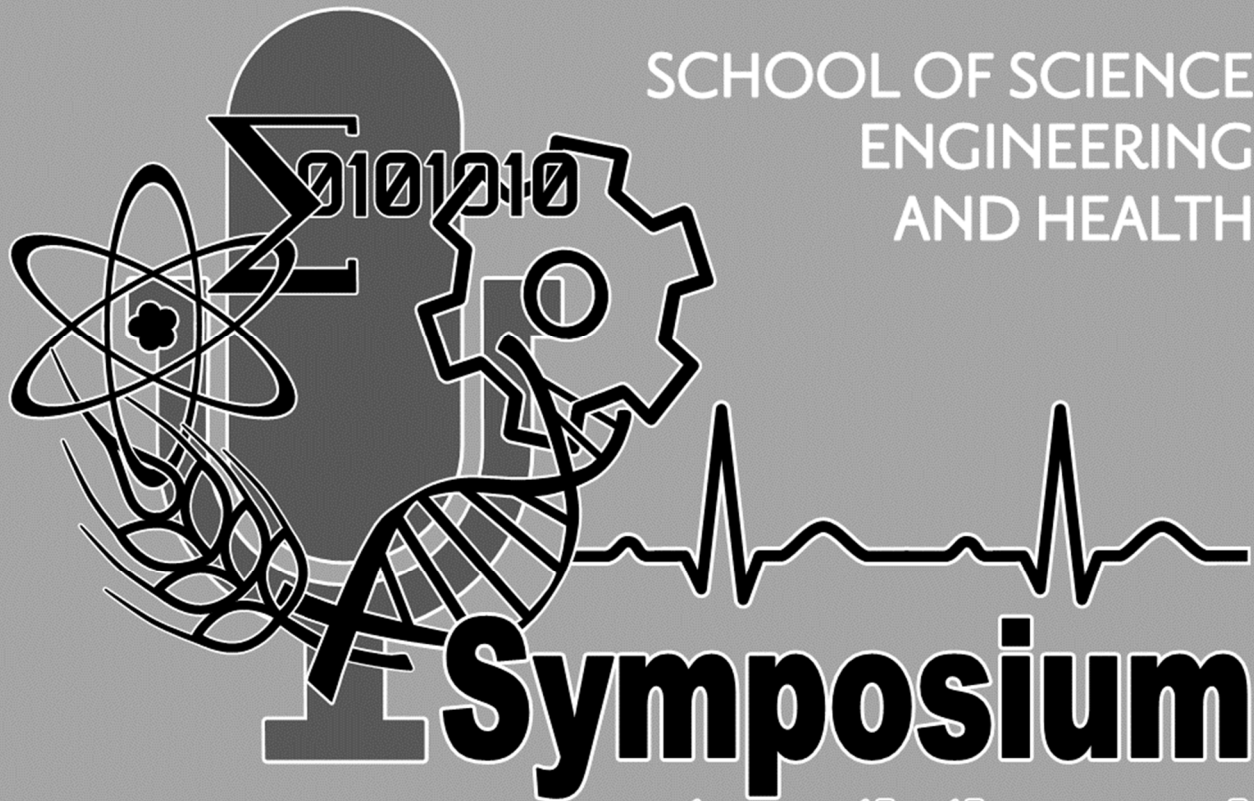


FRIDAY, APRIL 28, 2023



SCHOOL OF SCIENCE  
ENGINEERING  
AND HEALTH



# Symposium

twentieth annual

PROGRAM

## ***Welcome from the Dean***

We in the School of Science, Engineering and Health at Messiah University welcome you to our 20<sup>th</sup> Annual Symposium.

Please celebrate with our students, staff and faculty as you hear about and see professional presentations that showcase our students' basic and applied research in science and health fields.

The outcomes of scientific research expand intellectual understanding and have tremendous impact on quality of life, environmental health, and human flourishing.

*We warmly welcome you as guests for the day.*

Angela Hare  
Dean School of Science, Engineering and Health

## ***Special Thanks***

Thank you to Holly Myers, Administrative Assistant to the Dean of the School of Science, Engineering and Health, for coordinating room reservations, catering, and setup of the Symposium venues. We also thank Dr. Scott Weaver, D.P.S., Computing, Mathematics and Physics Department, for development and maintenance of the Symposium Project Registration and Management system (SymPRM) used to collect and organize the information contained in this booklet. Finally, we thank Dr. Timothy Van Dyke, Ph.D., Department of Engineering, for developing the web-based Symposium site on which you can now find the information presented in this printed program, and more! Please visit the site at:

[http://huggs.messiah.edu/seh\\_symposium](http://huggs.messiah.edu/seh_symposium)

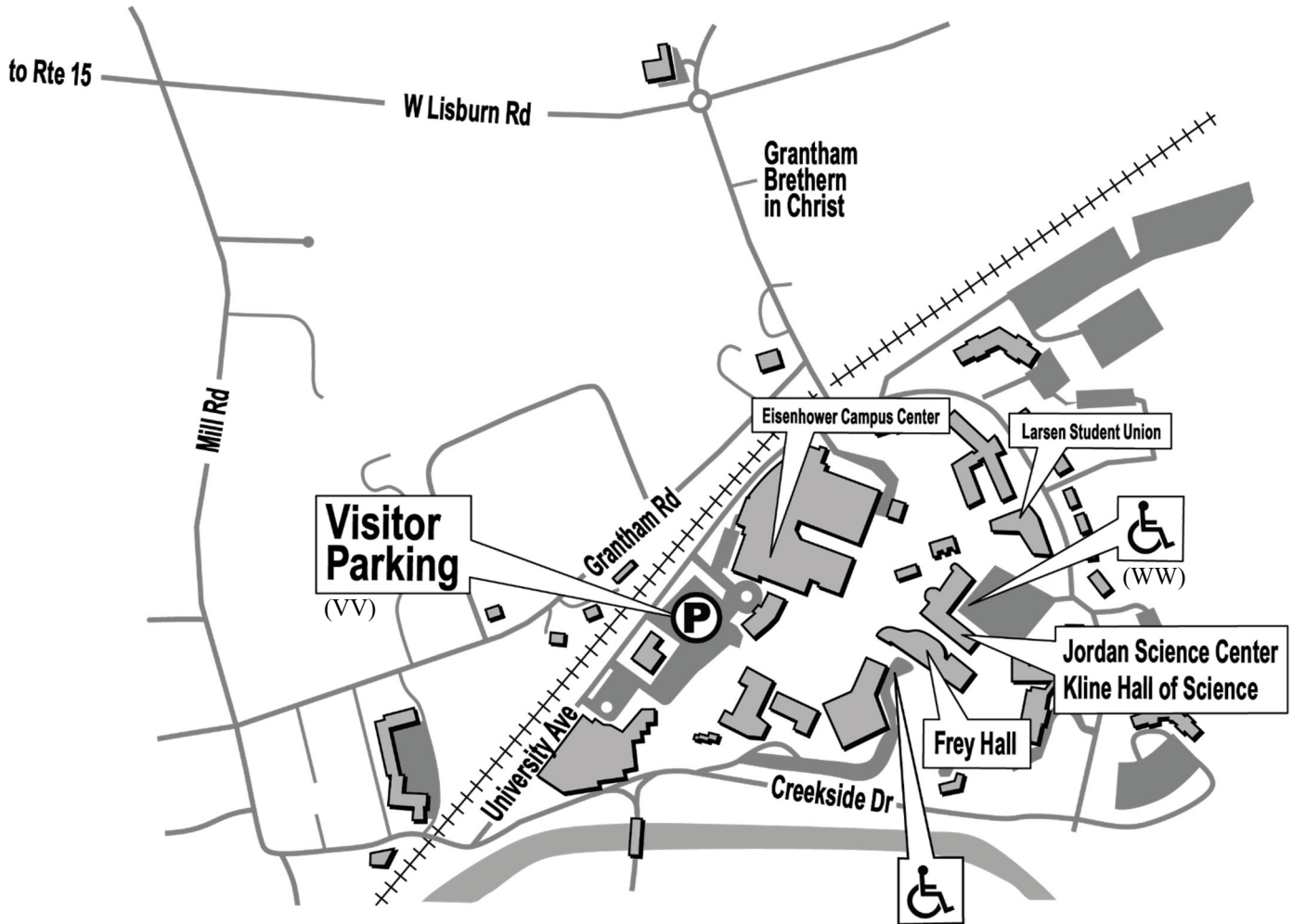
Larry Mylin, Ph.D., Symposium Coordinator  
Tim Van Dyke, Ph.D., Engineering Coordinator

# **W**elcome to the 20<sup>th</sup> Annual Symposium of the School of Science, Engineering and Health.

## **Table of Contents**

Messiah University Campus & Parking .....	2
Using this Booklet .....	3
<b>Schedule at a Glance: Oral Presentations</b> .....	<b>4</b>
<b>Schedule at a Glance: Poster Presentations</b> .....	<b>6</b>
Building Maps .....	8
<b>Oral Presentations (Morning)</b> .....	<b>10</b>
Computer & Information Science (Alexander Auditorium - Frey 110; 9:00 – 10:20) .....	10
Physics (Frey 243; 9:40 – 11:40) .....	10
Mathematics (Frey 349; 9:00 – 12:00) .....	11
<b>Oral Presentations (Early Afternoon)</b> .....	<b>12</b>
Engineering I (Alexander Auditorium - Frey 110; 1:00 – 3:00) .....	12
Engineering II (Frey 150; 1:00 – 3:00) .....	13
Organismal Biology (Kline 120; 1:00 – 3:00) .....	14
Biochemistry (Jordan 159; 1:00 – 2:40) .....	14
Cellular & Molecular Biology I; Exercise Science I (Jordan 161; 1:00 – 2:40) .....	15
<b>Oral Presentations (Late Afternoon)</b> .....	<b>16</b>
Engineering III (Alexander Auditorium - Frey 110; 4:00 – 5:20) .....	16
Engineering IV (Frey 150; 4:00 – 5:20) .....	16
Cellular & Molecular Biology II (Kline 120; 4:00 – 5:00) .....	17
Chemistry (Jordan 159; 4:00 – 5:00) .....	17
Exercise Science II; Biopsychology (Jordan 161; 4:00 – 5:00) .....	17
<b>Poster Presentations</b> .....	<b>18</b>
Engineering (Frey 070 Project Space; 3:00 – 4:00) .....	18
Evidence-based Nursing Care (Hollinger Lounge; 2:40 – 3:50) .....	20
Exercise Science; Biopsychology (Hollinger Atrium & Lounge; 2:40 – 3:50) .....	21
Natural Sciences (Hollinger Atrium; 2:40 – 3:50) .....	22
Organismal Biology; Cellular & Molecular Biology .....	22
Biochemistry; Chemistry .....	23
<b>Acknowledgments</b> .....	<b>24</b>
The Collaboratory for Strategic Partnerships and Applied Research .....	24
Steinbrecher Undergraduate Summer Research Program .....	25
Mentors: Collaboratory Educators, Collaborators, Partners, Review Panelists .....	26
Mentors: Messiah University Health & Natural Science Faculty Research Mentors .....	29
Mentors: Nursing Professionals (Penn State Holy Spirit Hospital).....	30
Financial & Material Support .....	30
<b>Index of Authors</b> .....	<b>31</b>

