



Program of Events

April 17, 2024

Welcome to Discovery Day 2024

I would like to extend my sincere thanks to all who contributed their time and effort to make the critical difference for the success of the Discovery Program, which is a key component of the Benedictine College experience.

Every spring semester, the anticipation builds: What have our students come up with this year? Will there be another new play? Have music majors composed new music to premiere? Will a concrete canoe float and be able to win a race? Whose mini robot will prove the best in the Robot Battle competition? What amazing research projects will be covered in the poster exhibits? It is always a fun and interesting day.

The true test for any academic program here is the mission of Benedictine College. The collaboration with faculty in a common academic project is the key to the Discovery Program and essential to our mission to educate men and women within a community of faith and scholarship.

I invite the entire College community to join me in supporting Discovery Day, attending the presentations, listening to the keynote address, and witnessing the joy of academic pursuit in our students' areas of interest. It is impossible to attend Discovery Day and not be proud of what Benedictine College is accomplishing in the lives of our students.

President Stephen D. Minnis



Discovery Day 2024 marks the 28th year of the Discovery Day Symposium. Since 1996, more than 3520 students have presented or co-authored a Discovery Project, involving virtually all the faculty and representing all academic departments. Discovery Day 2024 will present 77 projects, the result of the work of 127 students, 59 faculty/staff, and 22 academic departments. The Discovery Committee invites you to join in recognizing our students for their creative efforts being showcased today.

Discovery Week is always the highlight of our academic year. For months (or, in some cases, years) students and faculty have worked together to find out something new about the world. Now they are ready to share their findings, and we all have a chance to learn something that no one ever knew before their project was undertaken. We are so proud, at Benedictine College, that we offer all of our students the opportunity not only to learn what others have discovered in the past, but also to add to what people will know in the future. Discovery Day gives us all the opportunity to see the fruits of this work.

The Discovery Program is an integral part of Benedictine College, and its benefits go far beyond the results of the projects you will see during this symposium. Original research fosters and strengthens the curiosity and love of learning that are the foundation of a liberal arts education. Collaborative work develops the bonds of community among students and faculty that make Benedictine such a special place.

Through our commitment to developing students' confidence in their ability to make an original contribution to our understanding of the world and how it works, we are preparing leaders who will know they can draw on their knowledge and creativity to face the challenges that await the future.

On behalf of the faculty and administration of Benedictine College, I encourage you to participate fully in the activities of this day. Special thanks are in order for the Discovery Program Committee and the Discovery Directors: their efforts throughout the year have culminated in this unique and exciting academic experience.

Kimberly C. Shankman
Dean of the College

Discovery Day Schedule

All presentations will take place in the Ferrell Academic Center unless otherwise indicated.

Continental Breakfast

Napier Foyer (4th floor), Ferrell Academic Center

8:30 AM

MORNING SESSIONS

Poster/Exhibit Session #1

McAllister Board Room (4th floor)

8:30–9:35 AM

- 1. Developing an Impact Force Measurement System to Reduce Box Jump Injuries**
Joseph Accurso, Andrew Downs, School of Engineering
- 2. Examining Time-of-Day Effects of Traumatic Brain Injury in Drosophila**
Emma Antczak, Gracie George, Renée Bodoh, Jeremy Stubblefield, Biology
- 3. Rheology of American Dairy Manure**
James Atkinson, Dorothy Hill, Katharine Strandquist, Patrick Hirl, School of Engineering
- 4. Kite-Borne Radio Antenna**
Ryan Fricker, John Rogers, School of Engineering
- 5. Concrete Canoe Transportation Device**
Paul Hanson, Alexander Buman, Scott Newbolds, School of Engineering
- 6. Determination of the Most Effective Structure for Nitric Oxide Selectivity Using a Luminescent Probe With HOPO Antennae and a Copper Binding Site**
Richard Hernandez, Emma Baucom, Alexa Harper, Catherine Moraghan, Sarah Harris, Chemistry and Biochemistry
- 7. Comparative Behavioral Coding of Standard Versus Virtual Reality Hand-Arm Bimanual Intensive Training Programs**
Katelyn Malick, Martha Carletti, Biology
- 8. The Effects of Anthropogenic Sound at Different Frequencies on the Behavior of Blue Tilapia**
Austin Nobis, Leah Mages, Terrance Malloy, Virginia Winder, Biology

9. Ideal Sleeping Temperature for College Students

Julianne Peichel, Jeremy Stubblefield, Biology

10. Design and Construction of the Structure of a Radio Telescope

Nicolas Pena, Michael Price, Shane Koehr, Jacob Schmidt, John Modlin, Christopher Shingledecker, School of Engineering, Physics and Astronomy

11. Lightweight Concrete Mix

Gwenyth VanLeeuwen, Rebecca Madden, Scott Newbolds, School of Engineering



12. Depressed Drosophila, Morose Melanogaster

Sophia Winger, Jeremy Stubblefield, Biology

9:45–10:05 ❖ Room 109

13. The Bad Test-Taker Notion: Developmental Trajectory of Test Anxiety and the Bad Test-Taker Identity

Joanna Gambino, Katherine Brandenburg, Amy Posey, Psychological Sciences

9:45–10:05 ❖ Room 125

14. St. John Chrysostom’s Divine Liturgy and the Tridentine Latin Mass

Isabella Hodgins, John Romano, History

9:45–10:05 ❖ Room 208

15. Tracking Statistics for UBBA (Underground Benedictine Basketball Association)

Anthony Rumpza, Patrick O’Malley, School of Engineering

9:45–10:05 ❖ Room 219

16. Theory, Practice, and the Rehabilitation of Certitude

Joshua Heidenry, Francis Petrucci, Jean Rioux, Matthew Muller, Philosophy, Theology

9:45–10:35 ❖ Gangel Seminar Room

17. Student Perceptions of Academic Coaching in the Benedictine School of Nursing

Juliette Orr, Jackie Harris, School of Nursing

9:45–10:05 ❖ Room 307

18. How Kids Learn to Read: What the Research Says

Brooklyn Caskey, Gabriel Maday, Christi Adams, School of Education

9:45–10:05 ❖ Room 324

- 19. Expediting Diapause and Testing the Effects of S-Methoprene on Bee Larvae**
Kirstyn Crane, Juliette Lange, Virginia Winder, Biology
10:15–10:35 ❖ Room 109
- 20. Anxiety and Scrutiny: Performance Anxiety and Its Effect on Social Judgements of Others**
Molly Rolwes, Elena Nguyen, J. Dean Elmore, Psychological Sciences
10:15–10:35 ❖ Room 125
- 21. The Resurrectionists: Six Feet Down for Science**
Mary Ellen Raymo, John Romano, History
10:15–10:35 ❖ Room 208
- 22. Rocket-Launched RC Glider**
Ryan Fricker, Gabriel Guzman, Augustine Blosser, Patrick O'Malley, School of Engineering
10:15–10:35 ❖ Room 219
- 23. Edith as Educator: A Holistic Education of Woman Rooted in Steinian Theology**
Shea Nowicki, Mariele Courtois, Jeremy Sienkiewicz, Theology
10:15–11:05 ❖ Room 307
- 24. Regrafting English Education: New, Old, and Eternal Stories**
Miriam Del Castillo, Krystyn Schmerbeck, Stephen Mirarchi, Sheridan Center for Classical Studies, English
10:15–10:35 ❖ Room 324
- 25. Injuries Suck. Period. — A Dive Into the Menstrual Cycle and Athletic Injury**
Michaela Palmer, Kera Willoughby, Virginia Winder, Biology
10:45–11:05 ❖ Room 109
- 26. The Effect of Early Exposure to Technology on the Development of Children's Creativity Part I**
Renée Bodoh, Eva Chen, Psychological Sciences
10:45–11:05 ❖ Room 125
- 27. Anti-Zionism and Antisemitism: A Catholic Perspective**
Elizabeth Houska, Renee Lataif, Richard Crane, History
10:45–11:05 ❖ Room 208
- 28. Non-Intrusive Mechanization of Pianos**
Domenico Ricciardi, John Modlin, John Rogers, School of Engineering
10:45–11:05 ❖ Room 219

- 29. Grafting Person-Centered Theory Into a Catholic Christian Worldview**
Kelly Johnson, John Rziha, Theology
 10:45–11:05 ❖ Gangel Seminar Room
- 30. The Validity of Audiobooks**
Lane Werth, Sarah Wise, School of Education
 10:45–11:05 ❖ Room 324



Poster/Exhibit Session #2
 McAllister Board Room (4th floor)
 11:15 AM–12:10 PM

- 31. Evaluation of Uterine Histology in Aged and Young Female Mice Following Long-Term Space Flight and Live Animal Return**
Haley Cahill, Isabella Ferraro, Elizabeth Hunt, Martha Carletti, Biology
- 32. Improving Paddling With a Canoe Pedestal**
Rebecca Madden, Gwenyth VanLeeuwen, Paul Hanson, Scott Newbolds,
 School of Engineering
- 33. Benedictine College Students’ Knowledge of Fertility Awareness-Based Methods**
Juliette Orr, Clare Madden, Charlotte Andrews, Brianna Ball, Jackie Harris,
 School of Nursing
- 34. Can Crusher — Magnetic Implosion**
Benjamin Schuberg, Andrew Downs, School of Engineering
- 35. The Attack on the American Family Farm**
Jessie Sonnen, Gabriel Friess, David Mannella, Sean Maher, School of
 Business
- 36. Flowing Fortunes: Unveiling Atchison’s Water Journey From Missouri River to Tap Water**
Sophia Valdivia, Sarah Harris, Chemistry and Biochemistry
- 37. Analyzing the Affinity of a Lanthanide Metal Complex Probe to Remove Arsenate From Drinking Water**
Amelia Vopat, Julia Ondracek, Alexa Harper, Sarah Harris, Chemistry and
 Biochemistry
- 38. Determining if Mycorrhizal Fungi Are Present on Aquatic Duckweed Roots**
Anna Wingbermuehle, Virginia Winder, Biology

39. Foam Dart Flywheel Study

Kalen Wojtkun, Ryan Maderak, John Rogers, Physics and Astronomy, School of Engineering

40. Be Not Afraid: The Angels of the LORD and Humans' Depiction Through the Centuries

Katie Youll, Emma Kaminski, Anne Marie LeDoux, Andrew Salzmann, Charles Stewart, Theology, Art and Design

Lunch



Dining Hall



11:30 AM–12:50 PM

Keynote Address

Michael Raia

“A Church of the True Presence:
An Integrated Theology for Engaging the Culture”

O'Malley-McAllister Auditorium

1:00–2:20 PM

AFTERNOON SESSIONS

41. Considering a Framework for a Revival of the Privileges or Immunities Clause of the Fourteenth Amendment

Alejandro Calderon, Jeffrey Schremmer, Nicholas McGill, Kimberly Shankman, Political Science

2:35–2:55 ❖ Room 109

42. Developing a Differential Architecture Search (DARTS) Algorithm for Multiclass Fault Classification of Three-Phase Power Transformer Signals

Joseph Accurso, Max Saylor, Physics and Astronomy

2:35–2:55 ❖ Room 125

43. Bacterial Presence in Recreational Facility on Benedictine College Campus

Kathleen Beecher, Elizabeth Meyers, Courtney Kearney, Victoria Vordtriede, Mary Brenner, Janet Paper, Biology

