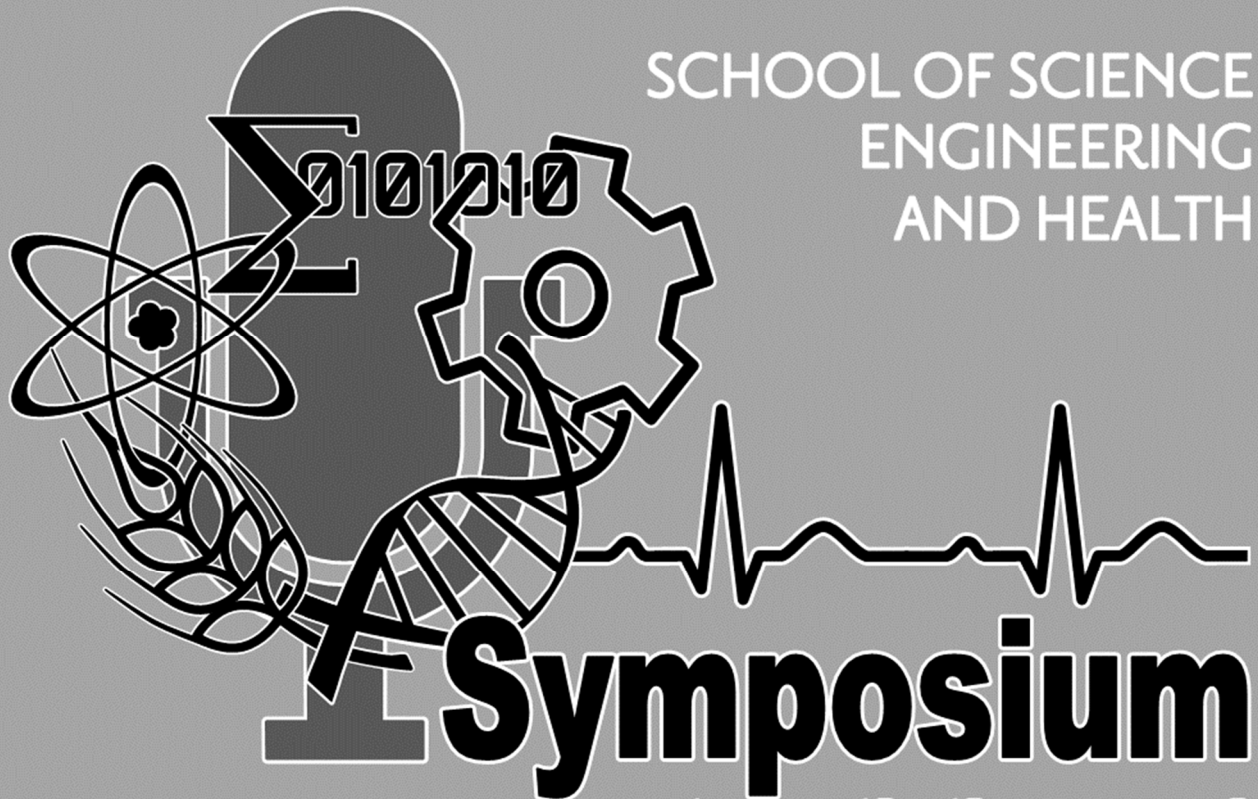


FRIDAY, APRIL 28, 2023



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)

