FRIDAY,
APRIL 22, 2022
2:30-5:00 PM
RICHARD &
HELEN DEVOS
FIELDHOUSE

21st Annual
Celebration of Undergraduate
Research and Creative Activity

Photo by Kate Winter '22
celebration.hope.edu
Welcome

April 22, 2022

Dear Friends,

I am excited to welcome you to the 21st annual Celebration of Undergraduate Research and Creative Activity (CURCA) at Hope College. This event highlights more than 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, and it is a distinction that has garnered national recognition. US News and World Report ranks Hope College #24 in undergraduate research, among a selective list of 56 colleges and universities, such as Harvard, MIT, Princeton, Stanford, and Yale, who excel in providing 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 a Hope College a transformative and world-class educational experience.

This year’s Celebration includes 153 presentations by 252 students from 22 different departments and programs working with 74 faculty mentors. Research occurs both during the academic year and summer, spans the four academic divisions, and includes independent study and course-based research. During the 2021 calendar year, Hope students made 91 conference presentations at off-campus conferences, published 27 articles or scholarly chapters, and submitted another 12 papers for publication. For the 2021 fiscal year, Hope College faculty, staff, and students received $2.9 million in external funding to support 50 research, outreach, public service, and educational awards.

Thank you for your participation in and support of CURCA 2022. To learn more about student-faculty collaborative scholarship, visit the website: hope.edu/research.

Sincerely,

Daryl R. Van Tongeren
Interim Associate Provost for Academic Affairs
Acknowledgements

Daryl Van Tongeren and Laura McMullen, Celebration Co-directors
Michael Howes, and Events and Conferences Staff
Theo Robert, Shawn Drost, Laura Clarke, and Physical Plant Staff
Andrew Bowen, Kim Pustover, Courtney Teiman, and Creative Dining Services Staff
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Tori Longfield and Jeremy Barney, Library
Kristi Rosendahl, Print and Mail Services
Michelle Gibbs, Sustainability Institute
Deb DuMez and Leo Herzog, Computing and Information Technology
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Listing of Projects by Department or Program

Numbers reference the project number on the floor of the event

Biochemistry & Molecular Biology

Mentors: Drs. Leah Chase & Virginia McDonough

133  Natnael Belay, Abigail Gift  Transcriptional Regulation of OLE1 by Cobalt
134  Anna Koppin, Sophia Farbarzhevich  Characterization of the K37R Mutation of System xc

Biology

Mentors: Drs. Aaron Best, Erika Calvo-Ochoa, Leah Chase, Megan Gall (Vassar College), Natalia Gonzalez-Pech, Laura Hurley (Indiana University), Benjamin Kopek, Jianhua Li, Farrah Madison, Kelly Ronald, Virginia McDonough, Phillip Rivera, and Joseph Stukey

117  Rosemary Mitchell, Leah Van Orman  Identification of a Potential Fatty Acid Desaturase in the Yeast Schizosaccharomyces pombe
125  Abigail Gift, Sarah Stevenson  Transcriptional Regulation of OLE1 in wild type, ino2, ino4, and opi1 Mutants in Response to Inositol and Unsaturated Fatty Acids
126  Annastasia Petouhoff  Role of YOR365C, SIP5, YMR141C, RPL13B, and RPS16A in Transcriptional Regulation of OLE1 by Unsaturated Fatty Acids
127  Devin White, Lillian Droscha  Evaluation of Drinking Water Quality in Peri-urban Zambia
128  Natalia Quizena, Ashley Lauraine, Audrey Yellich, Dirk Visser, Emma Rudisel, Hannah Kurncz, Josephine McClure, Maddison Wilder, Mallory Woodbury, Nicholas Figueroa, Thomas Dunn  Genomic Analysis of the Novel F1 Mycobacteriophage Beakin
129  Josephine McClure  Genomic Analysis of the Novel F1 Mycobacteriophage Phalconet
130  Jairus Ozara Zebulun Castillo Meer, Ryan Murphy  Investigation of Mycobacteriophage-host Interactions during Initiation of Phage Infection
131  Ryan Murphy, Jairus Meer  Temperature and Growth Properties of the Broad Host Range K1 Mycobacteriophages
132  David Price, Mackenzie Dole, Cameron Parsons  Do Trees and Shrubs Differ in Lignification? A Case Study on Hazelnuts
135  Claire Buck  Exposure to H2O2 leads to a change in ubiquitination status of the glutamate/cystine exchanger, System xc
136  Paulina Kozan  Evaluating the Impact of Gestational Ethanol Consumption on Adult Immune Function and Addiction-like Behaviors
137  Megan Lopez, Claire Baguley  Cellular Lipids and Viral Replication
2022

138 Mikayla Coombs
Insect Innate Immunity and Viral Infection

139 Morgan Sherrard, Suihnem Mawi
Changes in Chromatic Contrast of Avian Plumage in Forests with Different Levels of Deer Browsing

140 Paige Massa, Elianna Sandman, Anders Bogard, Matthew Czmer
Sex Differences in Hormone-modulated Neuroplasticity in the Songbird (Serinus canarius)

145 Eliese Moelker
Optimization of Protein Precipitation from Human Nails to Facilitate the Early Detection of Mental Health Disorders