2:35–2:55 ❖ Room 208

- 44. Early Byzantine and Christian Mosaic**
Caeli Haigh, Bryan Park, Jay Wallace, Art and Design
 2:35–2:55 ❖ Room 219
- 45. Anchor to Windward: Mooring Thomas’s Account of Love**
Katy Spiering, Daniel Pierson, Philosophy
 2:35–3:25 ❖ Gangel Seminar Room
- 46. The Role of the Emotions in Ethical Decision Making Through the Lens of Karol Wojtyla’s Person and Act**
Hagan Stovall, Anthony Crifasi, Philosophy
 2:35–3:25 ❖ Room 307
- 47. Developing the Interactome of a Known Virulence Factor**
Levi Streit, Kevin Sanchez, Chemistry and Biochemistry
 2:35–2:55 ❖ Room 324
- 48. From the Gospel to the Gallows: A Theological and Criminological Analysis of Capital Punishment and the Catholic Church**
Paul Bytnar, Itxel Martin-Huesca, Mariele Courtois, Currie Myers, Theology, Sociology and Criminology
 3:05–3:25 ❖ Room 109
- 49. Femtosecond Laser Restoration**
Damien Langfels, Daniel Hainert, Max Sayler, Megan Paciaroni, Physics and Astronomy, School of Engineering
 3:05–3:25 ❖ Room 125
- 50. Apples to Apples: A Comparison of Microbiomes During Decomposition in Local and Commercial Settings**
Wolfgang Louk, Mae Danaher, Janet Paper, Biology
 3:05–3:25 ❖ Room 208
- 51. Stained Glass: Focused Exploration on Painting**
Alondra Gomez, Bryan Park, Art and Design
 3:05–3:25 ❖ Room 219
- 52. Is EspG a Protein Chaperone? Protein-Protein Interactions in the ESX-1 Secretion System**
Abby Walterscheid, Kevin Sanchez, Chemistry and Biochemistry
 3:05–3:25 ❖ Room 324
- 53. Would Artificial Intelligence Be Better Described as Automated Reasoning?**
Jessica L’Ecuyer, Mariele Courtois, Theology
 3:35–3:55 ❖ Room 109

- 54. Making Plastics for Luminescent Solar Concentrators**
Faith Quinn, Mary van Auken, Elias Ford, Liam Philbin, Georgiy Shcherbatyuk,
 Physics and Astronomy
 3:35–3:55 ❖ Room 125
- 55. Oyster Mushrooms: From Grow Kit to No Kit**
MaryGrace Thompson, Lily Yandow, Janet Paper, Biology
 3:35–3:55 ❖ Room 208
- 56. Recreating Traditional Animation Techniques: Adding Depth and Light in a Two-Dimensional Medium**
Peter Pustejovsky, Susan Leo, Jay Wallace, Art and Design
 3:35–3:55 ❖ Room 219
- 57. The Ethics of Storytelling**
Benjamin Walter, James Madden, Philosophy
 3:35–4:25 ❖ Gangel Seminar Room
- 58. Discovering the Atmosphere of the Encounter With Christ: How Education and Suffering are the Means Through Which God Reveals Himself To Us**
Christopher Holzman, Deacon Dana Nearmyer, Evangelization and Catechesis
 3:35–3:55 ❖ Room 307
- 59. Approachable Nuclear Fusion**
Jacob Hawley, William Anderson, Joseph Wurtz, Gregorian Fellows
 3:35–3:55 ❖ Room 324
- 60. Humans' Ability to Detect AI-Generated Writing**
Annalucia Duggan, Kevin Page, Journalism and Mass Communications
 4:05–4:25 ❖ Room 109
- 61. Synthesis of PbS Colloidal Quantum Dots for Solar Energy Harvesting**
Grace Quinn, Daniel Draftz, Georgiy Shcherbatyuk, Physics and Astronomy
 4:05–4:25 ❖ Room 125
- 62. Chytrid Disease in Atchison's Watersheds**
Jackson Maldonado, Madeline Hays, Janet Paper, Biology
 4:05–4:25 ❖ Room 208
- 63. Freedom of Speech as Evaluated by Those of the Vendée Region: The Difference Between Freedom of Speech and Expression**
Kassidy Neuner, Nathan Orlando, John Settich, Political Science
 4:05–4:25 ❖ Room 219

- 64. How to Live Intentionally in an Isolating World**
Benjamin Hoopes, Joshua Heidenry, Lucia Fisher, Julia Jochum, Jeremy Sienkiewicz, Theology
4:05–4:25 ❖ Room 307
- 65. Photometric and Spectroscopic Monitoring of SRd Variables**
Timothy Rosno, Lucia Fisher, Ryan Maderak, Max Saylor, Physics and Astronomy
4:05–4:25 ❖ Room 324
- 66. Are Community Bathrooms Correlated With Success in College?**
John Welte, David Harris, Economics
4:35–4:55 ❖ Room 109
- 67. Software and Positioning for a Parabolic Reflector Radio Telescope**
Joshua Mansfield, Joel Iwanski, Christopher Shingledecker, Physics and Astronomy
4:35–4:55 ❖ Room 125
- 68. Effects of Sericea Lespedeza on a Restored Prairie Ecosystem**
George Gignstad, Samuel Chaney, Jonah Honerman, Johnathan Olivier, Brent Mortensen, Biology
4:35–4:55 ❖ Room 208
- 69. Portable Organ Year 2**
Joseph Bourke, Elias Ford, Anna McDonald, Jack Vanderzanden, Lara West, Music
4:35–4:55 ❖ Room 219
- 70. The College Knights of Columbus Council’s Historical Impact on Benedictine College Today: How It Forms Leaders, Creates Administrative Groups, and Teaches How to Evangelize**
Christopher Holzman, Joseph Wurtz, Gregorian Fellows
4:35–4:55 ❖ Gangel Seminar Room
- 71. Mercy: The Art of Remembrance**
Sister Peter Marie Tran, FSGM, Moriah Lippert, Jeremy Sienkiewicz, Theology
4:35–4:55 ❖ Room 307
- 72. Numerical Analysis of Complex Modes for Guided Wave Dispersion in Plates**
Karolek Suchocki, Andrew Downs, School of Engineering
4:35–4:55 ❖ Room 324

73. **Presenting “Agamemnon”**
Catherine Harper, Edward Mulholland, Classics
 4:35–5:05 ❖ Westerman Hall Auditorium
74. **“String Quartet no.1”**
André Bauer, Timothy Tharaldson, Music
 5:15–6:15 ❖ O’Malley-McAllister Auditorium
75. **“Suite for Piano”**
Kathleen Smith, John Paul, Dermot Trainor, Music
 5:15–6:15 ❖ O’Malley-McAllister Auditorium
76. **Mission, Poetry, and Music: The Transformation of Human Hearts**
Zavier Tarrant, Benjamin Hoopes, Ellen Glynn, Alexa Harper, Timothy Tharaldson, Music
 5:15–6:15 ❖ O’Malley-McAllister Auditorium
77. **Developing an Arranging Process That Maximizes Student Success in Performance, for Marching and Pep Bands in High School and Small College Settings**
Stephanie Schrader, Thomas Davoren, Music
 5:15–6:15 ❖ O’Malley-McAllister Auditorium



Spring Band Concert



Presentation Abstracts

Poster/Exhibit Session #1

McAllister Board Room (4th floor)

8:30–9:35 AM

1. Developing an Impact Force Measurement System to Reduce Box Jump Injuries

Joseph Accurso, Andrew Downs, School of Engineering

Serious athletes are taught the benefits of cross-training and lifting from day one. As today's professionals and college stars steadily break barriers and push the human body to its limits, it is important, now more than ever, for athletes to incorporate supplemental exercises into their regular training regimen to activate unfamiliar muscle groups and help reduce the overall risk of injury. A common exercise often found in many supplemental lifting routines is the box jump. If performed correctly, box jumps can help athletes improve their general explosive lower-body movements, such as jumping, sprinting, or squatting. A critical step in efficiently performing the box-jump exercise is to land on top of the box as lightly as possible. This works to reduce the impact on athletes' lower extremities and activate important muscle groups throughout their calves, shins, Achilles tendons, and feet. Many athletes make the mistake of landing too aggressively on top of the box, creating excess impact strain and perhaps leading or contributing to further injuries.

This research proposes an engineered solution to provide athletes with visual feedback corresponding to the amount of impact force exerted on the top of the box. The design takes advantage of two load cell arrays in a Wheatstone bridge configuration to convert the applied mechanical force into an electrical signal for user feedback. The signal is amplified and read by an Arduino microcontroller that processes the input data and displays the relative impact force on an array of light-emitting diodes (LEDs). Athletes can use this information to fine-tune their mechanics and ultimately reduce the risk of injury while performing box jumps. This simple impact measurement device is just one way in which electronics can be utilized to develop intuitive solutions in the field of exercise science.

2. Examining Time-of-Day Effects of Traumatic Brain Injury in *Drosophila*

Emma Antczak, Gracie George, Renée Bodoh, Jeremy Stubblefield, Biology

Each year, there are 61,000 deaths per year in the United States associated with Traumatic Brain Injury (TBI). These injuries are associated with both short- and long-term damage, disrupting proper brain function. Throughout the past 30 years, proposed treatments for TBI in humans have struggled to reach approval, creating a need for additional investigation into TBI-induced injury. Research suggests that the brain's response to injury may vary with time-of-day, yet studies looking at time-of-day variation in TBI-induced injury are lacking. Behavioral

and physiological variation is most often under the control of a 24-hour time-keeping system in the body, called the circadian system. The circadian system in most organisms maintains 24-hour cycles with a conserved mechanism, making model organisms, such as the fruit fly *Drosophila Melanogaster* (*D. Melanogaster*), useful for studying time-of-day variation in physiology. *D. Melanogaster* has also been established as a model organism for TBI. We therefore utilized *D. Melanogaster* to ask the question, “Is there time-of-day variation in TBI?” To answer this question, we utilized a High-Impact Trauma (HIT) device capable of delivering head injuries (hits) to groups of fruit flies. We conducted tests on both male and female fruit flies utilizing variable numbers of total hits (either 0, 2, or 5 hits). From this, we calculated the Mortality Index at 24 hours post-hit (MI24), which was defined as the percentage of flies that died 24 hours after receiving hits. Flies were maintained within environmental chambers with a 24-hour light: dark cycle with 12 hours of light and 12 hours of darkness. Flies received their designated number of hits within defined intervals throughout the light phase in order to analyze time-of-day effects on MI24. Our results will help uncover links between time-of-day and brain injury, possibly leading to insights on novel treatments of TBI in humans.

3. Rheology of American Dairy Manure

James Atkinson, Dorothy Hill, Katharine Strandquist, Patrick Hirl, School of Engineering

This proposal is for a project studying the rheology of American dairy manure. Rheology refers to the study of the flow of non-Newtonian fluids. In this case the fluid is dairy manure with a certain solid concentration, temperature, and from a certain location. The viscosity has been measured with each of these variables to produce power functions to predict the flow of each manure. Predictions of these flows will allow for easier pump, pipe, and flow designs in industrial applications. This type of experimentation is important because manure is a shear thinning, non-Newtonian fluid that is hard to characterize except by empirical models.

This experimentation is very important because not only is American dairy manure a necessary fact of having cows for milk and meat but also the manure is very useful. The most common usage of manure is as a fertilizer, but this manure also has properties that make it valuable in other spheres of influence. As the bacteria in the manure reacts, it releases methane that can be used in other applications, including natural gas power plants.

For this specific set of experiments, the manure was collected from four different farms: East Valley, High Plains, Del Rio, and Iowa. For each location’s samples, viscosity was measured from varied combinations of dilution and temperature. The received total solids concentration determined the set dilutions of the manure samples. The dilutions were done at as-received, 14%, 12%, 10%, 8%, and 6% total solids concentration. From each of these dilutions, a viscosity sample was taken using a viscometer at 5, 18, 32, and 43 degrees Celsius. Each sample is taken using a viscometer with a spindle that lowers into the dilution and spins at

3, 6, 12, 30, and 60 rpm, measuring the resistance from the dilution to the force of the spindle spinning. This can be related to shear stress (the desired quantity for industry application) by using the geometry of the spindle.

Over the course of running most of the tests required to develop the empirical model, some major trends have appeared. The dilutions from thickest to thinnest were as follows: East Valley, High Plains, Del Rio, and Iowa. The viscosity increases with the thickness of the sample. Within each sample, the viscosity typically lowers as temperature increases. The viscosity lowers with faster rpms (hence shear thinning).

The rheological study of American dairy manure is essential to the growth of this industry. This information is necessary for companies to design for safety, proper usage, and cost effectiveness. The empirical models drawn from this study will allow for more effective design in all three of these categories and increase the usefulness of dairy manure in industry.

