



2018 Sustainability Research Projects

In Holland, we believe that in order to become a vibrant, world-class community we must look at all aspects of our community. This includes the economic, social, and environmental impacts we all have.

Our City of Holland Sustainability Committee has created a seven-pillar framework with “lenses” to help us evaluate and make more sustainable choices. We have used this framework model as a way to identify the 2018 Hope College Sustainability Research Projects.

Framework Categories

SMART ENERGY | ECONOMIC DEVELOPMENT | TRANSPORTATION | COMMUNITY & NEIGHBORHOOD
QUALITY OF LIFE | COMMUNITY KNOWLEDGE | ENVIRONMENTAL ACTION & AWARENESS

The Holland-Hope College Sustainability Institute (HHCSI) would like to formally recognize the following projects. This year’s research projects will also be designated with a “green ribbon” on their research poster at the 2018 Celebration of Undergraduate Research and Creative Performance on April 13th.

For more information about the In Framework visit: www.hollandsustainabilityreport.org

SMART ENERGY | Our way of living requires a stream of energy to operate personal and infrastructure devices. We know that energy is produced with scarce resources and the byproducts impact our environment. We need to use both conservation and efficiency measures to manage the resources we have to provide access to reliable and cost effective energy.

59 Andrew Ochs	Dr. Mary Elizabeth Anderson, Chemistry	Tetrahedrite Nanoparticles: A Thermoelectric Pathway toward Alternative Energy Applications
60 Grace Kunkel	Dr. Mary Elizabeth Anderson, Chemistry	Thermoelectric Tetrahedrite Nanoparticles: Solution-Phase Synthesis and Characterization
82 Amanda Rensmo	Dr. Jennifer Hampton, Physics	Comparison of Charge Storage Properties of Prussian Blue Analogues Containing Copper and Cobalt
83 Scott D. Joffre	Dr. Jennifer Hampton, Physics	Comparing Electrochemical Calculations and Particle Induced X-Ray Emission Measurements of Prussian Blue Analogue Deposits

ECONOMIC DEVELOPMENT | The business community is the driving engine within the area. While it is dependent on community resources and structure for support, it generates capital essential to growth and development.

18 Taylor Calloway	Professor Kristen Gray, CAPS, Yolanda Vega, Phelps Scholars and Education	Where Did the Middle Go?: The Disappearance of the Middle Class
172 Colin Bennett	Dr. Virginia Beard, Political Science	Economic Impacts of the Arab Spring



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175 Emma Nyhof	Dr. Steven McMullen, Economics & Business, Dr. Sarah Estelle, Economics & Business	The Impact of Participation in Multiple Means-Tested Welfare Programs on Labor Supply
176 Alyssa Pinkham	Dr. Steven McMullen, Economics & Business	Is Poverty More Likely to Fall on Deaf Ears? The Effects of Being Deaf/Hard-of-Hearing on Poverty in the United States
221 Kiley Corcoran	Dr. Virginia Beard, Political Science	Foreign Aid and African Political and Economic Development?
216 Camryn Zeller	Dr. Sarah Estelle, Economics & Business, Dr. Todd Steen	Will Universal Basic Income Discourage Investments in Higher Education?
218 Darren Ford	Dr. Steven McMullen, Economics & Business	The Effect of Economic Downturns on Marriage
237 Derrick Perkins	Dr. Virginia Beard, Political Science	Political Polarization and Economic Health
238 Kelly Fuhs	Dr. Virginia Beard, Political Science	Indigenous Women and Economic Position
239 Brian Brown	Dr. Sarah Estelle, Economics & Business, Dr. Steven McMullen, Economics & Business	The Effects of Protective Tariffs on Employment and Wages: An Analysis of U.S. Tariffs on Chinese-Produced Tires
247 John Geshay	Dr. Steven McMullen, Economics & Business	The Impact of Income and Employment on Volunteering
248 Kurtis Slenk	Dr. Steven McMullen, Economics & Business, Dr. Sarah Estelle, Economics & Business	Does Attention Deficit Hyperactivity Disorder Affect Prosperous Living? A Look at ADHD's Impact on Income, Employment, and Schooling

TRANSPORTATION | The movement of people, goods, and services within the area is an evolving system. We interact with other regional, national and international elements to create a total network.