# Messiah University



## ***Welcome to Messiah University!***

**Visitor Parking:** Parking is provided in the main **Visitor Parking lot (VV)** accessed from University Avenue, between Old Main and the Eisenhower Campus Center. Parking tags are not required during the Symposium. While designated handicapped parking spots are located throughout campus, spots closest to Symposium venues are available in the employee parking lot (WW) which is located behind the Jordan Science Center.

**Dining facilities:** The Lottie Nelson Dining Hall (upper level) and The Falcon (lower level; soup, paninis, salads) are located in the Eisenhower Campus Center. The Union Café (pizza, grill, wraps, salads) is located in the Larsen Student Union.

# Using this Booklet

This **Program booklet** provides times, locations and titles for all presentations in the Symposium. A consolidated “**Schedule at a Glance**” (page 4) summarizes the schedule of all Oral Presentations and Poster Presentations (page 6).

**Presentation Number:** Each presentation has been assigned a unique Presentation Number. This number is used throughout the booklet to facilitate cross referencing.

**Authorship:** All contributing co-authors and mentors are listed in this Program. The name of each **presenting author** is indicated in **bold font**. An **Index of Authors** at the end of the booklet (page 31) lists the names of all authors alphabetically with the number(s) of each presentation on which each author is included.

**Program & Symbols:** Presentations are organized in discipline-specific sessions. Throughout the Program and “**Schedule at a Glance**,” unique **icons** (see box at right) indicate the discipline of each presentation.











**Abstracts:** Abstracts for all oral and poster presentations in the Symposium are provided in the accompanying web-based program found at: [http://huggs.messiah.edu/seh\\_symposium](http://huggs.messiah.edu/seh_symposium)

**Acknowledgments:** All faculty mentors, external mentors and collaborators, and nursing professionals are recognized. Sources of financial and material support are also listed (page 30) with corresponding presentation numbers.






## Authorship Legend:

- bold** Presenting author
- + Research or project mentor
- ‡ Off-campus contributor

## Discipline Categories:

-  Biopsychology
-  Cellular & Molecular Biology
-  Chemistry & Biochemistry
-  Computer & Information Science
-  Engineering
-  Exercise Science (or Nutrition)
-  Mathematics
-  Nursing
-  Organismal & Ecological Biology
-  Physics

## Additional Symbols:

-  This Oral Presentation is accompanied by a Poster
-  This Poster is accompanied by an Oral Presentation
-  This project was supported by the Steinbrecher Undergraduate Summer Research Program
-  This project was supported by the Collaboratory for Strategic Partnerships and Applied Research
-  Extended presentation (~40 min)

# Alexander Auditorium (Frey 110)

# Frey 243

# Frey 349



## Computer & Information Science

## Physics

## Mathematics

<b>8:55</b>	Welcome and instructions by Session Chairs		
<b>9:00</b>	1  Tamrat, Burger, Lee, McVey, Padilla		11 $\Sigma$ Wagman
<b>9:20</b>	2  Nissley, Garrido		12 $\Sigma$ Stoltzfus
<b>9:40</b>	3  Padovano, Alejos Acosta, Coldsmith, Pokrivka	5  Anthony	13 $\Sigma$ Provan
<b>10:00</b>	4  Robson, Dorsey, Firestone, Ossman, Yang	6  Whitehead-Zimmers	14 $\Sigma$ Johnson
<b>10:20</b>		7  Pavill	15 $\Sigma$ Humpert
<b>10:40</b>		8  Huang	16 $\Sigma$ Crowley
<b>11:00</b>		9  Neal	17 $\Sigma$ Barnhart
<b>11:20</b>		10  Griffith	18 $\Sigma$ Herrlin, Hildebeitel, Humpert, Tamrat (40 minutes)
<b>11:40</b>			

# Alexander Auditorium (Frey 110)

# Frey 150



## Engineering I

## Engineering II

<b>1:00</b>	19  Gillen, Goertzen, Rosengrant	25  Fouse, Huang, Rasinske
<b>1:20</b>	20  Mah, Koehnke, Zehr	26  Moyer, Mundis
<b>1:40</b>	21  Hunsberger, Brandt	27  Seubert, Santelli
<b>2:00</b>	22  Welch, Miller, Sonon	28  Dupler, Gilbert, Heckman
<b>2:20</b>	23  Holley, Deutcheu Tchouako, Mendoza	29  Witt, Fertig
<b>2:40</b>	24  Sinsel, Glavin, Rashford, Wright	30  Lee, Bingaman, Clancy, Hamann



## Poster Session 3:00 - 4:00 Frey 70 Project Space

<b>4:00</b>	47  Thrush, Horst, Snader	51  Groff, Caldwell
<b>4:20</b>	48  Matanguihan	52  Ginck, Stefanchik, Wildasin
<b>4:40</b>	49  Galyen, Bruner	53  Geyer, Shirk, Sison
<b>5:00</b>	50  Bartels, Wu	54  Finkbeiner, Fair, Wood

# Oral Presentations

## Kline 120

## Jordan 159


## Jordan 161



Organismal Biology


Biochemistry


Cellular & Molecular  
Biology I;  
Exercise Science I

1:00 31  Martin


37  White

42  Ramsey

1:20 32  Kowalski


38  Smith


43  Lin


1:40 33  Jahraus


39  Mateer

44  Soerens


2:00 34  Hart


40  Stevenson

45  Schoenhals, Lee

2:20 35  Register

41  Vidzicki

46  Howland

2:40 36  Jerome




**Poster Session 2:40-3:50 Hollinger Atrium & Lounge**




Cellular & Molecular  
Biology II


Chemistry

Exercise Science II;  
Biopsychology


4:00 55  Bath


58  Cook


61  Tirjan

4:20 56  Barr

59  Jerdan

62  Lukenbill

4:40 57  Morgan




















60  Stroud

63  Pratt

# Poster Presentations







## *Engineering*

**Frey 070 Project Space; 3:00 – 4:00**

- |   |  |   |
|---|--|---|
| 64  Ellis, Lacayo, Magness               | 72  Egelkamp, Lim, Sweeton, Collins     | 80  Brink, Faragallah, Smith |
| 65  Green, Sauder, Settipane             | 73  Ross, Green                         | 81  Heise, Price, Rijo       |
| 66  Bitler, Clemmer                      | 74  Oyler, Frederick                    | 82  Hargrove, Wood           |
| 67  Allbee, Gehenio                      | 75  Landis, Shea                        |   |
| 68  Gates, Kline                         | 76  Golub, Smith-Cassidy                |   |
| 69  Binko, Ferrin, Blagbrough            | 77  Friend, Wyrick                      |   |
| 70  Jaloszynski, Bisbort, Campbell, Wood | 78  Gingerich, Harro, Jaiyesimi, Touhey |   |
| 71  Clark, Bolin, Dressler               | 79  Herman, Kapp, Ling, Roca Ruano      |   |












## *Evidence-Based Nursing Care*

**Hollinger Lounge; 2:40 – 3:50**

- |   |  |
|---|--|
| 83  Wardwell, Smoker, Beaver, Barnes, Honychurch, McCord, Herr, Williams | 86  Smucker, Welsh, Putt, Roach Hagenbuch, Blevins, Keller        |
| 84  Doutrich, Lownsbury, Miller, Frey, Bradbury, Hess                    | 87  Kohl, Trimmer, Day, Phan, Apaga, Weaver, Jeffers              |
| 85  Seip, Montgomery, Orendorf, Hedrick, Forney, Pangle, Farah           | 88  Diethrich, Hirak, Bracken, Teisen, Hughes, Louder, Spadaccino |

## *Exercise Science; Biopsychology*

**Hollinger Atrium & Lounge; 2:40 – 3:50**

- |  |  |   |
|--|--|---|
| 89  Coln, Wright                              | 93  Wolf, Echard, Timco, Nixon                  | 97  Chandler, Cory, Oravitz, Zimmerman |
| 90  Daudt, Doran, Hess, Rutan                 | 94  Elder                                       | 98  Woodie, Elder                      |
| 91  Harbaugh, Hejeebu, Eade, Starkey, Yellets | 95  Gonzalez, Zercher, Hersh                    | 63  Pratt                              |
| 92  Myers                                     | 96  Lechthaler, Cook, Mark, Walker, Dereszynski |   |


















## Natural Sciences

Hollinger Atrium 2:40 – 3:50








### Organismal Biology

- 31  Martin
- 32  Kowalski
- 33  Jahraus
- 36  Jerome
- 99  Casey
- 100  Smith
- 101  Harman