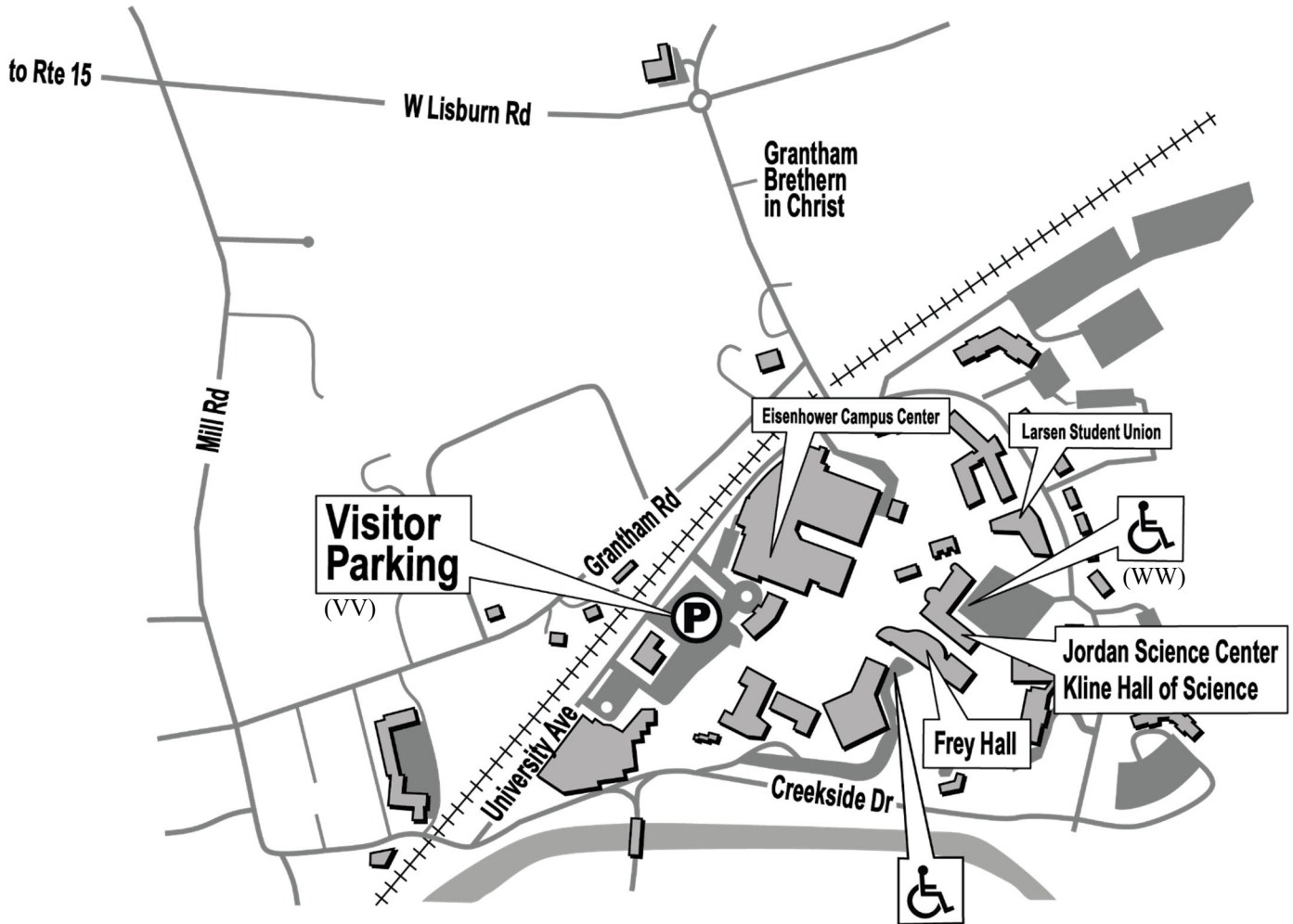
Larry Mylin, Ph.D., Symposium Coordinator  
Tim Van Dyke, Ph.D., Engineering Coordinator

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

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# 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, Lownsbey, 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