21 Stephen Wilbur, Jordan Hooker, Holden Dippel	Mary Ellen Kettelhut, Entrepreneurship	ParkShark: Using Carbon-based Painted Inductive Loops to Track Parking Space Occupancy
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COMMUNITY & NEIGHBORHOOD | The fiber of our lives can be traced to the places we live and the individuals we interact with on a daily basis. The places we live support the development of our personalities and perspectives on life. Communities at all scales have a vital role to play. Encouraging vital and effective communities is an important element.

1 Carolyn Ellis	Dr. Heidi Kraus	Spontaneous Emotional Searching: A Contemporary Analysis of Humanistic Action
17 Anna Vostrizansky	Dr. Charles Green, Psychology and Prof. Yolanda Vega, Phelps Scholars	No Home? Hazardous!: Homelessness and Children's Emotional Health
28 Krisia Rosa, Emily Wolfe, Michael Bernard	Dr. Marsley Kehoe, Mellon Scholars	The Civil War and Racism
29 Emma Wangstrom, Rebecca Stanton, Holle Wade	Dr. Marsley Kehoe, Mellon Scholars	The Effects of Calvin VanderWerf's Presidency
32 Madeleine Zimmerman, Cherish Joe, Carolyn Wetzel	Dr. Marsley Kehoe, Mellon Scholars	Media Outlets and Black Lives Matter on Twitter
54 Kylie DeKryger, Abigail Duran	Dr. Dennis Feaster, Social Work	Social Inclusion and Disability in the US and China: An International Context for Experiential Learning
55 Katherine Veldink, Madelyn Mikitka, Elizabeth Lilley,	Dennis Feaster, Ph.D, LMSW, Sociology and Social Work Department, Professor Nancy Cook, Education Department	Exploring the Attitudes of the Hope Campus Community towards the Ready for Life Program
129 Haila Asefa	Dr. Sonja Trent-Brown, Psychology	Flourishing, Affect, and Racial Attitudes
130 Curissa Sutherland-Smith	Dr. Sonja Trent-Brown, Psychology	The Mental Health of Minority Students at Predominantly White Institutions
131 Juliette Collins	Dr. Carrie Bredow, Psychology	Logic vs. Intuition: When Do Implicit and Explicit Mate Preferences Predict Relational Outcomes?
165 Peter Rak	Dr. Choonghee Han, Communication	Growing Creativity and Shrinking Traditions: An Exploration on the Internet's Impact on Gamelan in Bali, Indonesia
173 Natalie Fulk, Aine O'Connor, Avery Lowe	Dr. Jeanne Petit, History, Geoffrey Reynolds, Joint Archives of Holland	"We All Must Do Our Utmost:" Holland, Michigan in World War I



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217 Adam Rolain	Dr. Steven McMullen, Economics & Business, Dr. Sarah Estelle, Economics & Business	Legalization of Recreational Marijuana and its Effect on Labor Productivity
241 Jacob Pardonnet	Dr. Sarah Estelle, Economics & Business, Dr. Steven McMullen, Economics	Swapping Guns for Books: Analyzing the Relationship Between Academic Success and Violent Crime in Chicago
244 Fernando Bahena	Dr. Sarah Estelle, Economics & Business	Does Church Attendance Decrease Crime?

QUALITY OF LIFE | Ultimately, it is the feelings and state of mind of individuals in the collective that make up a community's quality of life. The community through governmental, religious, business and social organization, makes decisions and supports actions that contribute to the community's well being.