4. Kite-Borne Radio Antenna

Ryan Fricker, John Rogers, School of Engineering

When sending or receiving a radio signal you need a long, elevated antenna. Usually, a mast or a tower, or a tall building is used. In some cases, however, these are not available. One solution is to use a kite-borne radio antenna. This involves, as the name suggests, using a kite to hoist an antenna into the sky to use with a radio. This idea has seen some use in history. The first transatlantic radio signal was received with a kite-borne radio antenna. It has also seen some military use, mostly as a way for downed airplanes or life rafts to send a signal in the open ocean. However, there is a major downside to its use; it requires wind and is often unsteady and difficult to keep at a constant length, making it unreliable and difficult to tune. Despite the downsides, a kite-borne antenna and a small battery-powered radio make a serviceable station that is portable for use while hiking or boating, or to use in emergencies. In this project, a kite-borne antenna was constructed and used with an amateur radio to try to receive distant radio station signals. The antenna was a vertical dipole type tuned for a frequency of 7MHz.

5. Concrete Canoe Transportation Device

Paul Hanson, Alexander Buman, Scott Newbolds, School of Engineering

The concrete canoe transport is first and foremost a transportation system designed for the annual concrete canoe build. The concrete canoe competition is a competition between multiple schools to build and race canoes made from concrete. As can be imagined, the canoe is very heavy and so building a concrete canoe requires a great deal of preparation both for the build and post-construction. In order to be able to do anything realistically with the canoe, transportation needed to be built to move the canoe for testing and in the competition. This transportation is created to move the canoe safely from its storage place to test and use the canoe. A normal canoe transportation device, similar to what can be attached as a trailer, would not have nearly enough strength to hold a 300lb canoe, so a special transport had to be made to carry the concrete canoe.

The transport needed to be sturdy enough to provide a rigid frame to secure the canoe and have a flexible method to let the canoe sit in the transport without getting damaged. These are the two primary functions of the transport: strength and protection of the canoe. There were a few similar designs used in the past, which were utilized to create the new, much stronger frame. The final product consists of a large metal frame with a bungee cord laced on the top providing a flexible carrying system on wheels. These designs were implemented into the transport to allow safe and easy movement of the canoe.

6. Determination of the Most Effective Structure for Nitric Oxide Selectivity Using a Luminescent Probe With HOPO Antennae and a Copper Binding Site

Richard Hernandez, Emma Baucom, Alexa Harper, Catherine Moraghan, Sarah Harris, Chemistry and Biochemistry

Nitric oxide radical (NO), a reactive nitrogen species (RNS), has been identified as a crucial factor in reperfusion injury, tissue damage as blood returns to the tissues after a stroke. During a stroke, oxygen is supplied to the brain by nitric oxide to compensate for the lack of oxygen. During which, NO reacts with other oxygen species to form reactive oxygen species (ROS), which can significantly damage the brain. Not much is known about the timing, location, and concentrations of this process. Thus, more research is necessary. This creates the need for *in vivo* imaging to monitor the transient NO concentrations in the brain. The purpose of this research is to create an applicable and effective *in vivo* lanthanide-transition metal-based fluorescent probe for the detection and imaging of nitric oxide radical concentrations. Unlike most other fluorescent probes, lanthanides are advantageous for their narrow emission bands and long luminescent lifetimes. The probe will consist of a lanthanide, a spacer, and a fluorescent antenna. When excited by UV light, the electrons in the antenna will be transformed into an excited state. As the antenna relaxes, the energy is transferred to the lanthanide, which begins to phosphoresce—a process with a much longer luminescent lifespan. For this probe, the fluorescent molecule, 2-Hydroxypyridine-N-oxide (HOPO) will be used as an antenna. The lanthanide, Europium, will be used due to its fluorescent coordination with HOPO. In order to test for the presence of a specific ROS or RNS, the probe will be initially bonded to a copper atom, quenching the fluorescence. When the probe is exposed to an RNS, the species will bond to the probe, forcing it to drop the copper atom and restore luminescence. This project is concerned with answering two questions: First, will one or two HOPO molecules have an optimal binding affinity for copper? Second, will a probe containing one or two HOPO molecules be more selective for NO? Thus, this project will design two versions of the probe: one with a single HOPO antenna and one with a double antenna chelate for the copper. The probe that most reliably binds to copper while also reliably dropping it when introduced to NO may then aid in the study of NO in the brain for stroke victims.

7. Comparative Behavioral Coding of Standard Versus Virtual Reality Hand-Arm Bimanual Intensive Training Programs

Katelyn Malick, Martha Carletti, Biology

Cerebral palsy is a condition in which damage to the brain during development affects balance, coordination, and the ability to move. In order to help children with cerebral palsy to gain function in their affected muscles, HABILIT Camp was created. HABILIT stands for Hand-Arm Bimanual Intensive Training and is a camp for children with unilateral (affecting one side of the body) cerebral palsy. Standard HABILIT Camp consists of simple, fun activities that require children to use both of their hands. HABILIT has shown improvements in the usage of the affected hand and arm. However, HABILIT Camps are short, hard to find, and expensive. To attempt to achieve the same results as HABILIT, but without the same time, location, and financial restraints, researchers at the Munroe Meyer Institute of the University of Nebraska Medical Center developed HABILIT-VR. This technology includes virtual games that kids can interact with using both hands. The aim of this study is to compare participants' behaviors between the Standard HABILIT and the HABILIT-VR programs. This study seeks to explore whether the behaviors exhibited during HABILIT-VR sessions align with the intervention principles established by the Standard HABILIT program for children with unilateral cerebral palsy. In order to do this, researchers are recording information including arm usage, hand manipulation, visual attention, child engagement, child movement, therapist assistance, child behavior, challenge, and controller adaptations based on videos of the children during HABILIT and HABILIT-VR. If it is shown that HABILIT-VR produces the same or better outcomes than Standard HABILIT does, then HABILIT-VR could be distributed to children with this condition so they could complete therapy sessions when and where it is convenient for them.

8. The Effects of Anthropogenic Sound at Different Frequencies on the Behavior of Blue Tilapia

Austin Nobis, Leah Mages, Terrance Malloy, Virginia Winder, Biology

Studies on members of the family Cichlidae have revealed they have a wide variety of sensory capacities across different species. Hearing has been observed to vary in previous studies with the presence and size of a specialized or reduced air bladder. We studied *Oreochromis aureus* (Blue tilapia), a member of Cichlidae, with the aim of addressing our question about how different frequencies of monotone sound would affect the behaviors of the fish. We were observing how the presence of a sustained pitch tested with five specific frequencies would affect the behaviors of movement, feeding attempts, and proximity to the source of the sound. Other studies have found behavioral responses to loud anthropogenic disturbances, such as ship noise and air guns, in gobies, zebrafish, and other schooling fish. We hypothesized that the tilapia would feed less and move around the test tank more in response to the disturbance of the sound. We also hypothesized they would avoid the source of the sound. We finally hypothesized these changes would be the most dramatic at the frequencies that the tilapia

can hear the best. We exposed 15 individuals to ~85dB of sound at different frequencies ranging from 100Hz–1100Hz for three minutes. Over that time, we recorded the fish and watched the videos for each trial to observe three behaviors: their movements based on a grid at the bottom of the tank, proximity to the underwater speaker, and how frequently they exhibited feeding behaviors. The results indicate no significant difference among any of the frequencies tested and any of the behaviors that we observed. This data indicates that blue tilapia are not behaviorally affected by the presence of loud, monotonic sound at any of the frequencies tested. These results cannot say anything about the hearing range of the fish because there was no significant difference to compare. These results could be applied to how fish farms operate. If blue tilapia are not bothered by loud sounds, machinery can be louder in these farms without concern for the behavior of the fish. The number of trials we conducted, however, was limited due to complications with the speaker, so more tests would need to be run to perform a more powerful statistical analysis and to form a more concrete conclusion.

9. Ideal Sleeping Temperature for College Students

Julianne Peichel, Jeremy Stubblefield, Biology

Sleep is an important, and often lacking, part of every college student's routine. This makes it especially important for students to maximize the hours of sleep they do get. While there are many factors that can affect sleep, this project focuses on temperature. This project aims to analyze the correlation between temperature and sleep. Participants wore a Fitbit tracking device for two nights to measure sleep parameters, such as total sleep duration, sleep quality, and time spent in different sleep stages. Each participant received an assigned temperature of either 62, 65, or 68 degrees Fahrenheit at which to set their room thermostats. They were also asked to keep a thermometer in their room near their bed in order to measure room temperature. After measuring and recording each participants' data for two nights, we were able to analyze the relationship between room temperature and sleep quality.

10. Design and Construction of the Structure of a Radio Telescope

*Nicolas Pena, Michael Price, Shane Koehr, Jacob Schmidt, John Modlin,
Christopher Shingledecker, School of Engineering, Physics and Astronomy*

The objective of this project was to design and construct the structure of a radio telescope for use by the Benedictine College Department of Physics and Astronomy. The department does not currently have access to a radio telescope at the Daglen Observatory, and this project allows the opportunity to provide students with an introduction to the field of radio astronomy. A primary requirement was that the telescope be able to observe the 21-cm line of neutral hydrogen. To accomplish this, the group used a horn antenna design with a geometry optimized to observe this radio spectral line. Furthermore, the project required that the azimuth and altitude of the antenna was adjustable to be able to track different objects in space. The design implemented a turntable at the base to allow for azimuth rotation as well as ball bearings at the antenna supports to allow for altitude adjustment. Finally, because the planned location for the telescope is

outdoors, the structure is constructed using steel painted for corrosion resistance to allow for increased durability. This will serve as a subproject in the construction of a fully functioning radio telescope, with a separate project addressing the automatic positioning of the telescope and data collection.

11. Lightweight Concrete Mix

Gwenyth VanLeeuwen, Rebecca Madden, Scott Newbolds, School of Engineering

The use of concrete impacts our daily lives. Concrete is versatile, making its purpose depend on the mixture of elements. The material properties depend significantly on the application, process, and components in the concrete. Therefore, balancing concrete in the most cost-efficient and sustainable way is challenging. The objective of this project involves investigating the material science components of concrete and creating a concrete mixture for the concrete canoe project. The concrete mix that will be made must be strong enough to sustain the outside stress of four passengers, the water pressure against the bow, and be light enough to use in a canoe race. Incorporating the aggregate, Poraver, which are small glass spheres, can be used to achieve this purpose. This method also decreases the final product's weight, allowing the concrete mixture to float while increasing the compressive strength. Four different levels of concrete were developed based on varying levels of total glass volume percent: 0%, 30%, 40%, and 50%. Compression tests for each specimen were done at 7-, 14-, and 28-day curing periods. The 28-day curing test results yielded the strongest values, concluding that the 30% volume was the strongest at 3501.05 psi. The density for all specimens was relatively the same at around 92lb/ft³. The chosen mix for the 2024 concrete canoe was the 30% volume of Poraver, providing the most substantial relationship between density and overall strength.



12. Depressed *Drosophila*, Morose *Melanogaster*

Sophia Winger, Jeremy Stubblefield, Biology

9:45–10:05 ❖ Room 109

The primary aim of this study was to establish the common fruit fly (*Drosophila melanogaster*) as a model organism for studies in mental health as it relates to traumatic brain injuries in humans. Using a twofold experiment, we first sought to establish a reliable methodology artificially to depress fruit flies in order to then use these same flies for the second part of the experiment: continued studies in the effects of traumatic brain injuries (TBIs). By tinkering with the flies' light cycle, we induced symptoms found in humans affected by seasonal affective disorder (SAD) and measured a fly's level of depression by various assays testing food intake, locomotion, and normal behaviors. With a methodology firmly established, we then used a high-impact trauma (HIT) device to strike the *Drosophila*. After assessing their post-impact conditions, these results were compared to those collected from strikes performed on non-depressive flies. Ramifications of this project include assessing decrease of neural protection as correlated to

mental health, as well as consideration of more aspects of the results of traumatic brain injuries (TBIs) and therefore of potential treatments that could be used to lessen their symptoms. Further research would focus on assessing this decrease in protection across times of day.

13. The Bad Test-Taker Notion: Developmental Trajectory of Test Anxiety and the Bad Test-Taker Identity

Joanna Gambino, Katherine Brandenburg, Amy Posey, Psychological Sciences

9:45–10:05 ❖ Room 125

The bad test-taker phenomenon is commonly referred to as the tendency to believe that one's performance on a test does not accurately show how much one knows about the topic (Holmes, 2020). In our previous study at Benedictine College, we found that 94% of undergraduate students believe in the bad test-taker phenomenon, and 43% believe they are personally bad test-takers. A positive correlation between belief in being a bad test-taker and test anxiety was also observed. The current study sought to determine at what age the bad test-taker identity and experience of test anxiety tends to emerge among middle school, high school, and college students. This presentation will describe the findings of our study and discuss how the mitigation of test anxiety may impact personal identification as a bad test-taker.

