

The
Twenty-Second
Annual

Celebration of
Undergraduate Research
and Creative Activity

April 14
2023
DeVos Fieldhouse

Hope College
Holland, Michigan
USA



CURCA

Celebration of
Undergraduate Research
and Creative Activity

Friday, April 14, 2023
2:30 - 5:00 pm EDT
DeVos Fieldhouse

'23

Celebration of Undergraduate Research and Creative Activity

Welcome

April 14, 2023

Dear Friends,

I am excited to welcome you to the 22nd annual Celebration of Undergraduate Research and Creative Activity (CURCA) at Hope College. This event highlights over two decades of celebrating the scholarly accomplishments of talented Hope students working collaboratively with exceptional faculty mentors in our annual signature research showcase.

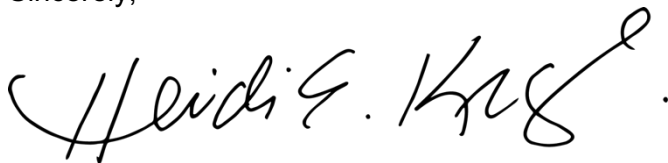
Student-faculty collaborative research has long been a hallmark of the Hope College academic program, a distinction that has garnered national recognition. US News and World Report rank Hope College #22 in undergraduate research and is one of only 62 colleges and universities, such as Harvard, MIT, Princeton, Michigan, Stanford, and Yale, which provide outstanding research and creative project opportunities.

Our research-infused courses, ensembles, and studios facilitate students to cultivate meaningful connections with faculty, encourage the development of tangible professional skills for graduate school and postgraduate work, and offer opportunities for enhancing critical thinking and interdisciplinary collaboration. Such experiences are part of what makes Hope College a transformative and world-class educational experience.

This year's Celebration includes 151 presentations by 268 students from 21 different departments and programs working with 78 faculty mentors. Research occurs during the academic year and summer, spans the four academic divisions, and includes independent study and course-based research. During the 2022 calendar year, Hope students made 117 conference presentations at off-campus conferences, published 17 articles or scholarly chapters, and submitted another 25 papers for publication. For the 2022 fiscal year, Hope College faculty, staff, and students received 6.5 million in external funding to support 61 research, outreach, public service, and educational awards.

Thank you for your participation in and support of CURCA 2023. To learn more about student-faculty collaborative scholarship, visit the website: hope.edu/research.

Sincerely,

A handwritten signature in black ink that reads "Heidi E. Kraus". The signature is fluid and cursive, with a large initial 'H' and a long, sweeping tail on the 's'.

Heidi E. Kraus, Ph.D.
Associate Provost for Academic Affairs

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Acknowledgements

Heidi Kraus, Shonn Colbrunn, and Maricela Mireles,
Celebration Co-directors

Margaret Kuzak and Events and Conferences Staff

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Kate Folkert, Abstract Book Graphic Designer

Frost Research Center

This book, as well as a sampling of posters from the Celebration event, can be viewed on Hope's Digital Commons Repository on the Van Wylen Library website (digitalcommons.hope.edu) beginning in May.

For projects funded in part or whole by the National Science Foundation: Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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Listing of Projects by Department or Program

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Biochemistry & Molecular Biology

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| 110 | Katelynn Paluch, Taylor Laurin | Intersection of one-carbon metabolism and mitochondrial genome maintenance |
| 111 | Alexandria Switzer | Creation of an N-terminal xCT mutant lacking lysines for use in protein turnover studies |
| 112 | Emma Rudisel | Use of mass spectrometry-based proteomics to study post-translational modifications of the mitochondrial transcription machinery |
| 113 | Katherine Lane | Does phosphorylation on serine 26 of system xc- lead to changes in cell surface expression? |
| 114 | Karlie Platz, Hope Markley | Do post-translational modifications of mitochondrial RNA polymerase and ribosomal protein L12 control mitochondrial DNA transcription? |
| 115 | Anna Koppin | Characterization of Select Lysine Mutations of the Cystine/Glutamate Transporter, System xc- |
| 120 | Madelyn Vitu | Development of a fluorescence-based assay to measure System xc- activity |
| 121 | Ryan Erdmann, Alexis Erickson | Cell Based Studies on the Effect of POLRMT and MRPL12 Post Translational Modifications on Mitochondrial Protein Synthesis |
| 109 | Connor Bricco | Optimization of xCT purification methods to enable future post-translational modification analysis |
| 122 | Grace Vollmert, Brendan Veenstra | Performance of Microbial Source Tracking Methods: Molecular Markers & qPCR/ddPCR |

Biology

Mentors: Drs. Maria Burnatowska-Hledin, Erika Calvo-Ochoa, Natalia Gonzalez-Pech, Vicki Isola, Virginia McDonough, Kelly Ronald, and Joseph Stukey

- | | | |
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| 119 | Natalia Quizena | Characterization of a novel peptide binding in HUVEC cells using fluorescent polarization approach. |
| 124 | Sean Slayton | Development of a Novel Method for Identifying Antibiotic Producing Microbes from the Soil |

