

**CURCA**  
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# **CURCA**

23rd Annual A. Paul and Carol C. Schaap  
Celebration of Undergraduate  
Research and Creative Activity

**Friday, April 12, 2024**

**3:00-5:00 pm**

**Richard & Helen DeVos Fieldhouse**





April 12, 2024

Dear Friends,

I am excited to welcome you to the 23rd annual Celebration of Undergraduate Research and Creative Activity (CURCA) at Hope College, an event that will be especially meaningful this year. We are renaming the event the **A. Paul and Carol Schaap Celebration of Undergraduate Research and Creative Activity** to honor the Schaaps' extraordinary generosity to the Hope campus community, especially in the areas of science and research. For over two decades, CURCA has highlighted the scholarly accomplishments of talented Hope students working collaboratively with exceptional faculty mentors in our annual signature research showcase. We are also thrilled to welcome Gentex Corporation, an innovative local technology company, as our sponsor for this year's event.

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 ranks Hope College #27 in undergraduate research and is one of only 54 colleges and universities, including Harvard, MIT, Princeton, Michigan, Stanford, and Yale, which provide outstanding research and creative project opportunities.

Our research-infused courses, ensembles, and studios facilitate students' cultivating meaningful connections with faculty, encourage the development of tangible professional skills for graduate school and postgraduate work, and offer opportunities to enhance 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 125 presentations by 254 students from 22 different departments and programs working with 64 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 2023 calendar year, Hope students made 71 conference presentations at off-campus conferences, published 14 articles or scholarly chapters, and submitted another 28 papers for publication. For the 2023 fiscal year, Hope College faculty, staff, and students received \$7,997,015 million in external funding to support 62 research, outreach, public service, and educational awards.

Thank you for your participation in and support of CURCA 2024. To learn more about student-faculty collaborative scholarship, visit the website: [hope.edu/research](http://hope.edu/research).

Sincerely,

A handwritten signature in black ink that reads "Heidi E. Kraus". The signature is fluid and cursive, with a period at the end.

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



## Acknowledgements

Heidi Kraus, Shonn Colbrunn, and Maricela Mireles, Celebration Co-directors  
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Andrew Bowen, Lindsay Scott, and Creative Dining Services Staff  
Sonja Glover and Digital Media Lab Staff  
Jeremy Barney, VanWylen Library  
Thomas Sura, English Department  
Amanda Presswood, Klooster Center for Excellence in Writing  
Kristi Rosendahl and Print and Mail Services Staff  
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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](http://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.

Numbers next to presenter names in this program reference the project number on the floor of the event.

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## Chemistry

### Mentors

Dr. Meagan Elinski, Dr. Jeffrey Johnson, Dr. Elizabeth M. Sanford, Dr. William F. Polik

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<b>Computer Science</b>		
<b>Mentor</b> Dr. Omofolakunmi Olagbemi		
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<b>Mentors</b> Dr. Jefferey Christians, Dr. Brooke Odle, Dr. Katharine Polasek		
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## Engineering continued

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## Geological & Environmental Sciences

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Dr. Brian Bodenbender, Dr. Michael Philben, Prof. Suzanne J. DeVries-Zimmerman

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## Global Health

### Mentors

Dr. Thomas Bultman, Dr. Regan Postma-Montaña

The Local is Global: The Science of Coffee Roasting and Brewing	Elliana Boer	10
The Local is Global: Voices of Leaders in Coffee Justice	Megan Kamper	20

