(s) and OUR.

**Wayzata Public Schools Office of Enrichment Programs** [2014-2016]

*Women in STEM Outreach Coordinator*

- Prepared and executed lesson plans for an audience of 30-40 gifted students (grades 3-6) in branches of science, technology, engineering, and math three times per week.
- Partnered with other teaching assistants and the Wayzata Public School district in order to match enrichment activities with classroom learning targets
- Strengthened the program's appeal to young women in the community by recruiting female instructors and creating a supportive environment.

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**Service and Activities**

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**Robeson Elementary School** [2016-present]

*STEM Enrichment Head Volunteer*

- Instruct a group of 125 students (grades K-5) in areas such as physics, chemistry, astronomy, and math through hands-on applications of abstract scientific ideas.
- Compile lesson plans into succinct brochures for distribution in enrichment programs throughout Illinois.
- Plan, budget, and host a biannual science night for the district

**Society of Women Engineers** [2016-present]

*Outreach Committee Chair, Website Manager*

- Maintain a visually appealing website for members and prospective students including calendars, blogs, photos, and lesson plans.
- Collaborate with 3 co-chairs to plan and host three STEM-themed workshops for 50-100 girls in the Urbana-Champaign area.
- Plan and participate in a wide-variety of community service and outreach events including mentorship of middle and elementary school-aged girls, with the goal of promoting STEM as an exciting career area to young women.

**Illinois Biodiesel Initiative** [2016-present]

*Production and Testing Committee*

- Convert university dining hall waste oil into environmentally friendly biodiesel at a rate of 50 gallons per week and ensure that the diesel product meets ASTM standards.
- Maintain on-going relationships with the university dining halls (who supply raw waste oil) and the university busing system (who purchase synthesized biodiesel).
- Communicate with other committee members about improvements to the production process, including innovations about the conversion of biodiesel waste to soap.

**Women in Math, Science, and Engineering Dormitory** [2016-present]

*Peer Mentor and Orientation Leader*

- Develop a weeks worth of introductory activities for incoming freshman with the goal of introducing them to the University of Illinois and specifically to the Women in STEM dorm.
- Collaborate with a group of ten other mentors in order to provide cohesive instruction.
- Maintain relationships with new students throughout the year with weekly tutoring and monthly professional development activities.

## **Skills**

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- Proficient in Unix, MATLAB, Python, and Java
- Experience with the University of Minnesota supercomputing system