13 Alejandra Gómez Limón	Dr. Virginia Beard, International Studies, Dr. Anne Heath, Mellon Scholars	Human Rights Violations of Detained Family Units
16 Kaelyn Poirier	Professor Yolanda Vega, Phelps Scholars and Dr. Charles Green, Psychology	Where Are You Wearing?: A Glocal Perspective
20 Jamie Breyfogle	Professor Yolanda Vega, Phelps Scholars and Dr. Charles Green, Psychology	The Protection of Our Youngest
66 Monica Teuthorn, Nate Silagi	Dr. Katelyn Poelker, Psychology	How Do Guatemalan Adolescents Help Each Other?: Within-Country Diversity in Prosocial Behavior and Empathy
67 Sydney Hudock	Dr. Katelyn Poelker, Psychology	Having the Number They Want: Empowerment of Latin American Women
68 Alyssa Arens	Dr. Katelyn Poelker, Psychology	"Dear Diary, I'm Feeling...": Within-Country Diversity in Guatemalan Adolescents' Gratitude and Hassles
69 Anna Langholz, Trevor Sooy, Allie Thiel	Dr. Alyssa Cheadle, Psychology	Measurement of Resilience in Undergraduate Students
84 Kayla Liggett, Annie Lohrstorfer	Dr. Mary Inman, Psychology	Correlates of Religiosity and Body Esteem in Women
85 Wenjin He, Rudy Kelly, Jordan Benjamin, Reece Lindemann, Russell	Dr. Alyssa Cheadle, Psychology, Dr. Andrew Gall, Psychology	Associations of Religiousness, Spirituality, and Sleep



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Houpt

86 Nicholai Shaw,
Marianne Lohrstorfer,
Selena Quintanilla,
Alexandra Knorp,
Mackenzie Mader

Dr. Alyssa Cheadle, Dr.
Andrew Gall, Psychology

The Effect of Religion and Spirituality on Physical Activity

87 Samuel Kuiper,
Reagan Spindler,
Allison Johnson

Dr. Alyssa Cheadle,
Psychology, Dr. Andrew Gall,
Psychology

Associations of Intentions and Perception of Social Norms on
Health Behaviors

110 Mendon Thomas

Professor Rob Pocock,
Communication Department

Gift of Life Michigan Research and Proposal

120 Grace DuMez,
Michael Kiley

Dr. Mike Jipping, Computer
Science

Pallist: Find Nearby Friends

126 Lauren Evert,
Lakna Jayasinghe,
Alyssa Goodwin, Erin
Freiburger, Elizabeth
Vizcarra

Dr. Andrew Gall, Psychology
and Dr. Sonja Trent-Brown,
Psychology

Does Your Occupation Affect Your Preschooler's Sleep?

132 Russell Houpt,
Johnny DeMaagd,
Kelsey Cox

Dr. Daryl Van Tongeren,
Psychology

Does Superman Make Us More Helpful? The Effect of Hero
Priming on a Behavioral Measure of Helping

140 Taylor Grill,
Nadine Kosten, Nia
Stringfellow, Rachel
Satkiewicz, Mary Clare
Theis

Dr. Maureen Dunn,
Kinesiology

The Chronic Effects of Moderate Intensity Yoga Training versus
Moderate Intensity Aerobic Exercise on Self-Esteem in
College-Aged Females

143 Erin Freiburger,
Bradley Dixon, Darby
Baird, Alyssa Goodwin,
Lauren Evert,
Mary-Kate Szuma,
Cameron Everse,
Madalyn Osbourne,
Carolina Marshall,
Grace Ditzenberger,
Elizabeth Vizcarra,
Lakna Jayasinghe,
Rebecca Messnick

Dr. Andrew Gall, Psychology
and Dr. Sonja Trent-Brown,
Psychology

The Key to a Good Night's Sleep in Childhood: Child and Parent
Sleep Hygiene Practices Predict Sleep Quality