### Cellular & Molecular Biology

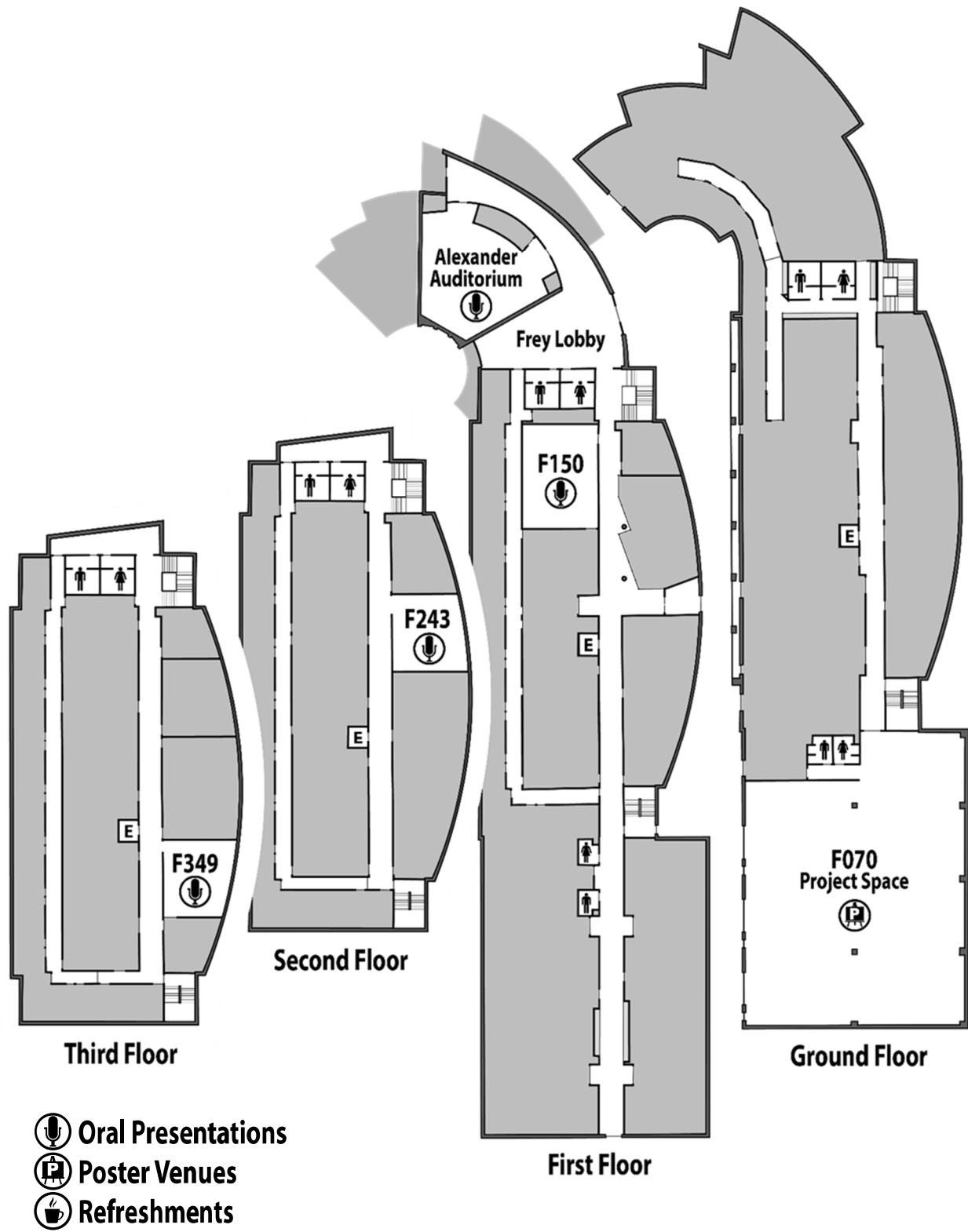
- 43  Lin
- 44  Soerens, Bath
- 55  Bath, Soerens
- 56  Barr
- 57  Morgan
- 102  Lapp

### Biochemistry; Chemistry

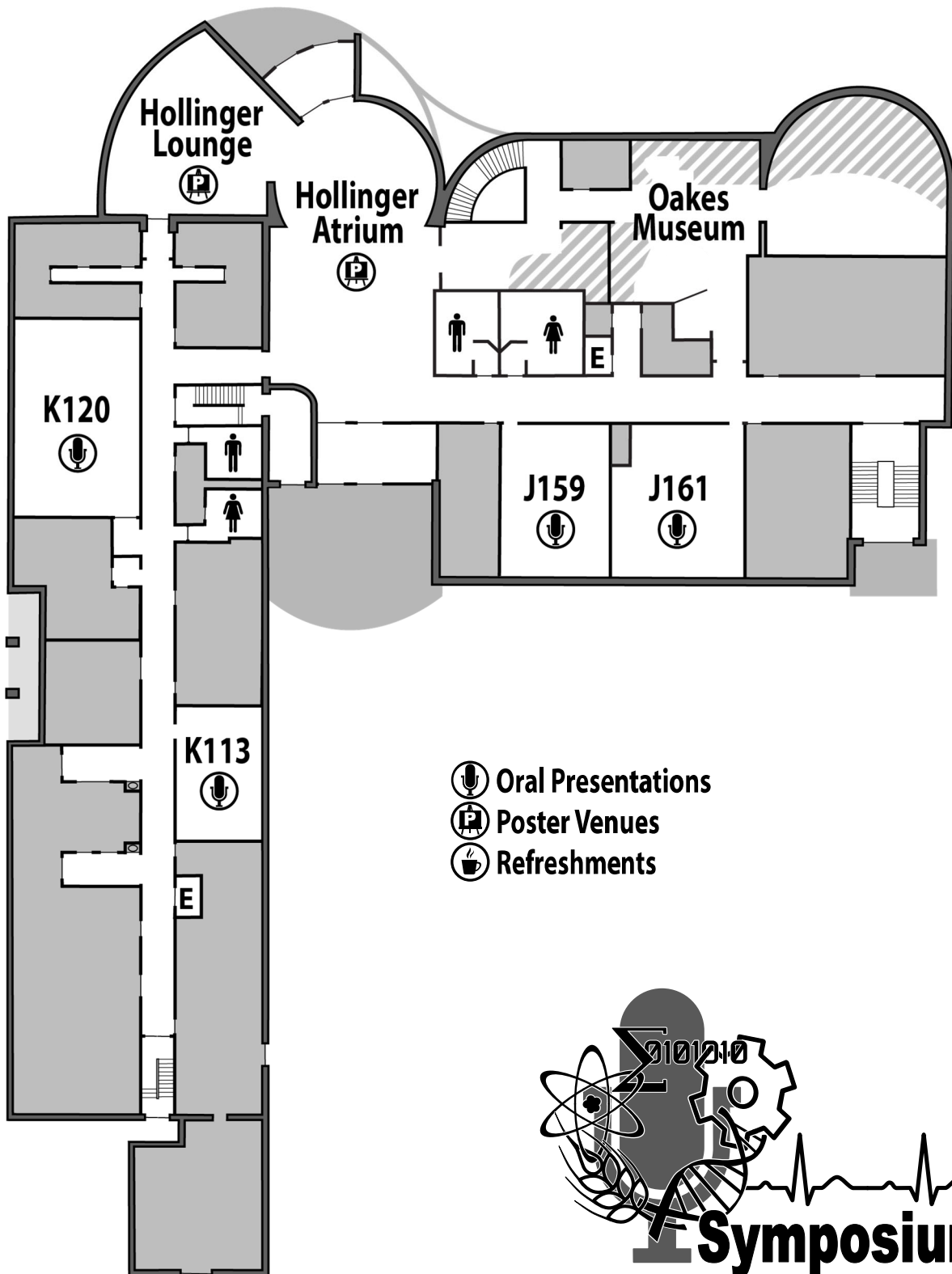
- 37  White
- 103  Kumi
- 58  Cook
- 59  Jerdan
- 60  Stroud
- 104  McFeaters
- 105  Garrett



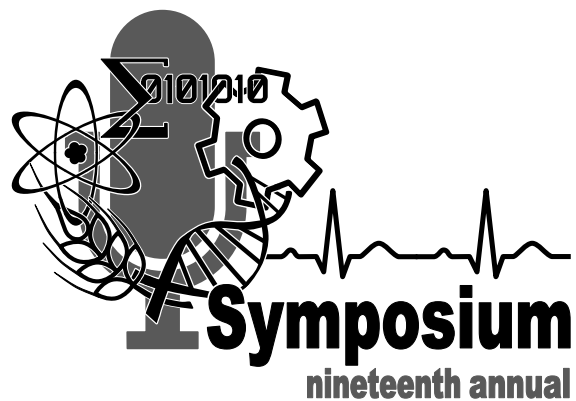
# Frey Hall



# Jordan Science Center - Kline Hall of Science



-  Oral Presentations
-  Poster Venues
-  Refreshments









# Oral Presentations (Morning)



## Computer & Information Science

**Alexander Auditorium (Frey 110); 9:00 – 10:20**

- 1 9:00  *MU Mobile*  
**Ammanuel Tamrat, Reid Burger, Timothy Lee, Thomas McVey, Ricardo Padilla**
- 2 9:20  *MyTV - Streaming Service Tracker*  
**Garrett Nissley, Abigail Garrido**
- 3 9:40  *Insight: Planning your Course Journey*  
**Jamie Padovano, Sebastian Alejos Acosta, Andrew Coldsmith, Ricky Pokrivka**
- 4 10:00  *Spark Worship*  
**Colin Robson, Austin Dorsey, Kylie Firestone, Logan Ossman, Azianna Yang**



## Physics

**Frey 243; 9:40 – 11:40**

- 5 9:40  *High-Power Impulse Magnetron Sputtering*  
**Katie Anthony**
- 6 10:00  *Duel of the Fates (of Ayeyarwady Sediment): Bay of Bengal or Gulf of Martaban?*  
**Eli Whitehead-Zimmers**
- 7 10:20  *Measuring the Duration of Laser Pulses Used in High Harmonic Generation*  
**Hanna Pavill**
- 8 10:40  *Vacuum Ultraviolet Detector for Dark Photon Searches with URIDA Experiment*  
**Kyle Huang, Abaz Kryemadhi<sup>†</sup>**
- 9 11:00  *The Physics of Fine-Tuning*  
**Samantha Neal, Robin Collins<sup>†</sup>, Abaz Kryemadhi<sup>†</sup>**
- 10 11:20  *Search for Axion Like Particle Dark Matter with the SNIPE Hunt Experiment*  
**William Griffith, Abaz Kryemadhi<sup>†</sup>**