## History

### Mentors

Dr. Lauren Janes, Dr. Gloria Tseng

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Urinary Indicators of Recovery Status in Collegiate Cross Country Runners	Madelynn Struck, Laura Taylor, Nile Devers, Erickson Kunzler	<b>1</b>
The Effects of Music on Acute Exercise Perception and Performance	Alison Bache, Tiovanni Knight, Lazerick Smith	<b>13</b>
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Quality of Health, Physical Activity, and Exercise in Former College Athletes Post-Sport: A Systematic Review	Ryan Endres, Christian Clark	<b>52</b>
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<b>Neuroscience</b>		
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<b>Circadian Rhythms, Light Responsiveness, and Behavioral Impacts in a Rotenone-Induced Parkinsonian Rodent Model</b>	Riley G. Checkley, Ethan De Koker, Megan E. Hugunin, Melanie G. Reagan, Juan M. O'Hara, Olivia J. Andry, Cameron Houck	<b>69</b>
<b>Fishing for Answers: Studying Hypoxia's Effects on the Zebrafish Olfactory Epithelium</b>	Madelyn Yakes, Skylar DeWitt, Gracie Hill	<b>80</b>
<b>Unveiling Sensory Gaps: A Study on Zebrafish Alanine Taste Blindness and the Consequential Neurotoxic Impact on Dopaminergic Neurons in Motor Regions</b>	Samantha Groenwold, Mackenzie Korff	<b>90</b>
<b>College student well-being: testing associations among happiness, gratitude, anxiety, depression, and cardiac vagal tone.</b>	Ana Wong, Jessica Estabrook, Joseph Gillengerten, Wyatt Collier, Tyler Kennedy, Jacob Bergstrom, Nhi Hoang, Parker Friend, Alexander Mathew, Kendahl Miller, Grace Sarafa, Charis Snyder	<b>122</b>

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<b>Modeling dopaminergic loss in the zebrafish olfactory system</b>	Lexus Putt	<b>101</b>
<b>Nanomechanical characterization of zebrafish olfactory epithelium following damage and recovery.</b>	Ander Ciesielski	<b>112</b>
<b>Effects of acute hypoxic exposure on the olfactory system of adult zebrafish</b>	Skylar DeWitt	<b>91</b>
<b>Nursing</b>		
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<b>Religious scrupulosity: Etiology, meaning-making, and spiritual well-being among participants with significant experiences with the Christian, Islamic, or Jewish faiths</b>	Erin Moran	<b>51</b>
<b>Physics</b>		
<b>Mentors</b> Dr. Belen Monteagudo, Dr. Zachary Williams, Mr. Andrew Bunnell, Dr. Paul DeYoung, Dr. Kyuil Cho, Dr. Peter Gonthier		
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<b>Investigation of Convection Cells Via Truncated Eigenmode Decomposition</b>	Gillian Donley	<b>71</b>
<b>Material Characterization for Industrial Thin Film Processes</b>	Nathaniel Jobson, Jacob Walther, Justin Rink, Wil Pinkerton	<b>81</b>
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<b>Quantifying the Effect of Air on Uncertainty in the Particle Accelerator</b>	Megan Haeussler, Evelyn Martin, Zachary Doctor	<b>94</b>
<b>Efficient Techniques for Calculating the Energy Widths of Cyclotron Resonance in Strong Magnetic Fields</b>	Will Vance, Matt Stowe	<b>104</b>
<b><math>\beta</math>-decay strength function of <math>^{53}\text{Ni}</math> and <math>^{52}\text{Co}</math></b>	Gabe Balk	<b>105</b>

### Political Science

#### Mentor

Dr. Virginia Beard

<b>Digital Divide in the Democratic Republic of the Congo</b>	Kevin Miller	<b>8</b>
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### Psychology

#### Mentors

Dr. Robert Henry, Dr. Alyssa Cheadle, Dr. Mary Inman, Dr. Emily Helder, Dr. Daryl Van Tongeren, Dr. Kendra Thomas, Dr. Carrie Bredow, Dr. Sonja Trent-Brown, Dr. Benjamin Meagher, Dr. Lindsey Root Luna, Dr. Lauren Slone, Dr. Andrew Gall

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## Sociology & Social Work

### Mentors

Dr. Aaron Franzen, Dr. Liz Sharda, Dr. Rodrigo Serrao

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Dr. Sarah Kornfield

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Dr. Tatevik Gyulamiryan

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## 2024 Celebration of Undergraduate Research and Creative Activity

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# 23rd Annual A. Paul and Carol C. Schaap Celebration of Undergraduate Research and Creative Activity