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144 Bradley Dixon, Carolina Marshall, Rebecca Messnick, Elizabeth Vizcarra, Mary-Kate Szuma, Lakna Jayasinghe, Cameron Everse, Alyssa Goodwin, Erin Freiburger, Lauren Evert, Grace Ditzenberger, Darby Baird	Dr. Andrew Gall, Psychology and Dr. Sonja Trent-Brown, Psychology	The Effect of Sleep Quantity and Quality on Working and Narrative Memory and Memory for Design in Preschoolers
146 Amanda Gibson, Jillian Isett, Jada Royer, Natalie Vela	Dr. Andrew Gall, Psychology and Dr. Peter Vollbrecht, Biology	Effects of High-Fat Diet Consumption on Circadian Rhythms and Cognition in Nile Grass Rats
159 Taylor Rink	Dr. Courtney Peckens	Development of Wireless Sensing Unit for Environmental Noise Monitoring
161 Eric Rosendahl	Dr. Virginia Beard, Political Science	Factors Leading to Catalonia's Independence Movement
162 Savannah Stewart	Dr. Virginia Beard, Political Science	Shut-ins in Japan: Culture-bound or Psychological
163 Rachel Gillespie	Dr. Lauren Hearit, Communication	Measuring Changes in Intrinsic Religiosity among College Students
164 Monica Ruser	Dr. Lauren Hearit, Communication	College Students and Religious Identification: Perceptions and Participation in College Religious Life
167 Sophia Vander Kooy	Dr. Virginia Beard, Political Science	How can nations work multilaterally to decrease rates of global sex trafficking?
168 Anna Benitez	Dr. Virginia Beard, Political Science	International Security and Human Rights
169 Matt Scheneman	Dr. Virginia Beard, Political Science	The Relationship between Religious Affiliation and Voter Turnout
170 Leigh Wynveen	Dr. Joel Toppen, Political Science	Syrian Identity in Civil War: A Content Analysis of Political Actors
171 Collin Martin	Dr. Virginia Beard, Political Science	Kurds and the Syrian Civil War



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180 Ryann Felton, Garrett Fogo, Sarah Plowman, Nicholas Rozema, Tymi Staub	Dr. Andrew Gall, Psychology, Dr. Leah Chase, Biology and Chemistry	Prepubescent Behaviors and Circadian Rhythmicity in an Animal Model for Bipolar Disorder
211 Jada Royer, Anna Lunderberg, Ryann Felton, Julia Berlin, Samantha VanHoven, Mercedes Rede, Sarah Zieschang	Dr. Leah Chase, Biology, Chemistry, Neuroscience, Dr. Christopher Barney, Biology	Establishing the Predictive Validity of a Novel Animal Model for Bipolar Disorder
212 Jada Royer, Anna Lunderberg, Ryann Felton	Dr. Leah Chase, Biology, Chemistry, Neuroscience	Establishing the Validity of a Novel Animal Model for Bipolar Disorder Through Neurochemical Analysis
215 Daniel Rush	Dr. Steven McMullen, Economics, Dr. Sarah Estelle, Economics & Business	Does Parental Involvement During Childhood Affect Substance Use

COMMUNITY KNOWLEDGE | The collective knowledge of the community is an incredible resource. The ability to tap into this wisdom is essential for continued growth. In both formal and informal channels, the community’s knowledge and energy must be channeled to where it is needed.

45 Jessica Lockwood	Dr. Barbara Vincensi, Nursing	A Descriptive Study on Barriers to the Use of an Online Early Childhood Education Tool for Caregivers
46 Heather Ponstein	Dr. Barbara Vincensi, Nursing Dr. Jane Finn, Department of Education, Dr. Vicki-Lynn Holmes, Department of Education and Math; Dr. Libbey Horton, Department of Education	Parental Use of an Online Interactive Tool to Increase Children's Kindergarten Readiness
49 Madeline Day	Dr. Jane Finn, Department of Education, Dr. Vicki-Lynn Holmes, Department of Education and Math; Dr. Libbey Horton, Department of Education	Friendship House Increases Independent Living Skills
50 Reganne Diener, Dara Madai Luna Medina	Dr. Jane Finn, Department of Education, Dr. Vicki-Lynn Holmes, Department of Education and Math; Dr. Libbey Horton, Department of Education	Friendship House Helps People with Cognitive Disabilities Improve their Life Skills