## Mathematics

Frey 349; 9:00 – Noon

- 11 9:00  $\Sigma$  *Mathematics and Public Key Cryptography*  
**Haley Wagman**
- 12 9:20  $\Sigma$  *History of Imaginary Numbers*  
**Maria Stoltzfus**
- 13 9:40  $\Sigma$  *Group Theory in Musical Harmony*  
**Josiah Provan**
- 14 10:00  $\Sigma$  *Point Groups and Their Applications in Chemistry*  
**Aaron Johnson**
- 15 10:20  $\Sigma$  *Ancient and Medieval Proof*  
**Charlie Humpert**
- 16 10:40  $\Sigma$  *Mathematics & Marketing: How successful marketing can be conducted through mathematical modeling*  
**Noelle Crowley**
- 17 11:00  $\Sigma$  *Analyzing Sabermetrics*  
**Nick Barnhart**
- 18 11:20  $\Sigma$  *Maximally Filled Staircase Tableaux*  
**Abigail Herrlin, Skyler Hildebeitel, Charlie Humpert, Ammanuel Tamrat**





















# Oral Presentations (Early Afternoon)



## Engineering I

Alexander Auditorium (Frey 110); 1:00 – 3:00

- |    |      |   |  |  |
|----|------|---|--|--|
| 19 | 1:00 |    | <i>Energy Monitoring &amp; Management System</i><br><b>Zach Gillen, Samuel Goertzen, Josh Rosengrant,</b> Noah Geiger, Clifton Green, Caitlin Ross, Tom Austin <sup>†</sup>  | <br><br>73     |
| 20 | 1:20 |    | <i>Designing and Building an Egg Incubator for the Zambian BIC Church</i><br><b>Joshua Mah, Brandon Koehnke, Josiah Zehr,</b> Shekinah Ellis, Johnathon Lacayo, Lane Magness, Philip Tan <sup>†</sup>  | <br><br>64     |
| 21 | 1:40 |    | <i>Better Pumps: Promoting Reliable Water Infrastructure for Everyone</i><br><b>Andrea Hunsberger, Benjamin Brandt,</b> Ryan Friend, Connor McAtee, Jonathan Wyrick, Tony Beers <sup>††</sup> , Matthew Schwiebert <sup>††</sup> , David Vader <sup>†</sup>                              | <br><br>77     |
| 22 | 2:00 |    | <i>Redesign and Fabrication of an Adjustable Prone Trolley for People Suffering from Spinal Cord Injuries in Nepal</i><br><b>Connor Welch, Abby Miller, Lukas Sonon,</b> Thomas Bitler, Blake Clemmer, Timothy Van Dyke <sup>†</sup>   | <br><br>66     |
| 23 | 2:20 |  | <i>Engineering a Locally Manufacturable Wheelchair for Nepal</i><br><b>Joshua Holley, Pauline Deutcheu Tchouako, Caleb Mendoza,</b> Trey Brackman, Joshua Frazho, Cai Green, Max Kramer, Caleb Kreider, Jacob Petrovich, Bethany Sauder, Travis Settipane, Timothy Van Dyke <sup>†</sup> | <br><br>65 |
| 24 | 2:40 |  | <i>A Modular Mobility Solution for Persons Living with Disability in Myanmar</i><br><b>Joey Sinsel, Timothy Glavin, Rachel Rashford, Caleb Wright,</b> Jacob Cruzan, Josh Gingerich, Riley Harro, Adeolu Jaiyesimi, Connor Touhey, John Meyer <sup>†</sup> , David Vader <sup>†</sup>    | <br><br>78 |



## Engineering II












Frey 150; 1:00 – 3:00

- |    |      |  |   |    |
|----|------|--|---|----|
| 25 | 1:00 |  | <i>Biomechanical Equivalency of Steenbeek and Cunningham Braces While Maintaining Clubfoot Correction in Babies</i><br><b>Brittney Fouse, Rachel Huang, Sam Rasinske</b> , Lilia Golub, Hayward Smith-Cassidy, Camilo Giraldo <sup>†</sup>  | 76 |
| 26 | 1:20 |  | <i>CURE Kenya Prosthetic Knee for Through-Knee Amputees</i><br><b>Josiah Moyer, Josh Mundis</b> , Caleb Bisbort, Paige Campbell, Nathan Jaloszynski, Cadee Wood, Jamie Williams <sup>†</sup>  | 70 |
| 27 | 1:40 |  | <i>Rapid Orthotics for CURE Kenya: Interpretation of the ISO 10328 Standard for Testing</i><br><b>Lauren Seubert, Antonio Santelli</b> , Kaitlyn Lutz, Jamie Williams <sup>†</sup>  | 70 |
| 28 | 2:00 |  | <i>Bacterial Comparison of Prosthetic Liners</i><br><b>Keera Dupler, Sarah Gilbert, Bella Heckman</b> , Philip Tan <sup>†</sup>   |    |
| 29 | 2:20 |  | <i>Circuit Development and Mechanical Testing of a Stance Control Orthosis</i><br><b>Jordan Witt, Levi Fertig</b> , David Alunni, Elizabeth Hargrove, Emily Javier, Laurel Pettitt, Ethan Regula, Justin Wood, Ryan Farris <sup>†</sup>     | 82 |
| 30 | 2:40 |  | <i>Circuit Development and Real-Time Gait Phase Detection for Functional Electrical Stimulation</i><br><b>Timothy Lee, Wyatt Bingaman, Andrew Clancy, Nick Hamann</b> , Callan Heise, Summer Price, Jaylinne Rijo, Ryan Farris <sup>†</sup> | 81 |



## Organismal Biology










Kline 120; 1:00 – 3:00

- |    |      |  |   |   |
|----|------|--|---|---|
| 31 | 1:00 |   | <i>Physical-Chemical Water Qualities that Impact <u>Faxonius rusticus</u> Colonization in the Yellow Breeches Watershed</i><br><b>Hanah Martin</b> , Jeff Erikson <sup>†</sup>  |        |
| 32 | 1:20 |   | <i>Seasonal Changes in Macroinvertebrate Composition Between Two Perennial Spring Fed Streams</i><br><b>Stephanie Kowalski</b> , Jeff Erikson <sup>†</sup>  |        |
| 33 | 1:40 |   | <i>Tissue Culture of Virginia bluebells</i><br><b>Tyler Jahraus</b> , David Foster <sup>†</sup>   |        |
| 34 | 2:00 |   | <i>Exploration of Antibiotic Mechanisms for Berberine</i><br><b>Joel Hart</b> , Abigail Casey, Richard Schaeffer <sup>†</sup> , Lawrence Mylin <sup>†</sup> , David Foster <sup>†</sup>   | <br>99 |
| 35 | 2:20 |   | <i>An Analysis of the Seasonal Variation in Soil Temperature, Ambient Temperature, and Vegetative Structure Associated with <u>Terrapene carolina carolina</u> Microhabitats from April to October</i><br><b>Margeaux Register</b> , Randy Cassell <sup>†</sup> |   |
| 36 | 2:40 |  | <i>Testing for the Presence of <u>Batrachochytrium dendrobatidis</u> and <u>B. salamandrivorans</u> in a Local Population of <u>Eurycea longicauda</u></i><br><b>Evan Jerome</b> , Erik Lindquist <sup>†</sup> , Michael Shin <sup>†</sup>                      |       |



## Biochemistry

Jordan 159; 1:00 – 2:40

- |    |      |   |   |   |
|----|------|---|---|---|
| 37 | 1:00 |  | <i>Analysis of novel chalcones, flavones, and stilbenes as potential protein tyrosine phosphatase inhibitors</i><br><b>Sydney White</b> , Anne Reeve <sup>†</sup>                             |  |
| 38 | 1:20 |  | <i>An engineered artificial selection system for the directed evolution of unnatural cytochrome c biosynthesis enzymes</i><br><b>Noah Smith</b> , Jesse Kleingardner <sup>†</sup>             |  |
| 39 | 1:40 |  | <i>Re-purposing the calcium biosensor Twitch-2B: creating transition metal detection proteins through fluorescent FRET analysis</i><br><b>Sarah Mateer</b> , Jesse Kleingardner <sup>†</sup>  |  |
| 40 | 2:00 |  | <i>The application of machine learning and genetic algorithms for the computational design of allosteric inhibitors of PTP1B</i><br><b>Marina Stevenson</b> , Jesse Kleingardner <sup>†</sup> |  |
| 41 | 2:20 |  | <i>Expression and Purification of Ferrochelatase for Metal Insertion Assay Development</i><br><b>Joseph Vidzicki</b> , Jesse Kleingardner <sup>†</sup>  |   |





## **Cellular & Molecular Biology I; Exercise Science I**

**Jordan 161; 1:00 – 2:40**

- |    |      |  |  |   |
|----|------|--|--|---|
| 42 | 1:00 |   | <i>Determining the efficacy of anti-fibrotic treatment on pancreatic cancer metastases</i><br><b>Ruby Ramsey</b> , Sean Lapp, John Harms <sup>†</sup>                              |   |
| 43 | 1:20 |   | <i>Generation of Bacteriophage T4-Neutralizing Antibodies Using Monoclonal Technology</i><br><b>Wei-Jin Lin</b> , Lawrence Mylin <sup>†</sup>                                      |  |
| 44 | 1:40 |   | <i>Use of Genetically Engineered Tumor Cells to Vaccinate Against Pancreatic Cancer</i><br><b>Evangeline Soerens</b> , Sarah Bath, Lawrence Mylin <sup>†</sup>                     |  |
| 45 | 2:00 |   | <i>A Holistic Model of Health Promotion: Partnering with our Neighbors at Brethren Housing Association</i><br><b>Heidi Schoenhals</b> , Irene Lee, Melinda Smith <sup>†</sup>      |   |
| 46 | 2:20 |  | <i>Nourish: Promoting Body Acceptance and a Holistic Mindset Toward Identity in Female Collegiate Cross-country Runners</i><br><b>Kirsten Howland</b> , Melinda Smith <sup>†</sup> |   |