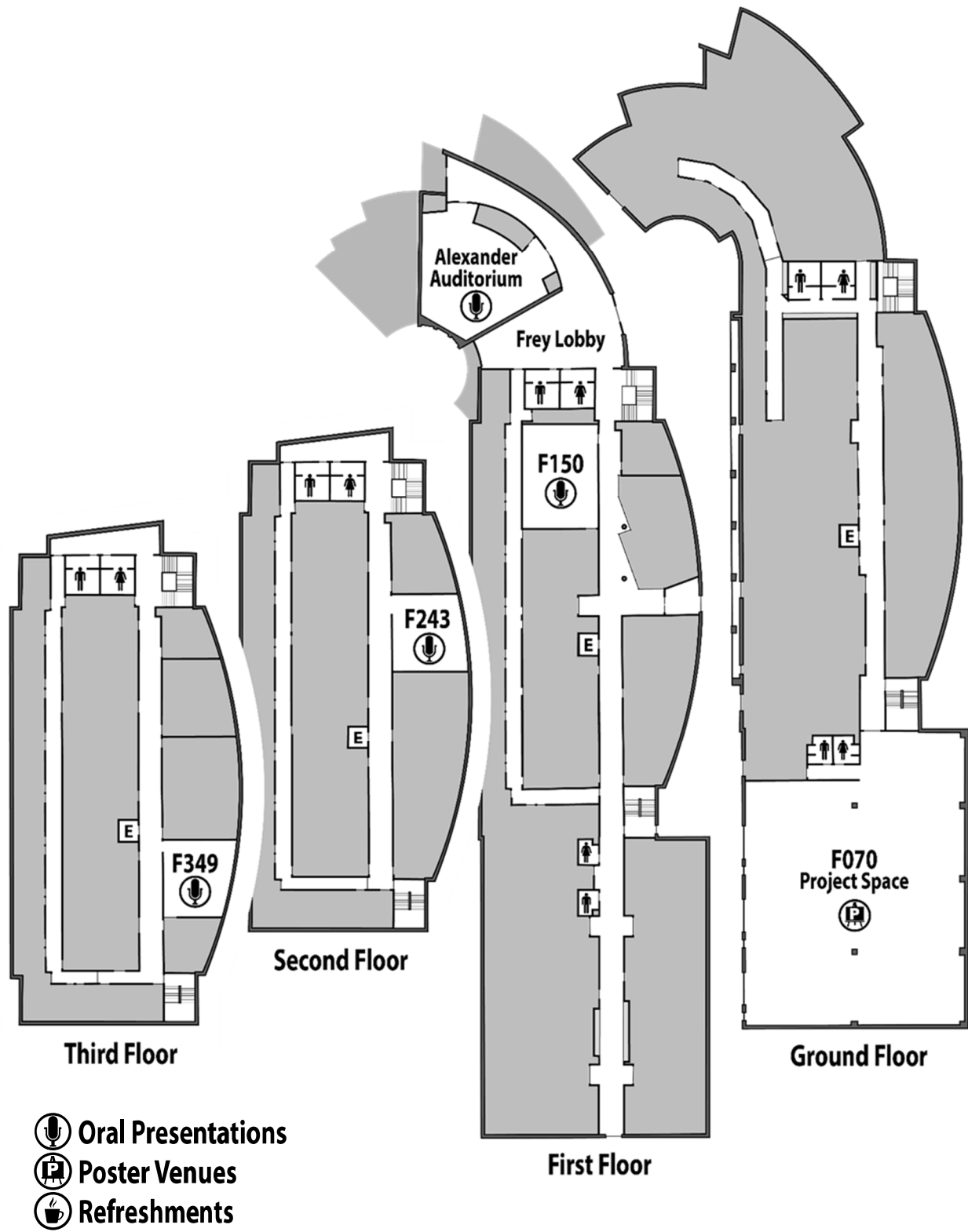
- 43  Lin
- 44  Soerens, Bath
- 55  Bath, Soerens
- 56  Barr
- 57  Morgan
- 102  Lapp