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51 Jessica McAlpine	Dr. Jane Finn, Department of Education, Dr. Vicki-Lynn Holmes, Department of Education and Math; Dr. Libbey Horton, Department of Education	Importance of Community for Improvement in Independent Living Skills for Individuals with Intellectual Disabilities
52 Amanda Miller	Dr. Jane Finn, Department of Education, Dr. Vicki-Lynn Holmes, Department of Education and Math; Dr. Libbey Horton, Department of Education	Improvement in Independent Living Skills for a Resident with a Disability
53 Kylie DeKryger	Carrie Dummer, Chemistry	Assessing the Impact on Learning of Summer Science Camps
92 James Cerone	Dr. Justin Shorb, Chemistry	Student Learning in Online Textbooks
98 Sarah Zurawski, Grace Commire	Dr. Libbey Horton, Education, Dr. Jane Finn, Education; Dr. Vicki-Lynn Holmes, Education & Math	What Really Works? FBA and Classroom Management for Students with Disabilities
99 Carly Hampton	Dr. Jane Finn, Department of Education, Dr. Vicki-Lynn Holmes, Department of Education and Math; Dr. Libbey Horton, Department of Education	Friendship House Research
100 Madison Schaefer, Colin Baron, Cassidy Henshaw	Dr. Libbey Horton, Department of Education; Dr. Jane Finn, Department of Education, Dr. Vicki-Lynn Holmes, Department of Education and Math	They are ALL Our Students: Inclusion in Education
101 Anna Davis	Dr. Jane Finn, Department of Education, Dr. Vicki-Lynn Holmes, Department of Education and Math; Dr. Libbey Horton, Department of Education	Impact of Supported Residency on the Independent Living Skills of Adults with Disabilities



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102 Chris Kruger, Abby Couwenhoven	Dr. Stephen C. Scogin, Biology and Education	STREAM School and Standardized Testing: A Comparison of State and District-Level Assessments in Traditional versus Experiential Learning Environments
103 Shelby Bowers, Montserrat Dorantes	Dr. Stephen C. Scogin, Biology and Education	Project Based Learning: The Teachers' Perspective
104 Katie Rietberg, Michelle Austin	Dr. Stephen C. Scogin, Biology and Education	21st Century Skill Development in a Project-Based Learning Program
111 Emily Krueger	Dr. Jane Finn, Department of Education, Dr. Vicki-Lynn Holmes, Department of Education and Math; Dr. Libbey Horton, Department of Education	A Journey of Improvement In Word Recognition, Oral Reading, and Reading Comprehension: Does First Language Make a Difference?
112 Allison Utting	Dr. Deborah Vriend Van Duinen, Education	Lessons from the Past: Teaching Empathy through Historical Fiction
116 Emma Jones, Regan Jekkals	Ms. Susan Ipri Brown, Engineering, Dr. Eric L. Mann, Mathematics	Engineering the Future Academies
118 Jori Gelbaugh, Amber Carnahan	Dr. Michael Jipping, Computer Science	Developing a Google Chrome Extension to Improve Online Readability
145 Carolina Marshall, Bradley Dixon, Alyssa Goodwin, Darby Baird, Elizabeth Vizcarra, Erin Freiburger, Grace Ditzenberger, Lakna Jayasignhe, Lauren Evert, Madalyn Osbourne, Cameron Everse, Mary-Kate Szuma, Rebecca Messnick	Dr. Andrew Gall, Psychology and Dr. Sonja Trent-Brown, Psychology	Relationship between Activity Level and Memory in Preschool-Aged Children
174 James Glagola	Dr. Steven McMullen, Economics & Business, Dr. Sarah Estelle, Economics & Business	Raising the Standards: The Impact of Common Core Education on Intermediate Student Mathematical Achievement



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177 Anna Van Deelen	Dr. Steven McMullen, Economics & Business	A Painful Problem: How is Educational Attainment Related to Opioid Overdose Rates?
178 Keenan Donk	Dr. Sarah Estelle, Economics & Business, Dr. Steven McMullen, Economics & Business	The Lasting Impact of Adolescent Mental Health on Educational Attainment of Adults
189 Cameron Everse, Elizabeth Vizcarra, Lakna Jayasinghe, Grace Ditzenberger, Carolina Marshall, Bradley Dixon, Alyssa Goodwin, Darby Baird, Erin Freiburger, Lauren Evert, Madalyn Osbourne, Mary-Kate Szuma, Rebecca Messnick	Dr. Andrew Gall, Psychology and Dr. Sonja Trent-Brown, Psychology	Parenting Styles, Preschoolers, and Memory
190 Mary-Kate Szuma , Rebecca Messnick, Carolina Marshall, Bradley Dixon, Alyssa Goodwin, Darby Baird, Elizabeth Vizcarra, Erin Freiburger, Grace Ditzenberger, Lakna Jayasinghe, Lauren Evert, Madalyn Osbourne, Cameron Everse	Dr. Andrew Gall, Psychology and Dr. Sonja Trent-Brown, Psychology	The Effect of Physical Activity on Sleep Habits and Sleep Quality in Preschool-Aged Children
209 Chelsea Miskelley	Dr. Peter Vollbrecht, Biology and Elizabeth Woodford	Comparison of Executive Function in Selectively Bred Obesity-Prone and Obesity Resistant Sprague-Dawley Rats through Behavioral Analysis
210 Jager Haan	Dr. Peter Vollbrecht, Biology	Impact of Obesity and Diet: Obesity Development Leads to Selective Manifestation of Anxiety-like Behaviors in Obesity-Prone Rat Populations