# Oral Presentations (Late Afternoon)










## Engineering III

Alexander Auditorium (Frey 110); 4:00 – 5:20

- |    |      |   |  |   |   |
|----|------|---|--|---|---|
| 47 | 4:00 |  | <i>Bridge for Forward Edge's Trigo y Miel Ministry</i><br><b>Noah Thrush, Logan Horst, Jarod Snader</b> , Joel Herman, Thomas Kapp,<br>Noah Ling, Luis Roca Ruano, John Steele, Brian Swartz <sup>†</sup>                  |  | <br>79 |
| 48 | 4:20 |  | <i>Clean Accessible Water Solutions</i><br><b>Miggy Matanguihan</b> , Olivia Allbee, Sam Dykes, Candace Forry,<br>Cassandra Gehenio, Regan Meals, Emma Rice, Ray Knepper <sup>††</sup> ,<br>Michelle Lockwood <sup>†</sup> |  | <br>67 |
| 49 | 4:40 |  | <i>Drinking Water Innovative Purification</i><br><b>Ruth Galyen, Caleb Bruner</b> , Nathan Binko, Amanda Blagbrough, Anna<br>Ferrin, Ray Knepper <sup>††</sup> , Michelle Lockwood <sup>†</sup>                            |  | <br>69 |
| 50 | 5:00 |  | <i>Coffee Wastewater Treatment in Rural Honduras</i><br><b>Abigail Bartels, Aleesa Wu</b> , Benjamin Gates, Caleb Hilton, Seth Kline,<br>Elizabeth Yoho, Thomas Soerens <sup>†</sup>                                       |  | <br>68 |







## Engineering IV

Frey 150; 4:00 – 5:20

- |    |      |   |   |   |   |
|----|------|---|---|---|---|
| 51 | 4:00 |  | <i>Improving Access to Clean Water Through Autonomous Monitoring of<br/>Hand Pump Operation</i><br><b>Jared Groff, Matt Caldwell</b> , Darin Landis, Owen Shea, Randall Fish <sup>†</sup>                               |  | <br>75 |
| 52 | 4:20 |  | <i>A Solar PV System for Grantham Memorial Park and an Upgraded<br/>Solar Cart</i><br><b>Josh Ginck, Michael Stefanchik, Jacob Wildasin</b> , Ethan Bolin, Micah<br>Clark, Adam Dressler, Harold Underwood <sup>†</sup> |  | <br>71 |
| 53 | 4:40 |  | <i>Diagnostic For Viral Diseases: A Low-Cost, Portable HIV Diagnostic<br/>Device</i><br><b>Michael Geyer, Brittany Shirk, Jon Sison</b> , Laura Frederick, Ryan Oyler,<br>Randall Fish <sup>†</sup>                     |  | <br>74 |
| 54 | 5:00 |  | <i>Developing Electronic Maskers to Improve Fluency</i><br><b>Jake Finkbeiner, Timothy Fair, Elijah Wood</b> , Micah Collins, Kaleb<br>Egelkamp, James Lim, Jon Sweeton, Harold Underwood <sup>†</sup>                  |  | <br>72 |







## Cellular & Molecular Biology II

Kline 120; 4:00 – 5:00

- |    |      |   |   |   |
|----|------|---|---|---|
| 55 | 4:00 |  | <i>Development of a Cell-based Vaccine against Pancreatic Cancer</i><br><b>Sarah Bath</b> , Evangeline Soerens, Lawrence Mylin <sup>†</sup> |  |
| 56 | 4:20 |  | <i>Analysis of Myelination Deficits in a Zebrafish Developmental Hypoxia Model</i><br><b>Kelly Barr</b> , Jennifer Ness-Myers <sup>†</sup>  |  |
| 57 | 4:40 |  | <i>Analysis of Lck Expression and Function in Cultured Rat Microglia</i><br><b>Abigail Morgan</b> , Jennifer Ness-Myers <sup>†</sup>        |  |





## Chemistry

Jordan 159; 4:00 – 5:00

- |    |      |   |  |   |
|----|------|---|--|---|
| 58 | 4:00 |    | <i>Synthesis of Magnesium Fulleride and Magnesium Tetraphenyl Borate</i><br><b>Dylan Cook</b> , Richard Schaeffer <sup>†</sup>                             |    |
| 59 | 4:20 |   | <i>Synthesis of trifluoromethylstilbenes as potential inhibitors of protein tyrosine phosphatase 1B</i><br><b>William Jerdan</b> , Anne Reeve <sup>†</sup> |   |
| 60 | 4:40 |  | <i>Characterization of Varying Conditions on Cobalt Decorated Graphene Oxide</i><br><b>Ethan Stroud</b> , Seth Burkert <sup>†</sup>                        |  |

## Exercise Science II; Biopsychology

Jordan 161; 4:00 – 5:00








- |    |      |   |  |   |
|----|------|---|--|---|
| 61 | 4:00 |  | <i>The Effects of Caffeine and the -163 A&gt;C CYP1A2 Polymorphism on Skill Performance in Soccer Players</i><br><b>Rachael Tirjan</b> , Jake Lent-Koop, H. Scott Kieffer <sup>†</sup> , Michael Shin <sup>†</sup> |   |
| 62 | 4:20 |  | <i>Fine Motor Skills and Caffeine: The influence of the polymorphisms of ADORA2A and DRD2</i><br><b>Courtney Luckenbill</b> , H. Scott Kieffer <sup>†</sup> , Michael Shin <sup>†</sup>                            |   |
| 63 | 4:40 |  | <i>Ketamine and PTSD</i><br><b>Elizabeth Pratt</b> , Austin Blakeslee, Jennifer Thomson  |  |

# Poster Presentations

## Engineering

**Frey 070 Project Space; 3:00 – 4:00**







- |    |   |  |   |
|----|---|--|---|
| 64 |    | <i>A High-Quality Egg Incubator to Support Zambian Churches with Food and Income</i><br><b>Shekinah Ellis, Johnathon Lacayo, Lane Magness,</b> Brandon Koehnke, Joshua Mah, Josiah Zehr, Philip Tan <sup>†</sup>   |  <br>20     |
| 65 |    | <i>Engineering a Locally Manufacturable Wheelchair for Nepal</i><br><b>Cai Green, Bethany Sauder, Travis Settipane,</b> Trey Brackman, Pauline Deutcheu Tchouako, Joshua Frazho, Joshua Holley, Max Kramer, Caleb Kreider, Caleb Mendoza, Jacob Petrovich, Timothy Van Dyke <sup>†</sup> |  <br>23     |
| 66 |    | <i>Adjustable Prone Trolley Design for People Suffering from Spinal Cord Injuries in Nepal</i><br><b>Thomas Bitler, Blake Clemmer,</b> Abby Miller, Lukas Sonon, Connor Welch, Timothy Van Dyke <sup>†</sup>   |  <br>22     |
| 67 |   | <i>Clean Accessible Water Solutions</i><br><b>Olivia Allbee, Cassandra Gehenio,</b> Sam Dykes, Candace Forry, Miggy Matanguihan, Regan Meals, Emma Rice, Ray Knepper <sup>††</sup> , Michelle Lockwood <sup>†</sup>  |  <br>48     |
| 68 |  | <i>Coffee Wastewater Solutions in Rural Honduras</i><br><b>Benjamin Gates, Seth Kline,</b> Abigail Bartels, Caleb Hilton, Aleesa Wu, Elizabeth Yoho, Thomas Soerens <sup>†</sup>   |  <br>50 |
| 69 |  | <i>Drinking Water Innovative Purification</i><br><b>Nathan Binko, Anna Ferrin, Amanda Blagbrough,</b> Caleb Bruner, Ruth Galyen, Ray Knepper <sup>††</sup> , Michelle Lockwood <sup>†</sup>  |  <br>49 |
| 70 |  | <i>Prosthetic Knee for CURE International Hospital</i><br><b>Nathan Jaloszynski, Caleb Bisbort, Paige Campbell, Cadee Wood,</b> Josiah Moyer, Josh Mundis, Jamie Williams <sup>†</sup>   |  <br>26 |
| 71 |  | <i>A Solar PV System for Grantham Memorial Park and an Upgraded Solar Cart</i><br><b>Micah Clark, Ethan Bolin, Adam Dressler,</b> Josh Ginck, Michael Stefanichik, Jacob Wildasin, Harold Underwood <sup>†</sup>   |  <br>52 |
| 72 |  | <i>Developing Electronic Maskers to Improve Fluency</i><br><b>Kaleb Egelkamp, James Lim, Jon Sweeton, Micah Collins,</b> Elijah Wood, Jake Finkbeiner, Timothy Fair, Harold Underwood <sup>†</sup>   |  <br>54 |