### Biochemistry; Chemistry

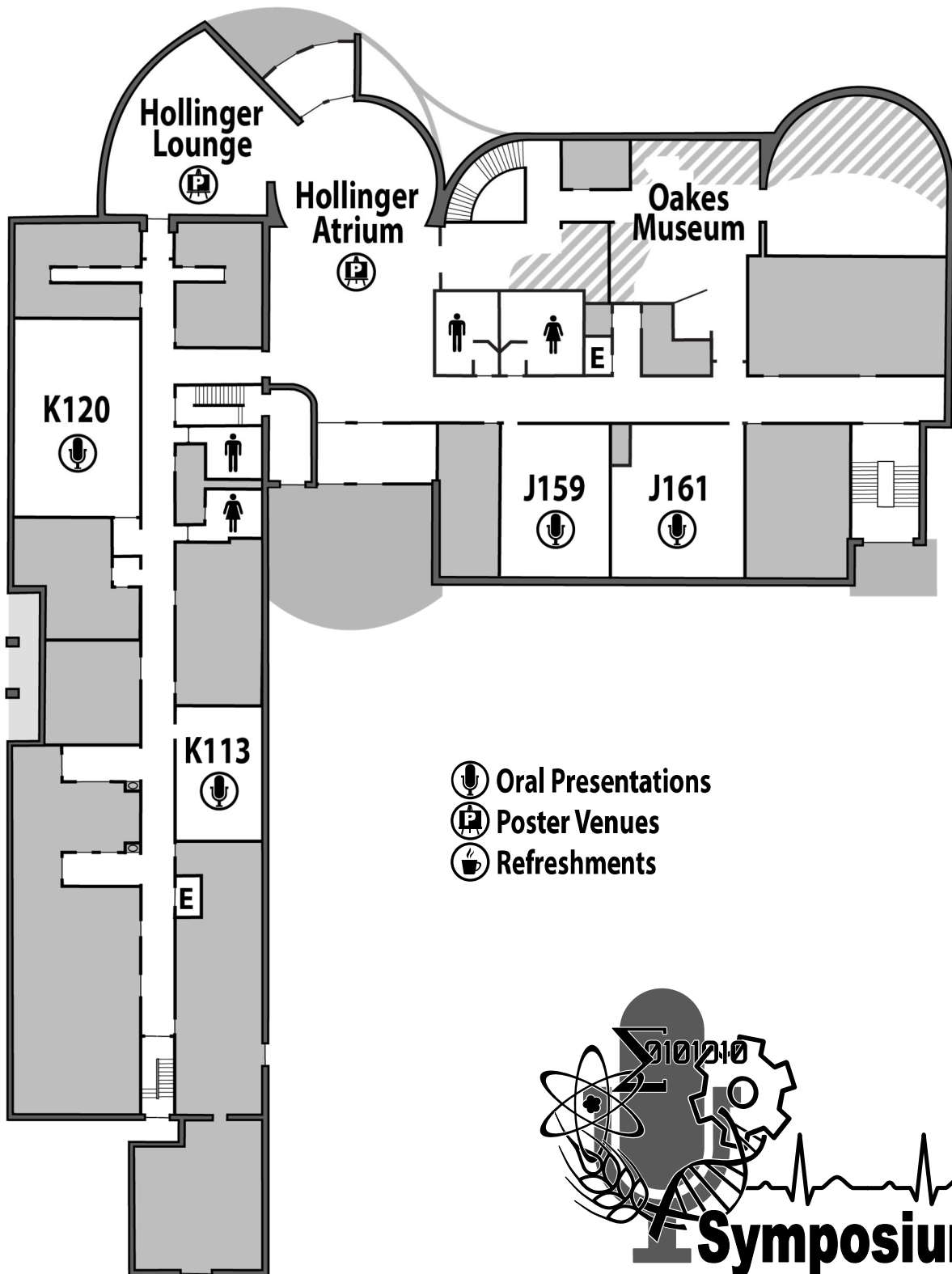
- 37  White
- 103  Kumi
- 58  Cook
- 59  Jerdan
- 60  Stroud
- 104  McFeaters
- 105  Garrett



# 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>Hahah 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, 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, Cassandra Gehenio, Regan Meals, Emma Rice, Ray Knepper <sup>††</sup> , 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 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, 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 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 Solar Cart</i><br><b>Josh Ginck, Michael Stefanchik, Jacob Wildasin</b> , Ethan Bolin, Micah Clark, Adam Dressler, Harold Underwood <sup>†</sup> |  | <br>71 |
| 53 | 4:40 |  | <i>Diagnostic For Viral Diseases: A Low-Cost, Portable HIV Diagnostic Device</i><br><b>Michael Geyer, Brittany Shirk, Jon Sison</b> , Laura Frederick, Ryan Oyler, 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 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 Settiane,</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>

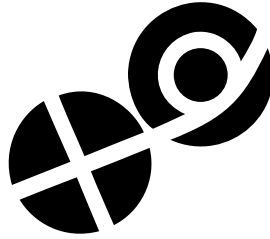


## Cellular & Molecular Biology, contd.

- 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>



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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

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Jamie Williams  
Michelle Lockwood  
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Tim Van Dyke  
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Luke Witmer	Shayne McIntosh
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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  
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David Foster, Ph.D.  
John Harms, Ph.D.  
Erik Lindquist, MS, Ph.D.  
Lawrence Mylin, Ph.D.  
Jennifer Ness-Myers, Ph.D.

## **Chemistry & Biochemistry**

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Anne Reeve, Ph.D.  
Richard Schaeffer, Ph.D.

## **Computer & Information Science**

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## **Biopsychology**

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## **Health, Nutrition & Exercise Science**

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Melinda Smith, Ed.D.

## **Mathematics, Physics & Statistics**

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Amanda Lohss, Ph.D.

## **Nursing**

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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

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