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240 Benjamin DeRitter	Dr. Sarah Estelle, Economics & Business, Dr. Steven McMullen, Economics & Business	Does Immigration Affect Academic Achievement in U.S. Schools?
243 Brandon Fuller	Dr. Sarah Estelle, Economics & Business	The Convergence of Sphere Sovereignty, Local Knowledge, and Subsidiarity
246 Samuel Schuster	Dr. Steven McMullen, Economics & Business	Does Divorce Impact High School Students' GPAs?

ENVIRONMENTAL ACTION & AWARENESS | The natural and built environments interact with one another over time with intended and unintended consequences. Educating the public on environmental protection and integrating these ideas into our city planning can change negative outcomes of the past and improve our future state.

36 Jade Laughlin, Tena Baar, Sydney Les, Lexi Schoonover	Dr. Aaron Best, Biology, Dr. Michael Pikaart, Chemistry; Sarah Brokus; Francesco Moen; Randall Wade	Global Survey of Water Quality using Point-of-Use Water Filters
37 Chris Belica	Dr. Aaron Best, Biology, Dr. Pikaart Dr. Kreuger, Randy Wade, Sarah Brokus, Frank Moen	Environmental Factors Affecting Bacterial Community Composition in Hypereutrophic Macatawa Watershed.
38 John Peterson, Megan Oostindie, Megan Grimes	Dr. Aaron Best, Biology, Dr. Matthew DeJongh, Computer Science	Comparing Metabolic Strategies of Environmentally-Isolated Escherichia Coli Strains [<i>Escherichia Coli</i> should be italics]
39 Jacob Peecher, Adam Slater, Shannon Smith, Megan Oostindie	Dr. Aaron Best, Biology, Dr. Michael Pikaart, Chemistry; Sarah Brokus; Francesco Moen; Randall Wade	Development of a qPCR Assay to Determine In Situ Replication of Escherichia coli in Freshwater Environments
40 Matthew Schuiling	Dr. K. Greg Murray, Biology, Dr. Elizabeth Sanford, Chemistry	Isolation and Identification of Fungistatic Compounds from <i>Phytolacca americana</i> and <i>Phytolacca rivinoides</i>
41 Monica Elliott, Emily Gregory	Dr. Kathy Winnett-Murray, Biology, Dr. K. Greg Murray, Biology	Wildlife Use Patterns in a Constructed Wetland