- 73  *Energy Monitoring & Management System*   19  
**Caitlin Ross, Clifton Green**, Noah Geiger, Zach Gillen, Samuel Goertzen, Josh Rosengrant, Tom Austin<sup>†</sup>
- 74  *A Low Cost, Portable Diagnostic Device to Broaden HIV Medical Care*   53  
**Ryan Oyler, Laura Frederick**, Michael Geyer, Brittany Shirk, Jon Sison, Randall Fish<sup>†</sup>
- 75  *Improving Access to Clean Water Through Autonomous Monitoring of Hand Pump Operation*   51  
**Darin Landis, Owen Shea**, Matt Caldwell, Jared Groff, Randall Fish<sup>†</sup>
- 76  *Fatigue Life Evaluation of the Cunningham Clubfoot Brace at the Thigh*   25  
**Lilia Golub, Hayward Smith-Cassidy**, Brittney Fouse, Rachel Huang, Sam Rasinske, Camilo Giraldo<sup>†</sup>
- 77  *Better Pumps: Promoting Reliable Water Infrastructure for Everyone*   21  
**Ryan Friend, Jonathan Wyrick**, Benjamin Brandt, Andrea Hunsberger, Connor McAtee, Tony Beers<sup>††</sup>, Matthew Schwiebert<sup>††</sup>, David Vader<sup>†</sup>
- 78  *A Modular Mobility Solution for Persons Living with Disability in Myanmar*   24  
**Josh Gingerich, Riley Harro, Adeolu Jaiyesimi, Connor Touhey**, Jacob Cruzan, Timothy Glavin, Rachel Rashford, Joey Sinsel, Caleb Wright, John Meyer<sup>†</sup>, David Vader<sup>†</sup>
- 79  *Bridge for Forward Edge's Trigo y Miel Ministry*   47  
**Joel Herman, Thomas Kapp, Noah Ling, Luis Roca Ruano**, Logan Horst, Jarod Snader, John Steele, Noah Thrush, Brian Swartz<sup>†</sup>
- 80  *Eye-Movement-Triggered Alarm for Late-Stage ALS Patients*   24  
**David Brink, Sameh Faragallah, Xander Smith**, Adriel Chan, Jacob Wong, Philip Graybill<sup>†</sup>
- 81  *Circuit Development and Real-Time Gait Phase Detection for Functional Electrical Stimulation*   30  
**Callan Heise, Summer Price, Jaylinne Rijo**, Wyatt Bingaman, Andrew Clancy, Nick Hamann, Timothy Lee, Ryan Farris<sup>†</sup>
- 82  *Circuit Development and Mechanical Testing of a Stance Control Orthosis*   29  
**Elizabeth Hargrove, Justin Wood**, David Alunni, Levi Fertig, Emily Javier, Laurel Pettitt, Ethan Regula, Jordan Witt, Ryan Farris<sup>†</sup>



## Evidence-Based Nursing Care












Hollinger Lounge; 2:40 – 3:50

- 83  *COVID-19 Vaccine Safety and Efficacy Education for Caregivers of Children Ages 5-11.*  
**Liliana Wardwell, Miranda Smoker, Alex Beaver, Meghan Barnes, Alice Honychurch, Kristen McCord, Janelle Herr, Maddie Williams**
- 84  *To Screen, or Not to Screen: Using Standardized Screening Protocol for Child Maltreatment in the Emergency Department*  
**Jo Doutrich, Erin Lownsbery, Michaela Miller, Sara Frey, Noah Bradbury, Brie Hess, Jeffrey Stroup<sup>†</sup>**
- 85  *Nonpharmacological Evidence-Based Methods to Decrease Length of Stay in Hospitalized Infants with Neonatal Abstinence Syndrome*  
**Brianna Seip, Kyra Montgomery, Olivia Orendorf, Joy Hedrick, Katherine Forney, Sami Pangle, Kaitlyn Farah, Kimberly Fenstermacher<sup>†</sup>**
- 86  *The Use of ICU Diaries to Decrease Psychological Sequela in Adults*  
**Savanna Smucker, Tierney Welsh, Lexi Putt, Michael Roach, Emmi Hagenbuch, Samuel Blevins, Rebekah Keller, Brenda Elliott<sup>†</sup>**
- 87  *Workplace Violence: Does Education Increase Nursing Confidence and Improve Attitudes?*  
**Avery Kohl, Alyssa Trimmer, Kelsey Day, Michelle Phan, Alyssandra Apaga, Rachel Weaver, Jady Jeffers**
- 88  *The Effect of COVID-19 on the Moral Distress Levels in Critical Care Nurses*  
**Jared Diethrich, Jordyn Hirak, Coby Bracken, Lauren Teisen, Maddie Hughes, Kristen Louder, Sophie Spadaccino**



## **Exercise Science; Biopsychology**

**Hollinger Atrium & Lounge; 2:40 – 3:50**

- 89  *Reliability and Validity of Clinometer Application to Measure Static Pelvic Tilt*  
**Lilly Coln, Sam Wright, Braden Lawson<sup>†</sup>**
- 90  *Dr. Goniometer for Measurement of Active Range of Motion of the Wrist*  
**Connor Daudt, Grace Doran, Bayley Hess, Samuel Rutan, Braden Lawson<sup>†</sup>**
- 91  *The Impact of Core Stabilization Exercises on Lower Extremity Vertical Power and Single Leg Dynamic Balance*  
**Claire Harbaugh, Grace Hejeebu, Elijah Eade, Daniel Starkey, Dylan Yellets, Borko Rodic<sup>†</sup>, Michael Lehr<sup>†</sup>, H. Scott Kieffer<sup>†</sup>**
- 92  *Understanding Near Infra-red Spectroscopy and the Application in Physical Therapy Reserach*  
**Grant Myers, H. Scott Kieffer<sup>†</sup>**
- 93  *The Effect of Head Position on Balance and Postural Control When Using Virtual Reality*  
**Christian Wolf, Kara Echard, Joey Timco, Jonathan Nixon, H. Scott Kieffer<sup>†</sup>, James Foster<sup>†</sup>**
- 94  *The Effects of Caffeine and the -163 A>C CYP1A2 Polymorphism on Exhaustive Anaerobic Performance*  
**Jonathan Elder, H. Scott Kieffer<sup>†</sup>, Michael Shin<sup>†</sup>**
- 95  *The Influence of Prayer/Meditation on the Psychophysiological Measures of the Autonomic Nervous System, Brain-derived Neurotrophic Factor and Glucocorticoid Signaling*  
**Rhianna Gonzales, Sam Zercher, Kyra Hersh, H. Scott Kieffer<sup>†</sup>, Jennifer Thomson<sup>†</sup>**
- 96  *The Acute Effects of Capsaicin Supplementation on Anaerobic Power*  
**Hoyt Lechthaler, Ava Cook, Hannah Mark, Owen Walker, Sawyer Dereszynski, H. Scott Kieffer<sup>†</sup>**
- 97  *Exploring the Use of RockFloss at the Elbow and the Effects on Knee Range of Motion: A Regional Interdependence Approach*  
**Cassidy Chandler, Olivia Cory, Bobby Oravitz, Megan Zimmerman, Braden Lawson<sup>†</sup>**
- 98  *Effects of Wearable Resistance on Sprinting Performance*  
**Christian Woodie, Jonathan Elder, Eric Rawson<sup>†</sup>**
- 63  *Ketamine and PTSD*  
**Elizabeth Pratt, Austin Blakeslee, Jennifer Thomson**























## Natural Sciences

Hollinger Atrium; 2:40 – 3:50

### Organismal Biology




- 31  *Physical-Chemical Water Qualities that Impact Faxonius rusticus Colonization in the Yellow Breeches Watershed*   
**Hanah Martin**, Jeff Erikson<sup>†</sup>
- 32  *Seasonal Changes in Macroinvertebrate Composition Between Two Perennial Spring Fed Streams*   
**Stephanie Kowalski**, Jeff Erikson<sup>†</sup>
- 33  *Tissue Culture of Virginia bluebells*   
**Tyler Jahraus**, David Foster<sup>†</sup>
- 36  *Testing for the Presence of Batrachochytrium dendrobatidis and B. salamandrivorans in a Local Population of Eurycea longicauda*   
**Evan Jerome**, Erik Lindquist<sup>†</sup>, Michael Shin<sup>†</sup>
- 99  *Exploration of the Antibiotic Effectiveness of Berberine-Containing Herbal Extracts*   
**Abigail Casey**, Joel Hart, Richard Schaeffer<sup>†</sup>, Lawrence Mylin<sup>†</sup>, David Foster<sup>†</sup> 34
- 100  *Evaluation of seed, root and shoot cutting propagation in Sassafras albidum*  
**Caleb Smith**, David Foster<sup>†</sup>
- 101  *Evaluation of aquaponic and tissues culture propagation of False Unicorn*  
**Savannah Harman**, David Foster<sup>†</sup>

### Cellular & Molecular Biology













- 43  *Generation of Bacteriophage T4-Neutralizing Antibodies Using Monoclonal Technology*   
**Wei-Jin Lin**, Lawrence Mylin<sup>†</sup>
- 44 & 55  *Development of a Cell-based Vaccine against Pancreatic Cancer*   
**Sarah Bath**, **Evangeline Soerens**, Lawrence Mylin<sup>†</sup>
- 56  *Analysis of myelination deficits in a zebrafish developmental hypoxia model*   
**Kelly Barr**, Jennifer Ness-Myers<sup>†</sup>

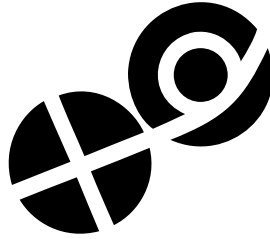


## Cellular & Molecular Biology, contd.

- 57  *Analysis of Lck Expression and Function in Cultured Rat Microglia*   
**Abigail Morgan**, Jennifer Ness-Myers<sup>†</sup>
- 102  *Assessing the metastatic potential of a murine pancreatic cancer cell line and the effect of anti-fibrotic treatment on disseminated disease*  
**Sean Lapp**, Ruby Ramsey, John Harms<sup>†</sup>

## Biochemistry; Chemistry

- 37  *Analysis of novel chalcones, flavones, and stilbenes as potential protein tyrosine phosphatase inhibitors*   
**Sydney White**, Anne Reeve<sup>†</sup>
- 103  *CHIP hemeprotein expression*  
**Kwesi Kumi**, Jesse Kleingardner<sup>†</sup>
- 58  *Synthesis of Magnesium Fulleride and Magnesium Tetraphenyl Borate*   
**Dylan Cook**, Richard Schaeffer<sup>†</sup>
- 59  *Synthesis of trifluoromethylstilbenes as potential inhibitors of protein tyrosine phosphatase 1B*   
**William Jerdan**, Anne Reeve<sup>†</sup>
- 60  *Characterization of Varying Conditions on Cobalt Decorated Graphene Oxide*   
**Ethan Stroud**, Seth Burkert<sup>†</sup>
- 104  *Identification, Proposed Mechanism, and Kinetics Determined by Hammett Plot Analysis of Novel Quinazolinone Side Products*   
**Dylan McFeaters**, Anne Reeve<sup>†</sup>
- 105  *Optimizing the Reaction Conditions for a Consistent Synthesis of Iron Based Metal Atom Catalysts*  
**Makayla Garrett**, Seth Burkert<sup>†</sup>



*This icon indicates a project supported by,  
or conducted in association with...*

# **The Collaboratory**

## **for Strategic Partnerships and Applied Research**

### **Service today... servant-leaders tomorrow.**

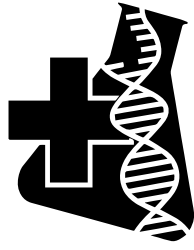
The **Collaboratory** is a center for applied research and project-based learning in the School of Science, Engineering and Health at Messiah University. We add value to classroom learning by enabling participants to apply academic knowledge and live out their Christian faith through imaginative, hands-on problem solving that meets needs brought to us by Christian mission, relief and development organizations and businesses. The two-fold mission of the Collaboratory is:

- To foster justice, empower the poor, promote peace, and care for the earth through applications of our academic and professional disciplines.
- To increase the academic and professional abilities of participants, their vocational vision for lifelong servant-leadership, and their courage to act on convictions.