146 Nathan Koorndyk
Inflammatory Protein Time of Flight LC/MS

147 Lindsay Jankowski, Molly McLinden, Olivia Sprys-Telner
The Effects of Iron Oxide Nanoparticles on the Auditory Physiology and Antipredator Behavior in House Sparrows (Passer domesticus)

148 Linda Nduwimana, Emma Yonker
The Effects of Anthropogenic Disturbances on the Auditory Processing of the House Sparrow (Passer domesticus)

155 Sarah Grimes, Eliza Lewis
Effects of Urbanization on House Sparrow (Passer domesticus) and House Finch (Haemorhous mexicanus) Song Propagation

156 Madisyn Kovacs
The Effect of Serotonin on Males’ Neural and Behavioral Mechanisms to Female Ultrasonic Vocalizations and Urine in the House Mouse (Mus musculus)

153 Nathaniel Vorhees, Hannah Gray
Neuroinflammatory and Proliferative Responses during Recovery of the Lesioned Olfactory System of Zebrafish

154 Skylar DeWitt, Evan Thomas
Olfactory Loss and Recovery Following Lesion of the Olfactory Bulb of Zebrafish

Chemistry
Mentors: Drs. Aaron Best, Meagan Elinski, Jason Gillmore, Natalia Gonzalez-Pech, Jeffrey Johnson, Brent Krueger, and Michael Pikaart

109 Alana Policastro, Halle McGuire
Multifaceted Surface Coatings from Composite Dry Lubrication Schemes

110 Claire Dwyer
Small Scale, Large Impact: The Tribology of Energy Conservation

111 Griffin Gleeson
Nanoparticle Interactions in Cartilage-Mimicking Hydrogels

112 Andrew Reiffer
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113 Liam Diephuis
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114 Luke George
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118 Nicholas Dawson, Jenna Currier, Luke Horsburgh
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120 Grace Stalions A Kinetic Study: Mechanism of Rhodium-Catalyzed Decarbonylation

121 Eric Salisbury, Joseph Cornell Characterizing the Product of Rhodium-Catalyzed Alkene Amidation

122 Charlie Michels Novel Directing Groups for Metal-Catalyzed Acylation and Decarbonylation Reactions

123 Colin Bradley Predicting UV-Vis-NIR Absorbance Spectra of Novel Long-Wavelength Azo Dyes


Communication

Mentors: Drs. Brandon Boatwright (Clemson University), Sarah Kornfield & Stephanie Pangborn

33 Caleigh Miller Frontline Health Heroes? Healthcare Providers’ COVID-19 Tweets Suggest Another Story

34 Rachel Johnson Poetic Politics: Renewing the Black Jeremiad on the Inaugural Stage

Computer Science

Mentors: Drs. Charles Cusack, Ryan McFall and Omofolakunmi Olagbemi

46 John VerMeulen III, Kaley Wilson Tennis Event Detection with Machine Learning

47 Trevor Palmatier Machine Learning Applications using SciKit-Learn and TensorFlow

48 Adam Czeranko, Dre Solorzano Algoraph but in C++

Economics and Business

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78 Anna Scott Does Money Buy Neighborliness? The Effect of Household Income on Neighbor Relationships
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35. Kelsey Corey  Compassion Fatigue: Do Special Education Pre-Service Teachers Display Signs?

36. Liliana Olvera, Nolan Kasher  Taking a Different Approach to Drive student's Motivation and Interest in STEM

**Engineering**

Mentors: Drs. Jeffrey Christians, Brook Odle, Courtney Peckens and Katharine Polasek


8. Clara Voskuil  Optimization of Bio-Inspired Control: Four-Story Shear Structure

9. Valerie Dien  Bio-Inspired Sensing and Actuating Architectures for Feedback Control of Civil Structures

10. Mary C. Ngoma  Exploration of the Use of a Proportional-Integral-Derivative Controller for Mitigation of Seismic Base Excitation in Civil Structures

11. Marianna Urdaneta Morillo  Modeling Selective Activation of the Median Nerve

12. Sarah Heinowski, Carolyn Atkinson, Peter Ruffolo  Cortical Responses to Physical and Electrically Evoked Somatosensation


14. Rory Campagna  Mechanistically Studying the Degradation of Cesium Lead Iodide Perovskite Phases due to Temperature and Humidity

15. Jonathan Outen  Understanding the Role of Iodide Vacancy Passivation in Cesium Lead Iodide Perovskite Phase Stability


17. Reese Moschetta, Yea Geon Song  Feasibility of the Lifting Full-Body Model to Simulate Squatting Tasks

18. Bridget Gagnier  Validating the Use of an IMU-based System to Capture Patient-handling Tasks

**English**

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103. Chloe Bartz  Disability in Disney
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26 Kailey Hoving, Garrett Peck Presence or Absence of Microcystins within the Lake Macatawa Watershed
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28 Lauren Bryan Selective Preservation of Structural Carbohydrates during Peat Formation
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44 Seth Almquist Effects of Drug Adsorption on the Settling of Very Fine Particles in Aqueous Suspensions
45 Grace Behrens Carbon Storage and Methane Production from Interdunal Wetlands in Saugatuck Harbor Natural Area

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21st Annual Celebration of Undergraduate Research and Creative Activity

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5. Geological & Environmental Sci.
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21. Biochemistry
22. Neuroscience

NATURAL AND APPLIED SCIENCES
SOCIAL SCIENCES
ARTS AND HUMANITIES

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Entrance