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42 Eleda Plouch, Abigail Jeavons, Mallory Luke, Abbygayle Parshall, Jacob Spry, Daniel Wade	Dr. Aaron Best, Biology, Dr. Michael Pikaart, Biochemistry; Dr. Brent Krueger, Chemistry	Monitoring nutrient levels and sediment in Macatawa Watershed
43 Abbygayle Parshall, Cassandra Harders	Dr. Aaron Best, Biology, Dr. Michael Pikaart, Chemistry; Sarah Brokus, Biology; Randall Wade, Biology; Francesco Moen, Biology	Genomic and Physiological Characteristics of Novel Escherichia Strains Isolated from Freshwater Sources
47 Kathleen Fast, Kaitlyn Caltrider	Professor Suzanne DeVries-Zimmerman, Geological and Environmental Science	Gegenwalle Ridges: An Ecohydrological Chronosequence in Morfa Dyffryn, Wales, United Kingdom
48 Erin Brophy	Dr. Edward Hansen, Geology, Charlotte Möller, Lund University Geology	Partial Melting of Amphibolites in the Eastern Segment of the Sveconorwegian Orogen, Southern Sweden
57 Russell Houpt, Sarah Seckler	Dr. Mark Pearson, Mathematics, Dr. Darin Stephenson, Mathematics	Name That Bird: Using Neural Networks to Classify Recorded Bird Songs
58 Keri Haddrill	Dr. Paul Pearson, Mathematics, Dr. Edward Hansen, Geology; Professor Suzanne DeVries-Zimmerman; Geology	Identifying Sand and Vegetation in Aerial Photos of Sand Dunes via Machine Learning
70 Briana Linton	Dr. Paul DeYoung, Physics	A Novel Technique of Fluorine Detection in Soil by means of PIGE Analysis
96 Benjamin Pederson	Dr. Brian Yurk, Mathematics and Dr. K. Greg Murray, Biology	A Model of Reproductive Success for Neotropical Pioneer Plants
105 Brooke Mattson	Dr. Alyssa Shiel, Assistant Professor in the College of Earth, Ocean, and Atmosphere Sciences, Oregon State University	Identifying Sources of Heavy Metals in Moss along a Mining Haul Road in NW Alaska Using Pb Isotopes and Concentrations of In and Bi



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106 Cleveland Tarp, Jonas Peterson, Owen Donahoe	Dr. Jonathan Peterson, Geological & Environmental Sciences	Progress Update on Global Survey of Suspended Load in Rural Drinking Water Sources Using Onsite Water Filter Kits
107 Max Huffman	Edward Hansen, Geological & Environmental Sciences, Paul Pearson	Using Drone Acquired Remote Sensing to Map Sensitivity to Sand Mobility in Coastal Dunes
108 Ian Gorgenson	Dr. Edward Hansen, Geological & Environmental Sciences, Dr. Brian Yurk, Suzanne DeVries-Zimmerman	Dune Distribution along the Laurentian Great Lakes: The Effects of Wind and Waves
115 Anne O'Donnell	Dr. Courtney Peckens	Bio-Inspired Control of Civil Infrastructure
147 Amanda Gibson	Dr. Sonja Trent-Brown, Psychology	Outside, Now! Parental Practices Shape Their Children's Activity Preferences and Behaviors
166 McKenzie Stock	Dr. Jonathan Peterson, Geological & Environmental Sciences	Estimating the Size of Very-fine Particles in Natural Water Suspensions via a Laboratory Settling Experiment
188 Anne Sangliana	Dr. Thomas Bultman, Biology	Mutualism between Fly and Fungus Depends upon Fungal Reproductive Modes
204 Kaitlyn Lein, Kimberly Paquette, Timbree Pederson, Matthew Switalski, Carter Smiley, Emma Oonk, Darby Baird, Brooke Van Wyk, Lilly Hemesath, Abigail Meder	Assistant Professor Joseph Stukey, Biology	Genomic Analysis of the Novel Mycobacteriophage Bromden
207 Ty Hergenreder	Dr. Jianhua Li	Relating Acer Morphology, Phylogeny, and Historical Climatology [Acer should be italicized]
208 Ismael Byers	Karen D. Calhoun, University of Michigan School of Medicine, Kent Key, PhD, Michigan State University College of Human Medicine Director, Office of Community Scholars and Partnerships; karen calhoun kdcalhou@med.umich.edu	Utilizing Community Voice to Guide the Design and Implementation of Institutional Responsiveness to the Flint Water Crisis



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209 Chelsea Miskelley	Dr. Peter Vollbrecht, Biology , Elizabeth Woodford	Comparison of Executive Function in Selectively Bred Obesity-Prone and Obesity Resistant Sprague-Dawley Rats through Behavioral Analysis
219 Joey Williams	Dr. Sarah Estelle, Economics & Business	The Effects of a Mobile Population on Green Space

We believe the Christian faith calls us to care for all of God's creation and ensure preservation for generations to come. We realize it is through our daily actions that we can make a big impact and create a better world for every individual, as one created and loved by God.

Called to be global citizens, we will engage the world constructively through our teaching, research, and community service in order to shape Hope College into a model of sustainability and be a force for good in the world.

Thank you to all of the students and faculty for their hard work this year!

Congratulations!

www.hope.edu/sustainability-institute