Areas of engagement include science, engineering, health, information technology, business, and education. Our projects enable students to engage classroom fundamentals in an authentic client-provider environment. Student leaders run the Collaboratory organization in partnership with the educators who mentor them. As God enables us to serve others today, we seek to grow as disciples of Jesus, to serve as God's stewards over the resources of our academic and professional disciplines, and to bear witness to the good news of the Kingdom of God.

**To learn more about the Messiah University Collaboratory for Strategic Partnerships and Applied Research please visit our web site at [www.messiah.edu/collaboratory](http://www.messiah.edu/collaboratory).**





*This icon indicates a project supported by the...*

## **Steinbrecher Undergraduate Summer Research Program**

The Steinbrecher Endowment for Research in the Health and Life Sciences was established at Messiah College (now Messiah University) in 2003 by Dr. Leroy and Mrs. Eunice Steinbrecher to support collaborative experimental research between students and faculty. Dr. Steinbrecher (Class of 1955) was a physician and longtime supporter of Messiah University. Eunice (Class of 1958) has served on the Board of Trustees at Messiah College continuously since 1987 and as chairperson of the board for 10 years (2000 – 2010).

*The Steinbrecher Undergraduate Summer Research Program* provides “heads-on, hands-on” research experiences essential to our School’s efforts to offer premier undergraduate health and science programs. The research must be experimental and collaborative in nature. Awarded on a competitive basis, the Steinbrecher fellowships provide a stipend supporting full-time research employment for between five and ten weeks of the summer.

# Collaboratory Educators, Collaborators & Partners

*We gratefully acknowledge the oversight and training provided by Messiah University faculty and external collaborators.*

## Project Partners

---

The ALS Association Greater Philadelphia Chapter  
Rural Water Supply Network and AlignedWorks  
Forward Edge and Trigo y Miel  
Tree 4 Hope - Guatemala  
Mission Lazarus  
CURE International, Hope Walks, Cunningham Prosthetic Care  
Forward Edge International  
Macha Research Trust  
Brethren in Christ Church in Zambia  
Open Door Development and Theological College of Zimbabwe and IEEE Smart Village  
World Vision Ghana, World Vision US, Aligned Works  
MM Ortho Solutions, Pretium Mobility  
International Nepal Fellowship's Green Pastures Hospital  
International Nepal Fellowship  
CURE International  
Grantham Cemetery

## Project Managers

---

Brian Swartz  
Camilo Giraldo  
David Vader  
Harold Underwood  
Jamie Williams  
Michelle Lockwood  
Philip Graybill  
Philip Tan  
Randy Fish  
Ryan Farris  
Thomas Soerens  
Tim Van Dyke  
Tom Austin

## Advisory Board

---

Russell Woleslagle - Chair  
Jeremy Freimark  
Glen Hair  
Robert Rashford  
Leif Uptegrove  
Jamie Williams  
Elizabeth Bashore  
David Vader  
Brian Swartz

## Independent Partner

David Germeyer



## Project Consultants

Dan Elliot  
Bob Hentz  
Ray Knepper  
Matt Schwiebert  
Tony Beers

## Project Review Panelists

Abaz Kryemadhi  
Al Mokris  
Alex Waardenburg  
Alicia Decker  
Amy Humphrey PT  
Avery deGruchy  
Barak Gohn  
Ben Burlew  
Ben Weaver  
Bob Kramer  
Bob Sheker  
Brandon Peterson  
Brant Meier  
Brian Seip  
Bruce Hulshizer  
Bryan Hoover  
Carl Satterberg  
Chad Long  
Charlie Kimpel  
Christian Rogerson  
Dan Elliott  
Dan Gallagher  
Dan Ma  
David Bedillion  
David Foster  
Don Waardenburg  
Doug Flemmens  
Doug Phillipy  
Doug Stumpp  
Ella Sobek  
Eric Shoemaker  
Erik Weenink  
Erin Brenneman  
Ethan Cornwell  
Gebeyehu Ayele  
Grant Kruppenbacher  
Gregory Talamo  
Harrison Crosley  
Helen King  
Jason Kunec  
Jeff Erikson  
Jeff Mcilhenny  
Jeremy Ross  
Jessica Paulus  
JJ Robinson  
Joe Wambach  
John Gershenson  
John Hannon  
John Khamis  
John Meyer  
John Trimmer  
Jonathan Shenk  
Jordan Barner  
Joseph Longenecker  
Josh Kunkle  
Joshua Wiedler  
Junior Guimaraes  
Justin Stevenson  
Karen Burket  
Karine Moussa

## **Project Review Panelists, *continued***

---

Karl Bergmann	Raymond Landon
Kevin Manieri	Rebekah Forshey
Larry Mylin	Rob Ebner
Leah Eberly	Robert Hentz
Leif Uptegrove	Ross Billings
Lexi Bane	Ruth Miller
Luke Brostek	Sandy Polak
Luke Fetterman	Scott Heisey
Luke Redcay	Scott Reichenbach
Luke Witmer	Shayne McIntosh
Lyndsy Barry	Stephen Osborne
Mark Brill	Steve Lockwood
Mark Raup	Steve Reisinger
Mark Simpkins	Steven Carpenter
Matt Farrar	Steven Deller
Matt Lewis	T.J. Quintilian
Michael Guion	Taran King
Mike Weil	Tim Howell
Nathan Chan	Tony Beers
Nathan Chaney	Vanessa Lee PT
Nathan Cordell	Victoria Kimathi
Noah Rood	Zach Holsinger
Ray Knepper	Zach Sizemore
Ray Norman	

# Faculty Research Mentors

*We graciously acknowledge the oversight and training provided by faculty from the following academic departments.*

## Biological Sciences

---

Randy Cassell  
Jeff Erikson, MS, MEPC  
David Foster, Ph.D.  
John Harms, Ph.D.  
Erik Lindquist, MS, Ph.D.  
Lawrence Mylin, Ph.D.  
Jennifer Ness-Myers, Ph.D.

## Chemistry & Biochemistry

---

Seth Burkert, Ph.D.  
Jesse Kleingardner, Ph.D.  
Anne Reeve, Ph.D.  
Richard Schaeffer, Ph.D.

## Computer & Information Science

---

Trevor Bunch, Ph.D.

## Biopsychology

---

Jennifer Thomson, Ph.D.

## Health, Nutrition & Exercise Science

---

Scott Kieffer, Ed.D., FACSM, ACSM, ETT  
Braden Lawson, DAT, LAT, ATC  
Eric Rawson, Ph.D., FACSM  
Melinda Smith, Ed.D.

## Mathematics, Physics & Statistics

---

Niklas Hellgren, Ph.D.  
Abaz Kryemadhi, Ph.D.  
Amanda Lohss, Ph.D.

## Nursing

---

Brenda Elliott, Ph.D., RN, CNE, ANEF  
Kimberly Fenstermacher, Ph.D., RN, CRNP  
Megan Gross, Ph.D., MPH, RN  
Tara Jankouskas, Ph.D., RN  
Jeffrey Stroup, DNP, CRNP, FNP-BC, CEN

See Collaboratory Project Managers (p. 26) for faculty from the **Department of Engineering**.



# Nursing Professionals

*We gratefully acknowledge the oversight and training provided by the following nursing mentors.*

## **Penn State Holy Spirit Hospital**

Sheila Rhodes, RN, BSN, CNOR

Tamara Rice, RN, CPAN

# Financial and Material Support

*We gratefully acknowledge the following sources of funding and support.*

	<i>Presentation</i>
Dr. Courtney Harris (Advisor from the Virginia Institute of Marine Science)	6
Fred Fenig	54, 72
NSF Grant #2051129	7
San Lazaro Coffee	50, 68
Southeastern PA Section of the American Chemical Society	104
Steinbrecher Undergraduate Summer Research Program	38, 39, 40, 104



# Index of Authors

Alphabetical listing of authors  
with corresponding presentation number(s).