14. St. John Chrysostom's Divine Liturgy and the Tridentine Latin Mass

Isabella Hodgins, John Romano, History

9:45–10:05 ❖ Room 208

I will analyze the commonalities and differences between the Western expression of faith in the Tridentine Latin Mass [1962] (TLM) and the Eastern Divine Liturgy of St. John Chrysostom. More focused points will be on the Eucharistic prayers used in the liturgical texts and the shared usage of the ordering of prayers. What I wanted to learn from these liturgical texts was the similarities in the prayers and to look at the overlapping qualities in these traditions. For example, the shared qualities between the TLM and Divine Liturgy are that both organically developed from more ancient liturgies in their own right tracing to the liturgical expression used by the Apostles themselves. Both liturgies are ordered in the same manner of being divided into the Mass/Liturgy of the Catechumens and the Mass/Liturgy of the Faithful. Elements in each of the Liturgy of the Catechumen and the Liturgy of the Faithful will be explored, including incensing of the altar and commemorating the saint or feast for the particular day. Important differences to note will also be the prayers at the foot of the altar; the preparation of the gifts; and the commemoration of the saints, the living, and the dead. The environment of Western Liturgies, in particular, the TLM, has ornaments of statues, and a communion rail. With an Eastern Liturgy, the nature of the church emphasizes mystery and the Divine; these are shown in the architectural features of the iconostasis, iconography, and in most cases, a curtain that further divides the people from the mysteries in the sanctuary.

15. Tracking Statistics for UBBA (Underground Benedictine Basketball Association)

Anthony Rumpza, Patrick O'Malley, School of Engineering

9:45–10:05 ❖ Room 219

In its fourth year, the Underground Benedictine Basketball Association (UBBA), a student-run organized basketball league with over 100 players, has implemented a significantly improved statistics tracking spreadsheet. Since its second season, students have volunteered to collect game statistics and enter the information into a shared Google Sheet document, which originally only tracked collective team stats but since last year has also tracked cumulative individual player stats. However, the method of entering data for individual stats involved mentally adding the new stat to the running total and manually overwriting each stat with this sum to track the cumulative total. With 15 stat columns for more than 100 players, who each play about 10 games, manually overwriting each player's cumulative season stats after each game required excessive effort and was prone to error in both mental math and typing. Additionally, this method only collected the cumulative stats, which did not allow users to see individual players' game performances. The aim of this project was to improve the way that the statistics for each game were processed to automatically accumulate team and individual player stats across the season as well as show each player's individual game performances. After discovering a system to reference dynamically Google Sheets tabs that do not yet exist (i.e., future game logs), this was incorporated into a new statistics spreadsheet, which is being used in the current UBBA season and has been a success. This presentation will explain the method and results of developing this new spreadsheet and how it minimizes data entry effort and error while providing more detailed statistics tracking in better format than previous years. Furthermore, this spreadsheet was created as a season template with intended use for future UBBA seasons.

16. Theory, Practice, and the Rehabilitation of Certitude

Joshua Heidenry, Francis Petruccelli, Jean Rioux, Matthew Muller, Philosophy, Theology

9:45–10:35 ❖ Gangel Seminar Room

In this paper, I claim that early modern philosophers René Descartes and David Hume lack a coherent view of certitude, settling for a univocal or purely equivocal understanding that arises from their conception of theory and practice and that together these notions contribute to a skeptical worldview.

To show this, I will do the following: First, analyze Descartes's and Hume's writings with a focus on how they speak both of the relationship between theory and practice and certitude; second, define certitude and propose an alternative to the univocity and purely equivocal view of certitude, i.e., an analogical conception; third, show how the nature of certitude, which upholds the legitimacy of moral certitude, helps dissolve both the dichotomy between theory and practice and the threat of radical skepticism.

17. Student Perceptions of Academic Coaching in the Benedictine School of Nursing

Juliette Orr, Jackie Harris, School of Nursing

9:45–10:05 ❖ Room 307

The purpose of this project was to obtain student perspectives and suggestions for improvement to the academic coaching process for students within the Benedictine Nursing Program. The research participants were all students currently enrolled in the Benedictine School of Nursing. Data was collected through a survey sent out by email to students in the Nursing classes of 2024 and 2025, and participants were given the option to enter a random drawing for a \$20 Amazon gift card. After analysis of student responses, the perceived efficacy and availability of academic coaching, as well as student feedback and suggestions for further improvement, will be presented.

18. How Kids Learn to Read: What the Research Says

Brooklyn Caskey, Gabriel Maday, Christi Adams, School of Education

9:45–10:05 ❖ Room 324

A daily skill most take for granted is the ability to see and read the words around us. Everyone has to be taught how to read, yet shockingly, only 36 percent of US fourth graders are reading at grade level. Over the last century, educators in English-speaking countries have disputed the techniques teachers should use to train their classes in this vital skill, and students are directly impacted by the ongoing literacy debate. Teaching methods within this debate include the whole-language approach, phonics instruction, sight-word memorization, balanced literacy, and structured literacy. Through this project, we aim to provide an overview of “the science of reading” and tell the story of the controversy it has caused, as well as present what researchers propose is the best way to teach children how to read in our schools.

19. Expediting Diapause and Testing the Effects of S-Methoprene on Bee Larvae

Kirstyn Crane, Juliette Lange, Virginia Winder, Biology

10:15–10:35 ❖ Room 109

Temperature has long been thought to play a key role in diapausal emergence for insects and has been tested in several species; however, its relative importance compared to other factors is still widely disputed. Blue orchard mason bees (*Osmia caerulea*) are a popular species of solitary bees bought and sold across the country due to their tendency to cross-pollinate crops. Cross-pollination increases the quality of crops by reducing inbreeding. Mason bees have a natural diapause length of 10 months and emerge in the spring for 1–2 months as adults. We hypothesized that a minimum of five months of diapause at controlled temperatures was necessary for development and that diapause could be expedited with minimal effects on the life-cycle. We lowered the environmental temperature for cocoons to 1.1°C where they were left for one month.

Next, we increased the temperature to 3.89°C for one month. Every few days, we increased the temperature until cocoons reached 21.1°C. This slow ramp up of temperature took 109 days total. Of the 21 cocoons, 10 successfully emerged four months prematurely, with no apparent negative impacts to their morphology or behavior. Eight of the 11 un-emerged cocoons were still in pre-pupal stages and died, one had a common disease called chalkbrood (caused by a fungus *Ascosphaera apis*), and the other two were cut out and survived. Due to a lack of accurate date laid information, the results of this experiment are hard to analyze conclusively; however, of the fully developed bees, only two individuals failed to emerge early on their own. Furthermore, all of the individuals went on to live out their normal life-cycle, indicating temperature plays a key role in early emergence. The second part involves testing effects of the pesticide S-Methoprene on larval development. S-Methoprene is a chemical used in many pesticides to prevent larval development in insects. S-Methoprene can be absorbed through the exoskeleton and imitates Methoprene, a growth hormone that determines pupal stages, shedding of the exoskeleton, sexual maturity, directional flight, and other key developmental features in insects. This chemical is used in over 500 pesticide products nationwide, but our focus is on Amdro brand mosquito dunks. Dunks are used to kill mosquito larvae in water bodies around houses or farms. All previous studies on the effects of this chemical on pollinators were conducted on adult bees and found low toxicity. We used blue orchard mason bees, provided by Crown Bees, as a model species to determine the relative effect of S-Methoprene on bee larvae. This part of the experiment is ongoing. Our process involves placing 1–2 drops of Amdro-dosed water onto a treatment group of eggs and young larval instars. We will document their development compared to an untreated control group to test hypotheses about the effects of S-Methoprene on be larval development.

20. Anxiety and Scrutiny: Performance Anxiety and Its Effect on Social Judgements of Others

Molly Rolwes, Elena Nguyen, J. Dean Elmore, Psychological Sciences

10:15–10:35 ❖ Room 125

Performance anxiety is an extremely prevalent issue that pervades many areas of life, including within higher education. It is a type of social anxiety that results from a fear of others' judgements and perceptions of your public actions. As members of a social species, we are constantly "performing" in front of one another and watching the performances of others. Most especially, performances, and thus performance anxiety, have become a common part of educational assessment today. Presentations, performances, speeches, and oral examinations, both impromptu and planned, are common sources of performance anxiety for students within higher education. There are many studies about performance anxiety itself; however, there are few to none that consider how performance anxiety could influence one's social judgements. Our research was to determine if performance anxiety leads to more positive or negative social judgements of others engaged in performance tasks.

As part of the study, participants were asked to watch a recording of another person giving a brief, impromptu speech and then rate the performance. In order to manipulate performance anxiety, some participants were told they would be giving a similar speech after watching and judging the other person. Response measurements were taken at specific intervals to determine whether the manipulation created a sense of anxiety among participants and whether ratings of the other person differed across groups.

Results showed that participants rated the person in the recording more positively when they were anticipating having to perform themselves. However, participants who were told they would be giving a speech did not report higher levels of anxiety, leading to questions about why the observed differences in social judgement occurred. Despite the failure of the manipulation, it seems that anticipating having to perform leads to more positive social judgements of others who are also performing. These results may have interesting implications for classroom or work settings.

21. The Resurrectionists: Six Feet Down for Science

Mary Ellen Raymo, John Romano, History

10:15–10:35 ❖ Room 208

Have you ever gone to grab your phone, only to find it missing from the exact spot you left it last night? Now imagine that same problem, but with your dearly departed family member. Bodies missing from graves was a common occurrence across the Eastern half of the United States. Medical schools back then needed thousands of cadavers for dissections in anatomy classes, but only a few bodies were legally available each year in the whole country, and they spoiled within days. Rather than risk turning out incompetent doctors, the universities began to fund professional grave robbers who supplied the much-needed bodies. Nicknamed “resurrectionists” for the empty coffins they left behind, they operated in secret to avoid being potentially beaten to death at the hands of a mob. The risk paid off, however, because doctors were willing to pay up to nine hundred dollars in today’s money for every corpse delivered. Some doctors even joined the resurrectionist trade themselves, hosting wild parties with their students before going out to dig up the next day’s lesson. These activities put the schools themselves in danger, and several universities were destroyed or otherwise forced to close when a stolen corpse was found on their grounds. Despite legal and social oppositions to grave robbing, very little action was taken overall to stop it due to the necessity of training new doctors. Professional grave robbing eventually died out due to new methods of embalming and the practice of donating one’s body to science. The resurrectionists of America never truly disappeared though. They live on in local legends across the country, a fitting tribute to the men and women who helped make medicine what it is today.

22. Rocket-Launched RC Glider

Ryan Fricker, Gabriel Guzman, Augustine Blosser, Patrick O'Malley, School of Engineering

10:15–10:35 ❖ Room 219

Airplanes have evolved a great deal since their beginning. Technological advances have allowed for incredible achievements with regard to maximizing velocity, minimizing fuel expenditure, and more. However, these achievements are usually the result of the specialization of aircraft to fit a specific set of needs. These are often at the expense of other capabilities. Faster planes tend to have poorer gliding capabilities, and gliders can struggle to achieve high speeds. This Discovery project is a search for the optimal wings for a rocket-launched glider. To power the rocket launch, Estes model rocket engines were used. A few different gliders were built and tested with regard to controllability and how stable it is when launched with a rocket. The glider is battery powered, and a simple servo and push-rod system will be used to power the control surfaces. The wings are modular to enable the testing of different wing shapes and sizes. Some of the factors that go into wing design are chord length, wing length, airfoil, sweep angle, dihedral, and edge taper. For gliders, there are already well-established wings that many different models use. For example, the Clark Y airfoil is used very commonly. However, the rocket launch changes everything about the optimal wing structure. A wing that is good at gliding and supplies a great deal of lift may provide too much drag during the rocket launch. After the launch, the glider is unpowered. In this phase, the traditional concerns for gliders, such as lift, glide radio, and center of gravity, come back into play. We tested a few different methods of building a glider, including using foam, foam board, and 3D printing.