- 123** Nathaniel Vorhees, Samantha Groenwold Modeling Olfactory Dysfunction in Parkinson's Disease in Zebrafish
- 125** Jairus Ozara Zebulun Meer, Dulcinea Licavoli Investigation of mycobacteriophage-host interactions during initiation of phage infection
- 117** Ethan West, Olivia Andry, Steven Awad, Connor Bricco, Chloe Coates, Owen Harries, Philip Kerber, Molly Kussmann, Taylor Laurin, Natalie Leake-Jara, Natalie Olander, Kate Sherman, London Yoder, Davi Zola de Araujo Genomic Analysis of the Novel A4 Mycobacteriophage Spino
- 126** Solange Fingleton, Alina Ciesielski Degeneration and neurogenesis following an excitotoxic focal lesion to the olfactory bulb of zebrafish
- 131** Kai Francisco, Seth Grove, Carrie Harmeling, Anna Richards Response of House Sparrows (*Passer domesticus*) to Predator-Based Auditory Cues and Consequent Threat Level Assessment
- 127** Sarah Grimes Urbanization Alters the Song Propagation of Two Human-Adapted Songbird Species
- 128** Linda Nduwimana, Hannah Peterson Can you hear me? The Role of Urbanization on Auditory Sensitivity in the House Sparrow (*Passer domesticus*)
- 129** Olivia Sprys-Tellner, Peyton Hallemann Effects of Iron Oxide Nanoparticle Exposure on the Auditory Physiology and Iron Bioaccumulation in House Sparrows (*Passer domesticus*)
- 132** Emma Yonker Auditory Differences between Two Species of Sexually Dimorphic Songbirds
- 118** Ethan West A New Beginning - How noncoding sequences could be the force behind phage genome evolution
- 116** Philip Kerber, Davi Zola de Araujo, London Yoder, Ethan West, Kate Sherman, Natalie Olander, Natalie Leake-Jara, Taylor Laurin, Molly Kussmann, Owen Harries, Chloe Coates, Connor Bricco, Steven Awad, Olivia Andry Genomic Analysis of the Novel F1 Mycobacteriophage Stap
- 133** Jacob Bergstrom The impact of aerosolized iron oxide nanoparticle exposure on behavior of the house sparrow (*Passer domesticus*).

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- 136** Madeline Kenney, Sean Slayton, Madison Smit, Hannah Sturgeon Does the House Sparrow (*Passer domesticus*) Prefer Color or Location-based Cues When Exhibiting Foraging Behavior?
- 134** Faith Huff, Sydney Hawkins, Ashley Lauraine, Eden Comer A Comparison of Antipredatory Responses to Visual and Olfactory Stimuli in House Sparrows
- 130** Paige Buckberry, Emily Dougherty, Nathan Koorndyk, Arsh Mir Impact of Male Dominance Behavior on Female Receptivity in Laboratory Mice
- 135** Alyssa Archer, Charlotte Brecht, Mackenzie Dole Female Vocalizations in Response to Male and Female Urine

Chemistry

Mentors: Drs. Aaron A. Best, Kenneth Brown, Leah Chase, Kristin Dittenhafer-Reed, Meagan Elinski, Jason Gillmore, Natalia Gonzalez-Pech, Natalie L.H. Huisman, Jeffrey Johnson, Brent Krueger, Michael Philben, Michael Pikaart, Elizabeth Sanford, and Brian Yurk

- 137** Nicholas Figueroa Structural investigation of novel supramolecular anion cages with synchrotron X-ray diffraction
- 138** Rachel Thomas Mechanistic Understanding of the Synthesis of Clusters of Fe₃O₄ Nanoparticles by Through Headspace Byproduct Analysis
- 139** Caleb Brzezinski Automating a Data Analysis Pipeline Including Automated Colony Counting
- 140** Andrew Reiffer Synthesis and characterization of clusters of ZnO-Fe₃O₄ nanoparticles
- 142** Elisabeth Arrondo, Jane DeGroot, Alison Bache Exploring quinoline-functionalized long-wavelength BF₂-coordinated azo dyes
- 143** Nicholas Dawson, Jenna Currier Microbial Community Composition Dependence on Season and *E. coli* Abundance in the Macatawa Watershed
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Communication

Mentor: Dr. Marissa Doshi

- 1 Nicole Galloway Decoding Insta-therapy: a case study pediatric therapists' Instagram accounts

Computer Science

Mentors: Drs. Omofolakunmi Olagbemi and Brooke Odle

- 35 Haniah Kring, Annie Ngoc Tran, Elsa Brillinger, Noah Bradford Patient-Handling Tasks and Posture Classification with Machine Learning

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Mentors: Drs. Jane Finn and Yooyeun Hwang

- 93 Emily Oegema, Grace Critchfield, Jacob Humbert Culturally Responsive Teaching and Religious Diversity
- 57 Marta Johnson, Kambree DeWitt, Macy Kerr Compassion Fatigue within pre-service teachers: An Analysis within Hope College's Education Department
- 75 Macy Kerr Empathy and pre-service teachers: How much is too much?

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Mentors: Drs. Courtney Peckens and Katharine Polasek

- 15 Dylan Clem, Clara Voskuil Experimental Experimental Validation of Real-Time, Weighted Control Algorithm on High Rise Structures
- 16 Madelyne Klunder Modeling Selective Activation of the Median Nerve
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- 153 Madison Smith Temperature sensitivity of nitrogen mineralization in peat from a southwestern Michigan Bog
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5	Anastasia Tucker	Determining the Accuracy of Two Commercially Available Smart Watches
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Mentors: Drs. Christopher Fashun, David Keep, Benjamin Krause, Rodrigo Serrao, and Rebecca VanDeWalker

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Mentors: Drs. Carrie Bredow, Alyssa Cheadle, Andrew Gall, Mary Inman, Nathaniel Klooster, Benjamin Meagher, Lindsey Root Luna, Lauren Slone, Kendra Thomas, Sonja Trent-Brown, and Daryl R. Van Tongeren

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