<b>Author</b>	<b>Presentation No.</b>	<b>Author</b>	<b>Presentation No.</b>
Alejos Acosta,	3	Coldsmith, Andrew	3
Allbee, Olivia	48, 67	Collins, Micah	54, 72
Alunni, David	29, 82	Collins, Robin	9
Anthony, Katie	5	Coln, Lilly	89
Apaga, Alyssandra	87	Cook, Ava	96
Austin, Tom	19, 73	Cook, Dylan	58
Barnes, Meghan	83	Cory, Olivia	97
Barnhart, Nick	17	Crowley, Noelle	16
Barr, Kelly	56	Cruzan, Jacob	24, 78
Bartels, Abigail	50, 68	Daudt, Connor	90
Bath, Sarah	44, 55	Day, Kelsey	87
Beaver, Alex	83	Dereszynski, Sawyer	96
Beers, Tony	21, 77	Deutcheu Tchouako,	23, 65
Bingaman, Wyatt	30, 81	Diethrich, Jared	88
Binko, Nathan	49, 69	Doran, Grace	90
Bisbort, Caleb	26, 70	Dorsey, Austin	4
Bitler, Thomas	22, 66	Doutrich, Jo	84
Blagbrough, Amanda	49, 69	Dressler, Adam	52, 71
Blakeslee, Austin	63	Dupler, Keera	28
Blevins, Samuel	85	Dykes, Sam	48, 67
Bolin, Ethan	52, 71	Eade, Elijah	91
Bracken, Coby	88	Echard, Kara	93
Brackman, Trey	23, 65	Egelkamp, Kaleb	54, 72
Bradbury, Noah	84	Elder, Jonathan	94, 98
Brandt, Benjamin	21, 77	Elliott, Brenda	85
Brink, David	80	Ellis, Shekinah	20, 64
Bruner, Caleb	49, 69	Erikson, Jeff	31, 32
Burger, Reid	1	Fair, Timothy	54, 72
Burkert, Seth	60, 105	Faragallah, Sameh	80
Caldwell, Matt	51, 75	Farah, Kaitlyn	85
Campbell, Paige	26, 70	Farris, Ryan	29, 30, 81, 82
Casey, Abigail	34, 99	Fenstermacher, Kimberly	85
Cassell, Randy	35	Ferrin, Anna	49, 69
Chan, Adriel	80	Fertig, Levi	29, 82
Chandler, Cassidy	97	Finkbeiner, Jake	54, 72
Clancy, Andrew	30, 81	Firestone, Kylie	4
Clark, Micah	52, 71	Fish, Randall	51, 53, 74, 75
Clemmer, Blake	22, 66	Forney, Katherine	85

<b>Author</b>	<b>Presentation No.</b>	<b>Author</b>	<b>Presentation No.</b>
Forry, Candace	48, 67	Herr, Janelle	83
Foster, David	33, 34, 99, 100, 101	Herrlin, Abigail	18
Foster, James	93	Hersh, Kyra	95
Fouse, Brittney	25, 76	Hess, Bayley	90
Frazho, Joshua	23, 65	Hess, Brie	84
Frederick, Laura	53, 74	Hiltebeitel, Skyler	18
Frey, Sara	84	Hilton, Caleb	50, 68
Friend, Ryan	21, 77	Hirak, Jordyn	88
Galyen, Ruth	49, 69	Holley, Joshua	23, 65
Garrett, Makayla	105	Honychurch, Alice	83
Garrido, Abigail	2	Horst, Logan	47, 79
Gates, Benjamin	50, 68	Howland, Kirsten	46
Gehenio, Cassandra	48, 67	Huang, Kyle	8
Geiger, Noah	19, 73	Huang, Rachel	25, 76
Geyer, Michael	53, 74	Hughes, Maddie	88
Gilbert, Sarah	28	Humpert, Charlie	15, 18
Gillen, Zach	19, 73	Hunsberger, Andrea	21, 77
Ginck, Josh	52, 71	Jahraus, Tyler	33
Gingerich, Josh	24, 78	Jaiyesimi, Adeolu	24, 78
Giraldo, Camilo	25, 76	Jaloszynski, Nathan	26, 70
Glavin, Timothy	24, 78	Javier, Emily	29, 82
Goertzen, Samuel	19, 73	Jeffers, Jadyne	87
Golub, Lilia	25, 76	Jerdan, William	59
Gonzales, Rhianna	95	Jerome, Evan	36
Graybill, Philip	80	Johnson, Aaron	14
Green, Cai	23, 65	Kapp, Thomas	47, 79
Green, Clifton	19, 73	Keller, Rebekah	85
Griffith, William	10	Kieffer, H. Scott	61, 62, 91, 92, 93, 94,
Groff, Jared	51, 75	Kleingardner, Jesse	38, 39, 40, 41, 103
Hagenbuch, Emmi	85	Kline, Seth	50, 68
Hamann, Nick	30, 81	Knepper, Ray	48, 49, 67, 69
Harbaugh, Claire	91	Koehnke, Brandon	20, 64
Hargrove, Elizabeth	29, 82	Kohl, Avery	87
Harman, Savannah	101	Kowalski, Stephanie	32
Harms, John	42, 102	Kramer, Max	23, 65
Harro, Riley	24, 78	Kreider, Caleb	23, 65
Hart, Joel	34, 99	Kryemadhi, Abaz	8, 9, 10
Heckman, Bella	28	Kumi, Kwesi	103
Hedrick, Joy	85	Lacayo, Johnathon	20, 64
Heise, Callan	30, 81	Landis, Darin	51, 75
Hejeebu, Grace	91	Lapp, Sean	42, 102
Herman, Joel	47, 79	Lawson, Braden	89, 90, 97

<b>Author</b>	<b>Presentation No.</b>	<b>Author</b>	<b>Presentation No.</b>
Lechthaler, Hoyt	96	Oyler, Ryan	53, 74
Lee, Irene	45	Padilla, Ricardo	1
Lee, Timothy	1, 30, 81	Padovano, Jamie	3
Lehr, Michael	91	Pangle, Sami	85
Lent-Koop, Jake	61	Pavill, Hanna	7
Lim, James	54, 72	Petrovich, Jacob	23, 65
Lin, Wei-Jin	43	Pettitt, Laurel	29, 82
Lindquist, Erik	36	Phan, Michelle	87
Ling, Noah	47, 79	Pokrivka, Ricky	3
Lockwood, Michelle	48, 49, 67, 69	Pratt, Elizabeth	63
Louder, Kristen	88	Price, Summer	30, 81
Lownsbery, Erin	84	Provan, Josiah	13
Luckenbill, Courtney	62	Putt, Lexi	85
Lutz, Kaitlyn	27	Ramsey, Ruby	42, 102
Magness, Lane	20, 64	Rashford, Rachel	24, 78
Mah, Joshua	20, 64	Rasinske, Sam	25, 76
Mark, Hannah	96	Rawson, Eric	98
Martin, Hanah	31	Reeve, Anne	37, 59, 104
Matanguihan, Miggy	48, 67	Register, Margeaux	35
Mateer, Sarah	39	Regula, Ethan	29, 82
McAtee, Connor	21, 77	Rice, Emma	
McCord, Kristen	83	Rijo, Jaylinne	30, 81
McFeaters, Dylan	104	Roach, Michael	85
McVey, Thomas	1	Robson, Colin	4
Meals, Regan	48, 67	Roca Ruano, Luis	47, 79
Mendoza, Caleb	23, 65	Rodic, Borko	91
Meyer, John	24, 78	Rosengrant, Josh	19, 73
Miller, Abby	22, 66	Ross, Caitlin	19, 73
Miller, Michaela	84	Rutan, Samuel	90
Montgomery, Kyra	85	Santelli, Antonio	27
Morgan, Abigail	57	Sauder, Bethany	23, 65
Moyer, Josiah	26, 70	Schaeffer, Richard	34, 58, 99
Mundis, Josh	26, 70	Schoenhals, Heidi	45
Myers, Grant	92	Schwiebert, Matthew	21, 77
Mylin, Lawrence	34, 43, 44, 55, 99	Seip, Brianna	85
Neal, Samantha	9	Settipane, Travis	23, 65
Ness-Myers, Jennifer	56, 57	Seubert, Lauren	27
Nissley, Garrett	2	Shea, Owen	51, 75
Nixon, Jonathan	93	Shin, Michael	36, 61, 62, 94
Oravitz, Bobby	97	Shirk, Brittany	53, 74
Orendorf, Olivia	85	Sinsel, Joey	24, 78
Ossman, Logan	4	Sison, Jon	53, 74

<b>Author</b>	<b>Presentation No.</b>	<b>Author</b>	<b>Presentation No.</b>
Smith, Caleb	100	Wildasin, Jacob	52, 71
Smith, Melinda	45, 46	Williams, Jamie	26, 27, 70
Smith, Noah	38	Williams, Maddie	83
Smith, Xander	80	Witt, Jordan	29, 82
Smith-Cassidy, Hayward	25, 76	Wolf, Christian	93
Smoker, Miranda	83	Wong, Jacob	80
Smucker, Savanna	85	Wood, Cadee	26, 70
Snader, Jarod	47, 79	Wood, Elijah	54, 72
Soerens, Evangeline	44, 55	Wood, Justin	29, 82
Soerens, Thomas	50, 68	Woodie, Christian	98
Sonon, Lukas	22, 66	Wright, Caleb	24, 78
Spadaccino, Sophie	88	Wright, Sam	89
Starkey, Daniel	91	Wu, Aleesa	50, 68
Steele, John	47, 79	Wyrick, Jonathan	21, 77
Stefanchik, Michael	52, 71	Yang, Azianna	4
Stevenson, Marina	40	Yellets, Dylan	91
Stoltzfus, Maria	12	Yoho, Elizabeth	50, 68
Stroud, Ethan	60	Zehr, Josiah	20, 64
Stroup, Jeffrey	84	Zercher, Sam	95
Swartz, Brian	47, 79	Zimmerman, Megan	97
Sweeton, Jon	54, 72		
Tamrat, Ammanuel	1, 18		
Tan, Philip	20, 28, 64		
Teisen, Lauren	88		
Thomson, Jennifer	63, 95		
Thrush, Noah	47, 79		
Timco, Joey	93		
Tirjan, Rachael	61		
Touhey, Connor	24, 78		
Trimmer, Alyssa	87		
Underwood, Harold	52, 54, 71, 72		
Vader, David	21, 24, 77, 78		
Van Dyke, Timothy	22, 23, 65, 66		
Vidzicki, Joseph	41		
Wagman, Haley	11		
Walker, Owen	96		
Wardwell, Liliana	83		
Weaver, Rachel	87		
Welch, Connor	22, 66		
Welsh, Tierney	85		
White, Sydney	37		
Whitehead-Zimmers, Eli	6		





## SCHOOL OF SCIENCE, ENGINEERING AND HEALTH

One University Avenue  
Mechanicsburg, PA 17055

[www.messiah.edu/SEHSymposium](http://www.messiah.edu/SEHSymposium)