23. Edith as Educator: A Holistic Education of Woman Rooted in Steinian Theology

Shea Nowicki, Mariele Courtois, Jeremy Sienkiewicz, Theology

10:15–11:05 ❖ Room 307

Unfortunately, current secular educational theories—which emphasize pragmatic formation for participation in society, subjective truth, and intense focus on career outcome, grade point averages, and résumés—offer a real lack in the formation of young people. Interestingly, in early twentieth-century Germany, St. Edith Stein noted similar patterns in women's education. While she is most known as a phenomenologist or a Carmelite mystic, Stein also spent eight years working at an all-girls' Catholic secondary school and giving lectures on girls' education throughout Germany. Based on her experiences and the educational milieu of Germany in which she was writing, Stein conceptualized an education for women, according to a trifold image of the human person as human, woman, and individual. The human person, she wrote, exists in the fallen state as a result of original sin but receives grace and transformation through relationship with God, allowing for the redemption of mankind through Jesus Christ, who is the ultimate telos for whom each human person is made. Furthermore, Stein

acknowledged the ontologically feminine vocations of mother, bride, and virgin to which each woman is called. With this in mind, the individual woman can be formed through an educational project attuned to her ultimate telos, ontologically feminine vocations, and particular career calling.

This paper seeks to offer educational implications of St. Edith Stein’s “theology of woman” as a starting point in addressing modern secular educational theories. It will do this by assessing Stein’s trifold layering of woman in conversation with the phenomenological and Thomistic work across the whole of her lifetime, which include her understanding of the psycho-physical individual, empathy, and ontological unfolding. Lastly, the paper will draw upon Stein’s lectures on women’s education to begin to conceptualize an educational vision to meet the needs, interests, and formational benchmarks for young high-school-aged women. The paper will propose Stein’s vision of education as the way forward in the modern educational milieu.

24. Regrafting English Education: New, Old, and Eternal Stories

Miriam Del Castillo, Krystyn Schmerbeck, Stephen Mirarchi, Sheridan Center for Classical Studies, English

10:15–10:35 ❖ Room 324

This project proposes a method for teaching high school English in a way that prepares students to sympathize with the people around them while not sacrificing their orthodox viewpoint. The classical model of education, which is gaining increasing popularity, provides students with the necessary background for engaging in such a conversation (unlike most secular public schools). However, classical education frequently favors the old stories over the new, confident that the canon of classical literature will not fail to speak to the heart of the human person. While these works will always be indispensable, classical education often overlooks the value of the new story. Some new stories, like some old ones, have the power to draw readers into a new way of seeing the world. By presenting a suggested curriculum and method of teaching several recent, non-Catholic authors in conjunction with both Catholic and classic literature, teachers can help their students understand the modern world while remaining firmly grounded in a Catholic worldview. It will demonstrate the value of using more recent or easier to read literature in a classical context as doing so can inspire students who are turned off by difficult literature to pursue the good, true, and beautiful, and help students who are already interested in such a discussion to draw their peers into such a conversation.

25. Injuries Suck. Period. — A Dive Into the Menstrual Cycle and Athletic Injury

Michaela Palmer, Kera Willoughby, Virginia Winder, Biology

10:45–11:05 ❖ Room 109

In the 50 years since Title IX was passed, participation in women’s athletics has increased to almost equal representation in college sports. To acknowledge fully women’s athletics, it is important also to recognize the natural processes

a female athlete's body goes through. There has been some research on the effect of menstrual cycles on athletes with Chelsea's Soccer Program along with research on hormone levels and their effect, but there is still a lot unknown. We conducted research to assess the effects of menstrual cycle phase on athletic injury. We collected data using surveys posted in the athletic training room and through a group of female athletes who participated in a 5-week study. The null hypothesis we tested was that the cycle phase is not related to the number of athletic injuries incurred. Through a chi-squared test run in the program R, the survey data produced significant results that there was a difference between expected injuries per cycle phase and observed values. Testing showed a chi-squared value of 14.257, degrees of freedom of 3, critical value of 7.81, and a p-value of .0026, which rejects the null hypothesis, meaning there is a correlation between injury and menstrual cycle phase. Sixteen percent of reported injuries were expected to occur in menstruation due to the average of our test group having five days of menstruation. This was taken out of an average of a 30.9-day cycle (Due to restrictions in R we rounded to 31 days.) and multiplied by 24 (the number of reported injuries). However, 42% of injuries were found to occur during menstruation. We also found significance in the follicular phase where the expected frequency of injury was 26% due to the estimated eight days of follicular phase out of the 31-day cycle; however, data showed a 4.2% chance of injury, with only one injury reported in the follicular phase. Data collection of the 5-week study was ongoing until April 1, 2024, which will help us further see if any injury occurring during the study period was correlated to a certain phase as our survey showed. It could also show what potential reasons there are for the correlation and if there are any underlying causes to why injuries in the menstrual phase have a higher probability of occurring and injuries in the follicular phase have a lower chance of occurring. Over the past six months we have designed, surveyed, and tested female athletes and the potential correlation of injury to a certain phase in the menstrual cycle, through chi-squared analysis in R and comparison of expected to observed values we have found we can reject the null hypothesis. With the data from our research, we hope to create better recognition for female athletes and the natural processes of their bodies.

26. The Effect of Early Exposure to Technology on the Development of Children's Creativity Part I

Renée Bodoh, Eva Chen, Psychological Sciences

10:45–11:05 ❖ Room 125

In a world where technology has become affordable and easily accessible in homes and classrooms, children are being exposed to technology at a much earlier age than previous generations. The invention of interactive devices and digital games has provided new methods of play for children, which constitutes an essential component of young children's daily routines and serves as a vital avenue for acquiring cognitive and social abilities. This project aims at analyzing the effect of technology on children's creativity during play through a systematic literature review of the recent data collected on the digitalization of play due to

early exposure to technology. Existing literature suggests that the integration of technology in children’s play promotes cognitive and social development. It is hypothesized that parents and teachers are less supportive of exposing children to technology at a young age, contrary to what existing literature has demonstrated. Part I of this Discovery project (in 2024) will propose a study using self-report measures (e.g., questionnaires, surveys) to examine schoolteachers and parents’ beliefs of young children’s use of technology in everyday life. Suggestions and comments received from this presentation will inform further research design and data collection that will take place in the academic year 2024–2025 (Part II). This two-year project aims to examine whether there exists a gap between evidence-based findings and schoolteachers and parents’ perceptions, with an ultimate goal to inform best practices of exposing young children to technology.

27. Anti-Zionism and Antisemitism: A Catholic Perspective

Elizabeth Houska, Renee Lataif, Richard Crane, History

10:45–11:05 ❖ Room 208

Throughout recent months, news outlets have been full of stories detailing Antisemitic attacks across the world and arguments in favor of Palestinian rights. The term “Anti-Zionism” is commonly used to describe the movement against the existence of the State of Israel (founded in 1948). The goal of this project is to address the current conversation on this issue and attempt to answer the question: Is Anti-Zionism the same as Antisemitism? Is it possible for one to be Anti-Zionist without having a general prejudice against Jews? To answer these questions, we will first identify and examine scholarly definitions of each term. Next, this project will analyze the current conversation around the existence of the State of Israel and look at historical examples of Anti-Zionism and Antisemitism. Finally, this project will look at the Catholic Church’s relationship with the State of Israel since its founding in 1948. Ultimately, this project seeks to propose a potential response to the age-old prejudice against Jews today, particularly from a Catholic perspective.

28. Non-Intrusive Mechanization of Pianos

Domenico Ricciardi, John Modlin, John Rogers, School of Engineering

10:45–11:05 ❖ Room 219

Player pianos have been a staple of mechanized instruments for over a century; however, all of them require either they be built from the ground up or an already existing piano be permanently modified. Thus, the question arises: “Is it possible to mechanize the playing of any piano without having to destructively modify it?” The solution to this question is to design a mechanism to depress the keys of the piano on the outside, as a human does, rather than on the inside, as player pianos do. To achieve this, mechanical pushers and a control system of some kind are needed. For the mechanical pushers, solenoids are used because they are easily controlled electrically, and the force with which they push is controllable. For the control system, an Arduino microcontroller is responsible for taking a MIDI input and converting it to electrical instruction signals, which are then sent to a

multi-channel PWM generator using the I2C protocol. The PWM signal is then sent to an amplifier because the PWM output is too weak to power directly the solenoids. Finally, the output of the amplifier is sent to the solenoids, which then play the piano keys. Putting everything above together, the result is a device that sits on top of the piano keys and plays the piano keys from a MIDI input signal.

29. Grafting Person-Centered Theory Into a Catholic Christian Worldview

Kelly Johnson, John Rziha, Theology

10:45–11:05 ❖ Gangel Seminar Room

Can psychology and Catholicism work together? The development of modern psychology in the 19th and 20th centuries led to separation and hostility between Christianity and psychology due to the Enlightenment undertones of the times. This gap between religion and psychology has often made Catholics skeptical of the field as a whole. However, can Catholics be certain that psychology, and more specifically psychotherapy, is inherently evil when it has helped so many people overcome significant challenges? Since early Christianity, faithful Christians have undertaken the challenge of integrating the truths found in other cultures and philosophies into a Christian worldview. These Christians understood that because all truth comes from God, the Church should accept and integrate them to gain a fuller understanding of reality. Carl Rogers, the founder of the humanist movement in psychology, had a strong influence on the way psychotherapy is done today. In this presentation, I argue for the grafting of Rogers' theory into a Catholic Christian worldview. I hope that by studying a prominent figure in the development of modern psychotherapy, Christians can learn how to place other theories in psychology within a teleological Christian worldview to promote greater integration and dialogue between psychology and the Christian faith.

30. The Validity of Audiobooks

Lane Werth, Sarah Wise, School of Education

10:45–11:05 ❖ Room 324

As technology advances, so do many conventions of everyday life. Musicians have been able to create music solely through electronics, artists have found a new medium in graphic design, and photographers have found ways to alter photographs through programs, such as Photoshop. Authors discovered a way to reach thousands of readers through the creation of audiobooks. Though audiobooks have been around since the early twentieth century, they have surged in popularity over the past thirty years. Now, many readers enjoy their books through platforms, such as Audible, Everand, and Libby. People can “read” as they drive to work, clean the house, or simply sit and listen. Alongside their growth in popularity, however, has come a point of contention: do audiobooks count as reading? If one is not reading when listening to an audiobook, then what is one doing? I used these questions to fuel my research in hopes of coming to a conclusion regarding the validity of audiobooks.



Poster/Exhibit Session #2
McAllister Board Room (4th floor)
11:15 AM–12:10 PM

31. Evaluation of Uterine Histology in Aged and Young Female Mice Following Long-Term Space Flight and Live Animal Return

Haley Cahill, Isabella Ferraro, Elizabeth Hunt, Martha Carletti, Biology

Studying the effects of space flight on reproductive organs, as exemplified in this research, holds crucial importance for our understanding of human adaptation to extended space flight. Beyond the specific results outlined, such investigations contribute to the broader comprehension of how space environments impact reproductive health. Application of the obtained results can guide the development of strategies to safeguard astronauts' overall health during extended space travel. Additionally, it is possible that insights from these studies can inform advancements in space medicine and support the formulation of countermeasures to protect against potential reproductive health challenges, ensuring the long-term sustainability of human presence in space.

The uterus is composed of three distinct layers: the innermost endometrium and two smooth muscle myometrium layers. In the current experiment we completed morphometric analyses of uterine tissue from young (10–12wks. of age) and old (32wk.) mice sacrificed 2–3 days after live animal return following a 40d ISS mission (RRRM-1). Experimental groups included baseline (n=10/6, young and old mice sacrificed after launch), vivarium control (n=7/3, normal vivarium), habitat control (n=6/6, maintained in Rodent Research Hardware–Transporter and Habitat with hut), in addition to flight mice (6/6). Previous research has shown that mice were in various stages of the estrous cycle, with the exception of baseline mice commonly found in estrous. Uterine tissues were fixed following dissection and embedded in paraffin and 6 μ m thick sections collected at three different levels and then processed for general histology (hematoxylin and eosin staining). ImageJ was used to trace and determine the area of the different layers on three central sections from each uterine sample, and section areas were averaged. Overall, the surface area of the uteri from flight mice [avg area = 1.45mm³] were significantly smaller than baseline [avg area = 2.21mm³], vivarium control [avg area = 2.03mm³], and habitat control mice [avg area = 2.09 mm³]. When comparing young versus old mice, the uteri from the young flight mice were smaller [avg area = 1.25mm³] than the uteri from the old flight mice [avg area = 1.65mm³]. When the uterine layers were examined, the surface area of each layer (endometrium, inner myometrium, and outer myometrium) in the flight mice were significantly smaller than the corresponding layers in the controls. Because of small sample sizes, the estrous cycle stage was not considered. We are currently analyzing data from RRRM-2. Overall, this study extends previous observations that uteri in flight mice are smaller than control mice.