## Poster and Presentation Map



NATURAL AND APPLIED SCIENCES



SOCIAL SCIENCES

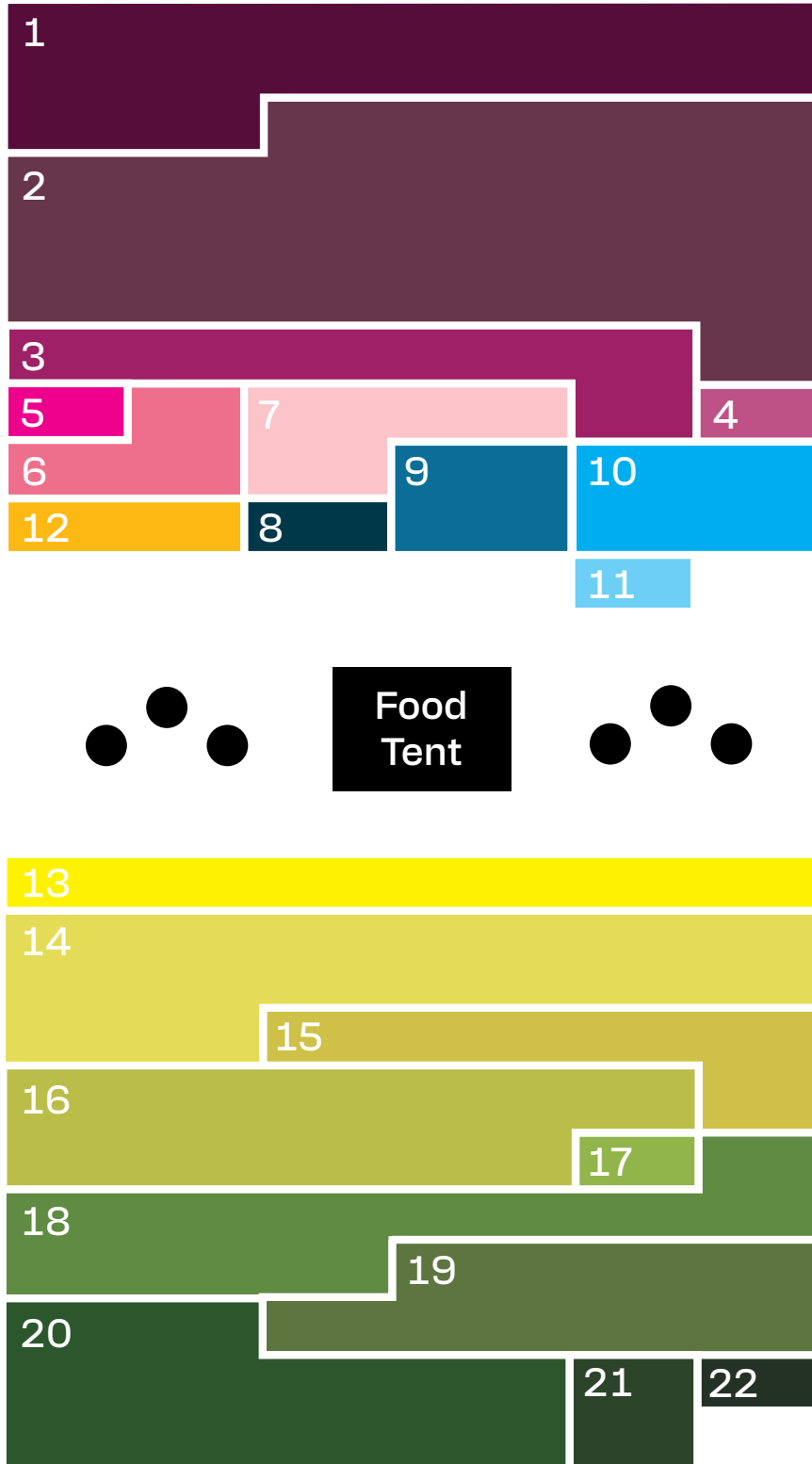


ARTS AND HUMANITIES



GLOBAL HEALTH

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| 1. Kinesiology                | 12. Global Health                      |
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| 11. Philosophy                | 22. Math                               |



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