32. Improving Paddling With a Canoe Pedestal

Rebecca Madden, Gwenyth VanLeeuwen, Paul Hanson, Scott Newbolds, School of Engineering

Although the overall design of a canoe is quite simple, there are many elements that can affect the overall performance and comfort; one such element is a proper seat. While it may seem trivial, maintaining proper posture while paddling is imperative for ensuring efficiency, increasing overall control of the canoe, and decreasing muscle fatigue. The two main seating options for canoes are sitting and kneeling. Sitting is typically more comfortable but decreases efficiency and control of the canoe. Kneeling is a preferred option as it increases control of the canoe but can be uncomfortable for paddlers. Additionally, kneeling can cause asymmetrical loading on the paddler, which can cause back and lower limb pain. The solution is a canoe pedestal. The canoe pedestal allows paddlers to kneel in the canoe, increasing efficiency, control, and stability, while putting less weight on their legs, increasing comfortability. The pedestal also creates symmetrical loading on the body, decreasing pain. With a simple fix, paddling can become more efficient, and more enjoyable.

33. Benedictine College Students' Knowledge of Fertility Awareness-Based Methods

Juliette Orr, Clare Madden, Charlotte Andrews, Brianna Ball, Jackie Harris, School of Nursing

Does Benedictine students' perceived knowledge of Natural Family Planning (NFP) and fertility awareness-based methods (FABM) reflect their actual knowledge of NFP/FABM? The purpose of this project was to compare Benedictine College students' perceived knowledge of Natural Family Planning and fertility awareness-based methods to their actual knowledge.

A survey was distributed to Benedictine College students via email. Students ranked what they believe their knowledge to be on a Likert scale from 1–5 both before and after taking an 8-question quiz with questions about the female cycle and fertility. Results of the quiz were analyzed and compared to demographics and what respondents perceived their knowledge to be before and after taking it to look for any correlations.

34. Can Crusher — Magnetic Implosion

Benjamin Schuberg, Andrew Downs, School of Engineering

How much energy does it require to implode magnetically an aluminum can? This is the question that this Discovery project will look to answer. I plan to build a capacitor charging station that will release variable amounts of energy onto the surface of a can in the hope of imploding it. This will be done with the help of diodes, inductors, resistors, high-voltage transformers, and much more! The parts will be gauged around the estimation of 1450 Joules of Energy to implode the can. Using this number, I will work backward to calculate the minimum energy required.

The design can be broken down into three parts. The first will convert a Sinusoidal wave of 120 Vrms at 20 A into a DC of 20mA at 2000V. This will be done with the use of two transformers. In the second part, the 20mA at 2000 V DC will charge up two large capacitors. Once charged the source voltage will be turned off and disconnected from the capacitor. In the third part of the circuit, the capacitor's charge of 2000 V will be applied to a 3-coil inductor wrapped around the non-ferrous metallic object. If the circuit works, the capacitor should discharge almost instantaneously and release a variable amount of energy as a magnetic field onto the object's surface. From here I will adjust the amount of energy released until the minimum amount has been obtained.

The design of the circuit was completed, and the necessary base components were ordered. The circuit was not built due to the lack of a readily High-Voltage Relay, which could not be purchased with the provided grant of \$500. An alternative method of self-designing the switch was proposed to the principal faculty advisor and a design for the switch was made. This design would consist of 3D printed components, which would provide the operator a safe environment for testing. It was also decided that the switching mechanism would need to be submerged in mineral oil to prevent arcing between the leads. This design of a switch only went through an initial design process and wasn't constructed due to a worry about the safety of the operator and the reliance on the components used. This worry is also increased due to the operating voltage of 2000 V.

Future improvements would consist of a larger budget to buy a commercially available switching mechanism, which would guarantee safety for the operator. In addition, various other safety measures for the circuit would include multiple fail-safe fuses, earth grounding, and a safe environment for operation.

35. The Attack on the American Family Farm

Jessie Sonnen, Gabriel Friess, David Mannella, Sean Maher, School of Business

This study explores the effect of government subsidies and tax incentives on the overall economics regarding family farming in the United States. Beyond examining available data and historical changes to government subsidies and tax incentives, we also supplemented that data with primary data of our own from in-person interviews with small farmers in various regions of the United States.

The Federal Crop Insurance Reform Act of 1994 made participation in crop insurance programs mandatory for farmers in order to be eligible for certain loans, price support programs, and other benefits. 1996 saw the repeal of the mandatory participation requirement but still required the purchase of crop insurance for the farmers who wished to participate in any of the programs or benefits. Due to these changes, the number of farming acres insured more than tripled from 1988 to 1994 and saw about two-thirds of the country's total planted acreage insured under the program.

We looked at four particular categories of family farming to examine the effects of subsidies: equipment prices, seed prices, market crop prices, and food prices.

The questions we posed to farmers were closely related to the following examples: 1) When did you begin to utilize crop insurance? 2) Do you think it is possible for a farmer today to not have crop insurance? 3) Have you noticed an increase in expenses over the last 20 years? 4) Has crop insurance given you more security? 5) How has the next generation of your farm been affected by crop insurance? 6) Do you think the increase in prices due to government subsidies has created barriers that are too steep for new entrants into the farming market?

In our presentation, we will contrast our results from interviews with the farmers with what economists typically predict in industries that receive government subsidies and tax incentives. Oftentimes, economists view just the numbers and formulas but fail to take the entire situation into consideration. In our study, we sought to reconcile both views and create a synthesized perspective that combined both economic predictions and farming realities.

36. Flowing Fortunes: Unveiling Atchison's Water Journey From Missouri River to Tap Water

Sophia Valdivia, Sarah Harris, Chemistry and Biochemistry

Water treatment plays a critical role in ensuring the availability of safe and drinkable water for urban populations worldwide. This project aimed to investigate the efficacy of water treatment systems in purifying water from its natural source to meet drinking water standards. The focus was identifying and quantifying common impurities, such as metals, sulfates, and phosphates in raw river water and treated tap water.

The study involved analyzing the Atchison water and began with collecting water samples of the Missouri River and analyzing them for phosphate levels, sulfates, and various metals. Subsequently, tap water samples from dormitories and academic buildings, treated by the local water treatment facility, were subjected to the same tests. The comparison aimed to assess the effectiveness of the treatment process in removing these impurities and rendering the water safe for consumption.

Results revealed significant reductions in phosphate levels, sulfate concentrations, and metal content in treated tap water compared to raw river water. However, despite the water treatment system's efficacy, traces of these impurities were still detected in the treated water samples, indicating that the treatment process is not entirely perfect. These findings underscore the importance of ongoing monitoring and optimization of water treatment processes to ensure the delivery of high-quality drinking water to urban communities.

Along with this assessment, the economic effect of water treatment was studied to see a correlation between the city and its water source and how much money was spent on this water treatment annually. Studies showed that a better water treatment system would improve health conditions within local communities, but proper storage of any excess water would reduce the time and energy expenditures necessary for water collection.

37. Analyzing the Affinity of a Lanthanide Metal Complex Probe to Remove Arsenate From Drinking Water

Amelia Vopat, Julia Ondracek, Alexa Harper, Sarah Harris, Chemistry and Biochemistry

Arsenate, the water-soluble form of arsenic, is extremely toxic. It is one of many substances that is tested in drinking water. Unfortunately, it is odorless, tasteless, and colorless, making it difficult to detect. Even in very small quantities, it can lead to arsenic poisoning over time. The Environmental Protection Agency recommends keeping arsenate concentrations below 10 $\mu\text{g/L}$. However, many states in the U.S. and other countries are already at or exceeding this limit. Arsenic levels are in further danger of rising due to nonselective phosphate recycling. Phosphate and arsenate are very electrochemically similar anions, which allows them to participate in the same chemical reactions. This means that nonselective phosphate recycling could unintentionally isolate the arsenate as well as the phosphate, and possibly add poison into the food supply if this nonselective anion combination is added to fertilizers. This experiment proposes to solve this issue by testing the selectivity and binding affinity of arsenate over phosphate and other biologically and environmentally relevant anions.

We propose to combat this issue with a lanthanide metal probe that selectively binds with arsenate over phosphate. Our novel probe would contain a lanthanide metal and would function as a soft Lewis acid that could selectively bind to a small Lewis base, such as arsenate. Our probe, 5LIN-EtNH₂-1,2-HOPO, was modified to increase solubility, decrease steric hinderance, and alter its ability to hydrogen bond in order to increase its binding affinity with arsenate. 5LIN-EtNH₂-1,2-HOPO could potentially be used to develop a filter to detect and remove arsenate, providing a clear opening for safe methods of recycling phosphate and keeping our drinking water clean.

38. Determining if Mycorrhizal Fungi Are Present on Aquatic Duckweed Roots

Anna Wingbermuehle, Virginia Winder, Biology

Mycorrhizal fungi are organisms that participate in symbiotic relationships with plants—particularly their root systems. The hyphae of mycorrhizal fungi functionally extend the reach and absorption capabilities of the plant's roots, increasing the plant's growth rate and access to essential nutrients. Mycorrhizae relationships are known to exist in nearly 90% of plant species. For this reason, these relationships play a substantial role in the viability of plants. However, little is known about mycorrhizal fungi in fully aquatic plants. *Lemna minor* and *Spirodela polyrhiza*—commonly known as duckweed—are special in their fully aquatic nature. They are small floating plants of a single leaf and 1–9 roots. They are also completely stemless and do not grow their roots in any kind of substrate. The water that the duckweed inhabit is their main source of nutrients and oxygen. Because of this aquatic dependency, water quality and nutrient regulation are extremely important to the success of these plants. Lakes and ponds where

duckweed and other aquatic plants grow are also where excess nutrients (such as phosphorus and nitrogen) often collect. These excesses can affect water quality and the organisms that depend on the water source. In theory, mycorrhizal fungi in conjunction with duckweed could utilize these excess nutrients, increase growth rate of the duckweed, and ameliorate nutrient levels. This project attempts to determine whether mycorrhizal fungi naturally exist on the roots of aquatic duckweed plants (*Spirodela polyrhiza* and *Lemna minor*). I collected duckweed samples from six different online sources; grew cultures from these six sources in separate aerated tanks under grow lights; and removed the roots from the leaves of each plant, placed them in tissue cassettes, rinsed them in dechlorinated water, and placed the cassettes in individual beakers of aniline blue stain. Because duckweed roots are only a few cells thick, no clearing or bleaching was necessary prior to the staining. I then analyzed these stained samples on a wet mount slide under a compound microscope to view the root surface and to determine the presence/absence of mycorrhizal fungi. Cultures D and E showed structures consistent with mycorrhiza (D with hyphae-like threads, E another with vesicle-like clusters), but the other four cultures lacked any visible fungal structures. These four cultures were both *S. polyrhiza* and *L. minor*, so fungal presence does not seem to depend on the genus and species of the duckweed. However, the environments in which each culture came from could have contributed to these results. Upon receiving the six samples, cultures D and E had small snails and miscellaneous plant material with the duckweed—possibly suggesting a less homogenous environment and higher chance of exposure to mycorrhizal fungi.

39. Foam Dart Flywheel Study

Kalen Wojtkum, Ryan Maderak, John Rogers, Physics and Astronomy, School of Engineering

The Foam Dart Flywheel Study is a project that aims to determine a quantitative relationship between the spacing of flywheels in electronic Nerf (foam dart) blasters and the resultant velocity of the foam darts. This relationship will allow an individual to easily determine the optimal parts to achieve a desired velocity. Previous experience shows smaller flywheel spacing results in greater dart velocity. Theoretically, this is because the work done (energy imparted) on the darts by the flywheels due to friction directly relates to the force needed to squeeze the dart through the flywheels. Hence, the method devised to study this relationship centered around the application of the energy balance equation. Photogates, scales, computers, and other lab equipment were able to acquire the necessary quantitative information to study the relationship. MATLAB programming software was the method of choice for analyzing and evaluating the relationship between different trials. Preliminary results indicate a need to refine the analysis and further results are forthcoming.

40. Be Not Afraid: The Angels of the LORD and Humans' Depiction Through the Centuries

Katie Youll, Emma Kaminski, Anne Marie LeDoux, Andrew Salzmann, Charles Stewart, Theology, Art and Design

Humanity has sought to understand the immaterial realm for centuries, with angels representing a focal point of inquiry across various cultural and religious contexts. This project explores the historical and artistic representations of angels, particularly within the Judeo-Christian tradition, to illuminate humanity's evolving comprehension of these spiritual beings.

Drawing upon the expertise of theologians, sacred art scholars, and an array of primary sources, including biblical texts and centuries-old artworks, this study investigates the depiction of angels across different historical periods, namely biblical, ancient, medieval, and Renaissance. Special emphasis is placed on distinguishing the Choirs of angels, particularly the Archangels, the only ones referred to by proper names.

The project unfolds in two main parts: an intensive research component examining theological texts, historical accounts, and artistic depictions, followed by a visual presentation showcasing select artworks that embody the diverse interpretations of angelic beings throughout history. By combining scholarly analysis with captivating visual representations, this project aims to illuminate humanity's ongoing quest to comprehend the messengers of God.



41. Considering a Framework for a Revival of the Privileges or Immunities Clause of the Fourteenth Amendment

Alejandro Calderon, Jeffrey Schremmer, Nicholas McGill, Kimberly Shankman, Political Science

2:35–2:55 ❖ Room 109

How was the Meaning of the Constitution's Fourteenth Amendment Altered when the Court Slaughtered the Privileges or Immunities Clause in 1873?

The *Slaughter-House Cases* (1873) and *United States v. Cruikshank* (1876) stripped the 14th Amendment of its most important clause in the eyes of its framers and ratifiers. The erasure of the Privileges or Immunities Clause has led to a corruption of the original meaning of the 14th Amendment and a misapplication of the Due Process Clause. This project examines the original meaning of the Privileges or Immunities and Due Process Clauses of the 14th Amendment, proposes a framework for the revival of the Privileges or Immunities Clause as the textual basis for substantive rights, and considers the practical legal benefits of such a framework over the Court's current "selective incorporation" theory through substantive due process.

42. Developing a Differential Architecture Search (DARTS) Algorithm for Multiclass Fault Classification of Three-Phase Power Transformer Signals

Joseph Accurso, Max Saylor, Physics and Astronomy

2:35–2:55 ❖ Room 125

The Transformer architecture took the world of machine learning by storm in 2022 when it launched as the foundational architecture of a generative deep-learning application called ChatGPT. The strengths of this architecture are rooted in its ability to efficiently attribute positional embeddings to tokenized data and process them through multi-head attention encoder and decoder layers. For this reason, the Transformer architecture is favorable in most natural-language processing and time-series classification tasks. However, it is not a one-size-fits-all solution because different deep-learning tasks can take advantage of subtle modifications to the order of layers in an architecture or be completely misrepresented by others. A differentiable architecture search (DARTS) algorithm can be used to iterate over a search space of layers commonly found in Transformer architectures to find the most optimal sequence of layers and connections for a particular task.

This research works to construct methods that are capable of properly training the most optimal output from the DARTS algorithm. The model's efficiency is trained, tested, and verified on a dataset of three-phase time-series signals that contain examples of 46 types of common power transformer faults. Test metrics, such as the F1 score, Matthews Correlation Coefficient, individual class accuracy scores, and confusion matrices, are also produced and compared with the metrics of a standard Transformer architecture.

43. Bacterial Presence in Recreational Facility on Benedictine College Campus

Kathleen Beecher, Elizabeth Meyers, Courtney Kearney, Victoria Vordtriede, Mary Brenner, Janet Paper, Biology

2:35–2:55 ❖ Room 208

The purpose of this study was to determine the efficacy of sanitation practices in reducing bacterial growth at the Benedictine College Murphy Recreational Center and to determine what bacterial growth was currently present. According to the Murphy Recreational Center student workers, current sanitation practices include Suprox Concentrate mixed with water to be used at the workers' discretion, with a goal of every hour. Benzalkonium Chloride wipes are available to all who use the equipment at the gym, with the expectation to be sanitized between each user. The sample includes three treadmills, three dumbbells, three ellipticals, three weight racks, three ab mats, and three weight machines. Sterilization swabbing took place over a three-day period at 5:30 am and 10:30 pm. The purpose of this was to test the bacterial presence before the recreational center opened and at the end of the day after participants were done using the machines and to compare the bacterial growth throughout the day. The

gymnasium equipment was swabbed. Then, NA agar plates were streaked and stored in the fridge for 24 hours to cultivate bacterial growth. Further testing was completed after bacterial growth was established. Using information collected, researchers determined which bacteria was present. Conclusions of the study were to be determined after the experiment was carried out and will be presented on Discovery Day. Limitations of this study include inability to control user sanitation compliance after each use, time constraints, limited equipment, and supplies. Another limitation is that the experiment is specific to one gym and may not be generalizable.

44. Early Byzantine and Christian Mosaic

Caeli Haigh, Bryan Park, Jay Wallace, Art and Design

2:35–2:55 ❖ Room 219

The reality that we live in is one in which “The Word became Flesh and dwells among us, and we have seen His glory ... full of grace and truth” (Jn 1:14). Byzantine Christian mosaic art portrays this reality in its principles and tradition of craft. What is it about Byzantine Mosaic art that captivates the beholder and makes it such a beautiful and perfect art for church decoration? This specific art follows set principles within the Byzantine tradition, namely that the art reflects and considers the architectural framework and that the whole sum of the images must be considered for the beholder to appreciate the work as one and complete. Through its style, Byzantine art abolishes all clear distinction between the world of reality and the world of the image, so that the beholder is really more of a participant within the image. Mosaics most especially achieve this because of their three-dimensionality and ability to be both within the architectural framework of the church, but also in using the space that the beholder occupies as part of the image’s space. I will delve into the process of creating a Byzantine Mosaic in the Ravenna method, which I learned at a Byzantine Mosaics workshop in London this past February. In this week-long course, we copied two fragments of mosaics, which will be on exhibition. I will discuss the design of mosaics within a church and the step by step process of the craft. This will be followed by a demonstration of part of the process and a discussion of how this can be done today.

45. Anchor to Windward: Mooring Thomas’s Account of Love

Katy Spiering, Daniel Pierson, Philosophy

2:35–3:25 ❖ Gangel Seminar Room

Aquinas’s account of love is often reduced to his idea, taken from Aristotle, that “to love is to will the good for the other.” It is a correct representation, yet taken out of context, this definition of human love becomes like a ship without an anchor. What good are we willing, for whom, in what way, and how does this come about? I will answer this question by examining Aquinas’s account of love, beginning with a consideration of the will in relation to the good by discussing appetitive and apprehensive powers and their unity. I will then move to discussing what love is and how we can love a good for another, by considering Aquinas’s main division of love, love of goods, which he calls love of concupiscence,

and love of goods for someone, which he calls love of friendship. Next, I will discuss self love and the necessity of self love for friendship. Here I will also consider likeness as the means by which man stretches his self love to include friends. Lastly, I will situate Aquinas's account of love in relation to two other common accounts of love, love of gift and selfless or altruistic love.

46. The Role of the Emotions in Ethical Decision Making Through the Lens of Karol Wojtyla's Person and Act

Hagan Stovall, Anthony Crifasi, Philosophy

2:35–3:25 ❖ Room 307

If the philosophy of the emotions were to be analyzed on a spectrum, Immanuel Kant and Max Scheler would represent two opposite views on either end of it. Scheler's view represents what is classified as emotionalism while Kant sees the emotions as detracting from free ethical choice. The aim of this paper is to address the proper role that the emotions play in ethical decision making through the lens of Karol Wojtyla's Person and Act. The paper will begin with a brief analysis of Immanuel Kant's ethical thought and will address his negative view of the emotions as well as addressing Max Scheler's opposing overemphasis of feelings in ethical choice. Karol Wojtyla's thought will then be proposed as a response to and middle path between both Kant and Scheler's systems. It will ultimately be shown that Wojtyla's incorporation of the emotions in the idea of perfection through the act, an idea that he adopts from the Aristotelian and Thomistic traditions, provides a more whole approach that corrects the shortcomings of the two previous philosophers.

47. Developing the Interactome of a Known Virulence Factor

Levi Streit, Kevin Sanchez, Chemistry and Biochemistry

2:35–2:55 ❖ Room 324

Tuberculosis (TB) persists as a leading cause of global mortality due to its reputation as an infectious disease killer. This disease presents itself through a variety of pathways. While seen primarily in the lungs, it can also affect the central nervous system, the kidney, bone, and even the brain. It is estimated that up 10.6 million (up 4.5%) in 2022 were infected with *M. tuberculosis* leading to the death of 1.64 million people worldwide. *M. tuberculosis* pathogenesis occurs when bacteria travel in aerosol droplets from an infected individual to an uninfected individual. The bacteria use a molecular weapon system to escape the phagosome in white blood cells. This weapon system is called the ESX-1 secretion system, and it is governed by a series of Esp (ESX-1 Secreted Proteins) proteins, such as EspE, EspL, EspG, EspM, EspF, and others. While these proteins have been identified as being part of the ESX-1 system, the protein-protein interactions between the proteins is largely unknown.

The objective of this project is a continuation of characterizing the interactions of proteins found in this Esp protein family. We seek to develop a working bacterial interactome consisting of numerous substrates within the family for the

mycobacterial transcription factor, EspE. This particular substrate has previously been implicated as a regulator of ESX-1 gene expression, and preliminary data indicates that it associates with a neighboring gene, EspF. The protein-protein interactions will be tested with a Bacterial-2-Hybrid System. Our overarching hypothesis is that EspE protein-protein interactions mediate its function. As part of this overarching hypothesis, our working hypothesis is that EspE will interact with one or more of the other proteins. In identifying protein-protein interactions in an ESX-1 transcription factor (EspE), we hope to contribute to identifying relevant candidates for future drug targeting. In preparation for obtaining a preliminary round of data, there have been difficulties in isolating each substrate; only few colonies have been obtained. As a result, PyMOL will be utilized to conduct a structural analysis of EspE and EspF to further investigate the properties of each substrate that promote the duo's interaction.

48. From the Gospel to the Gallows: A Theological and Criminological Analysis of Capital Punishment and the Catholic Church

Paul Bytnar, Itxel Martin-Huesca, Mariele Courtois, Currie Myers, Theology, Sociology and Criminology

3:05–3:25 ❖ Room 109

Capital punishment is considered by contemporary Catholic leaders to be “inadmissible” (CCC 2267) and an attack on “the dignity of human life” (Pope John Paul II, Homily in St. Louis, MO, January 27, 1999), and the US Conference of Catholic Bishops calls for a “an end to the death penalty in our land” (Statement: A Good Friday Appeal to End the Death Penalty, April 2, 1999). The Old and New Testament defend capital punishment in principle as a legitimate form of defense and justice. The Early Church fathers and Doctors of the Church are unanimous in their defense of capital punishment. Historical records also indicate that the Papal States publicly executed criminals as late as 1870 AD. Paul VI did not ban capital punishment from the Fundamental Law of Vatican City until 1969 AD. Both Popes John Paul II and Benedict XVI defended capital punishment in principle. This project will offer an historical overview of theological analysis of capital punishment and describe survey results depicting how college students approach this ethical question and what resources they utilize in forming their consciences on this matter. The presentation will also suggest directions for further education and discussion on the topic.

49. Femtosecond Laser Restoration

Damien Langfels, Daniel Haunert, Max Saylor, Megan Paciaroni, Physics and Astronomy, School of Engineering

3:05–3:25 ❖ Room 125

In the ongoing restoration of a high-power short-pulse laser system at Benedictine College, one of the next steps is to characterize the laser produced by the oscillator. To do this, we are developing an autocorrelator as well as frequency-resolved optical gating, which allows one to measure the laser pulse envelope on a femtosecond (10^{-15} s) time scale. Here, we will present the theory underlying

the operation of this device as well as the construction plan. Finally, we will detail obstacles we have encountered in this development.

50. Apples to Apples: A Comparison of Microbiomes During Decomposition in Local and Commercial Settings

Wolfgang Louk, Mae Danaher, Janet Paper, Biology

3:05–3:25 ❖ Room 208

A quickly accelerating area of research is the study of agricultural microbiomes. One region of study is focused on understanding how microbiomes develop and interact with produce, specifically regarding food preservation and storage methods. There is currently research in biocontrol methods aimed towards reshaping the microbiomes of fruits for better health profiles and postharvest management. Preservation has become a focal point regarding produce and safe consumption. Recent studies have found that depending on the different geographical location of an apple orchard, apple microbiomes will differ in their microbiome and thus the rate of apple decomposition (Abdelfattah, et al.). Similarly, we asked if there is a difference in the microbiome and decomposition rate between store-bought fuji apples and locally sourced fuji apples. We hypothesized that due to less chemical and radiation treatment, the locally sourced apples would decompose faster and differ in microbiome. A total of four fuji apples were collected: two from a local Kansas farm, and two bought from a commercial source (Walmart). The apples' physical appearances were observed over a period of six weeks. The makeup of their microbiomes was determined via 16s rRNA analysis. Initial results revealed significant changes in the microbiome from the beginning and to end of the experiment as well as between the commercial and the locally sourced. As expected, the abundance of microbial DNA sequences increased as the experiment progressed. However, at the ending time-point, the local and commercial apples vary majorly; commercial apples exhibiting more than ninety-eight percent fungal DNA with a corresponding bacterial DNA percentage in commercial apples. We hope to investigate the data further and analyze trends in different microbial families found at the various stages of decomposition. Additionally, we are excited to ask more questions about this significant observation.

51. Stained Glass: Focused Exploration on Painting

Alondra Gomez, Bryan Park, Art and Design

3:05–3:25 ❖ Room 219

Stained glass pieces can be geometrically placed together with colored glass to create a composition. These compositions can be taken further by the use of painting, which displays imagery and different sorts of texture. Painting especially controls the effect of halation, which is an effect that takes place when light-colored glass allows light to spread beyond its boundaries, making the image become distorted by the drowning of light. Thus, by painting the glass, an image is revealed as it is made alive when lit.

This project continues the research conducted last year where the basic processes of crafting stained glass with modern and traditional methods were explored. This year the process of painting and firing stained glass will be presented by the explanation of each of the steps that go into painting a window. Examples of painted glass will be on display.

52. Is EspG a Protein Chaperone? Protein-Protein Interactions in the ESX-1 Secretion System

Abby Walterscheid, Kevin Sanchez, Chemistry and Biochemistry

3:05–3:25 ❖ Room 324

Mycobacterium tuberculosis is the strain of bacteria that causes tuberculosis in humans. While tuberculosis can be treated and is curable, it remains one of the leading killers in infectious disease, targeting people of low socioeconomic status in particular. *M. tuberculosis* combats host immune cells using the ESX-1 secretion system, which is a group of proteins that form a complex and deploy proteins as a way to disrupt phagosomal membranes. Understanding more about how the proteins that form this system interact can give insight into how the system is built and what proteins are relevant for ESX-1 function.

This project was aimed at learning more about the protein-protein interactions involved in the ESX-1 system. Learning more about how the ESX-1 system works will allow for better vaccines that target the system and, therefore, work against *M. tuberculosis* bacterial virulence. This was done by studying the interactions of these proteins and how they may form the ESX-1 secretion system, contributing to a growing interactome. I specifically looked at the interactions that a protein called EspG has with other ESX-1 proteins using proteins from a *M. tuberculosis* model.

We hypothesized that EspG interacts with multiple other ESX-1 proteins as a chaperone protein and that this works to either bring other proteins to the membrane complex or to load the system itself. To test this hypothesis, we used the LexA Bacterial-2-Hybrid system, which has been used with mycobacterial proteins in previous literature. This system allowed us to measure the amount of protein-protein interaction between EspG and other proteins by measuring the amount of a lacZ reporter. By comparing the levels of lacZ produced when different proteins multimerize with EspG, we were able to identify how EspG interacts with specific other ESX-1 proteins. Taken together, this will contribute to a growing interactome and identify key protein-protein interactions in ESX-1.

53. Would Artificial Intelligence Be Better Described as Automated Reasoning?

Jessica L'Ecuyer, Mariele Courtois, Theology

3:35–3:55 ❖ Room 109

This paper explores how we view Artificial Intelligence (AI), what we expect of it, and whether or not we should continue to call it Artificial Intelligence (AI). Historically speaking, the definition of AI has changed multiple times

throughout the decades as definitions were set and then surpassed without meeting the overall goal. It would seem that those who develop AI want to achieve the same streamlined efficiency pursued in many technological advancements and apply that efficiency into new professional fields that could not have been previously automated.

The purpose of this project is to investigate what Artificial Intelligence has previously meant, what it means now, and how it relates to the substance of intellect and reason. Additionally, this paper will examine briefly how AI functions and how it compares to human intelligence. Taking everything into consideration, should we call it Artificial Intelligence or could it be better referred to as reasoning that has been automated?

54. Making Plastics for Luminescent Solar Concentrators

Faith Quinn, Mary van Auken, Elias Ford, Liam Philbin, Georgiy Shcherbatyuk,
Physics and Astronomy

3:35–3:55 ❖ Room 125

The focus of this project was making sheets of plastic suitable to construct a quantum dot luminescent solar concentrator (QD LSC), requiring even thickness and transparent appearance to maximize the efficiency of the device. We successfully designed and built a new mold for the plastic sealed with a Teflon ring and ran multiple trials to evaluate the mold's effectiveness. The mold design worked as intended with regards to preventing leakage of the plastic polymer during polymerization, but further studies are necessary to improve the plastic's consistency. Future testing variables include evening the temperature gradient across the mold, improving MMA filtering techniques, and increasing the pre-polymerization temperature.

55. Oyster Mushrooms: From Grow Kit to No Kit

MaryGrace Thompson, Lily Yandow, Janet Paper, Biology

3:35–3:55 ❖ Room 208

Mushrooms are the reproductive structure for a strange organism called a fungus, which is more like an animal than a plant. Many types of mushrooms are commonly eaten by people around the world. Although most mushrooms are commercially grown or foraged, some people grow them at home using kits. We decided to investigate whether we could grow mushrooms without a kit. To do this we acquired oyster mushrooms from a grocery store and used their stems to grow mycelium. The mycelium is the actual 'body' of the fungus, which decays organic material into food for itself. We tested three different media and two growing methods to see which would be the most effective at producing mushrooms. To compare our results with commercially available kits, we also grew mushrooms from two different types of kits. Additionally, we tried to grow mycelium from the spores, which are similar to seeds and are the fungus's typical way of reproducing. We will be presenting what happened in this experiment and how one can use our results to grow mushrooms from scratch.

56. Recreating Traditional Animation Techniques: Adding Depth and Light in a Two-Dimensional Medium

Peter Pustejovsky, Susan Leo, Jay Wallace, Art and Design

3:35–3:55 ❖ Room 219

The presentation will show the process of replicating special effects techniques used in old animated films. It will specifically cover the making and operation of a multiplane camera to create a parallax effect and multiple film exposures to animate light sources.

57. The Ethics of Storytelling

Benjamin Walter, James Madden, Philosophy

3:35–4:25 ❖ Gangel Seminar Room

Storytelling and its status in the search for truth has become an infamous subject in philosophy, and this is mainly due to the seeming necessity of deception in the imitative method of stories. No matter how “true” a story may be, it will never accurately represent our world but only imitate it. Is this a problem? If so, should storytelling be allowed at all? Drawing primarily from *Plato’s Republic*, Friederich Nietzsche’s *On the Advantage and Disadvantage of History for Life*, and J.R.R. Tolkien’s “On Fairy-Stories,” I argue that this is not a problem, but that nonetheless, storytelling should be approached and engaged in responsibly.

58. Discovering the Atmosphere of the Encounter With Christ: How Education and Suffering are the Means Through Which God Reveals Himself To Us

Christopher Holzman, Deacon Dana Nearnmyer, Evangelization and Catechesis

3:35–3:55 ❖ Room 307

Encountering Christ is something that each and every Catholic desires. While He is always present around us and truly present in the Blessed Sacrament, how do we encounter Christ in the day-to-day, non-liturgical activities? What factors have an influence on our receptivity to Christ’s actions? This presentation will explore the encounters students at Benedictine College have had in attempts to find the common threads that connect each of them. These factors include not only education and friendships but also the Sacraments and suffering. Finally, it will describe how we can begin to use this information not only to increase the potential for youth to encounter Christ through Ministry work but also to impact evangelizing youth to continue living as a faithful Catholic.

59. Approachable Nuclear Fusion

Jacob Hawley, William Anderson, Joseph Wurtz, Gregorian Fellows

3:35–3:55 ❖ Room 324

Can nuclear fusion be scaled down? Ever since it was first demonstrated in 1942, nuclear power has amazed and terrified the human race. For many it is a mysterious subject talked about in the history of World War II and in theories about a future apocalypse. For others it is less aloof but seemingly only accessible to some of the

most brilliant scientists and researchers. The claim is made here that a nuclear reaction is much more accessible (however far less deadly) than one would think.

Nuclear fusion is the act of two atoms fusing together to make a larger atom. The easiest element to fuse is an isotope of hydrogen called deuterium. The products of the most common reaction of deuterium fusion is helium-3 and an extra neutron. The detection of emitted neutrons is proof of fusion occurring.

The more commonly thought of nuclear reaction is called nuclear fission, where large atoms are split releasing tremendous amounts of energy. This is what creates a nuclear bomb and is used in nuclear power plants. The experiment being performed is an attempt at small scale nuclear fusion, which does not result in an explosion.

The device that contains a nuclear reaction is called a reactor. The more official name for the specific design used in this experiment is a Farnsworth–Hirsch fusor, or fusor for short. This design uses a vacuum chamber with a high voltage electrode inside. By removing all of the air inside the chamber the deuterium gas is able to move toward the center of the chamber unimpeded. With the energy from the high voltage electric field, and nothing else to collide with but itself, the deuterium fuses creating helium-3 and ejecting an extra neutron. This also releases energy and makes an Iron Man arc reactor-looking light source.

This experiment would not create a source of energy. The world's leading researchers are currently working on a way to make a fusion reactor that nets positive energy, but they are still unable to do so. The goal of this experiment is simply to see if detectable fusion can be achieved on a small scale.

60. Humans' Ability to Detect AI-Generated Writing

Annalucia Duggan, Kevin Page, Journalism and Mass Communications

4:05–4:25 ❖ **Room 109**

AI-generated work is becoming more prominent in higher education and media circulations. The evolution of AI programs can lead individuals to struggle differentiating between human written and AI-generated work. Shortly after the launch of ChatGPT in November 2022, AI-detect software Originality.AI launched in November 2022. To test humans' ability to determine between the two, participants filled out a survey where they determined whether a passage was AI-generated or human-written. Key insights, such as overall participant accuracy in human detection abilities in each passage and overall thought process, are compared to AI-detection program Originality.AI's detection abilities, Originality.AI's detection process versus human reasoning, and how AI generated the passage through prompt engineering. I will present the survey's findings on Discovery Day.

61. Synthesis of PbS Colloidal Quantum Dots for Solar Energy Harvesting

Grace Quinn, Daniel Draftz, Georgiy Shcherbatyuk, Physics and Astronomy

4:05–4:25 ❖ Room 125

The goal of this project was to develop a controllable and repeatable synthesis of ideal lead sulfide quantum dots. Quantum dots are nanostructures, which exhibit optical properties between individual atoms and bulk materials that have many varied uses in quantum computing, biomarking, and—what we are primarily interested in—the collection of solar energy. The dependence of quantum dot properties to the nanoparticles' size and distribution while suspended in solution has been established through previous research, and the goal of our research this year was to fill in the gaps for the dependent relationship of the quantum solution's optical properties and the synthesis temperature. However, recent issues arose pertaining to the successful, consistent synthesis of quantum dots with ideal optical properties, so much of this year was spent running tests to identify the parameters that created this inconsistency, from synthesis reaction and duration to stock chemical shelf life.

62. Chytrid Disease in Atchison's Watersheds

Jackson Maldonado, Madeline Hays, Janet Paper, Biology

4:05–4:25 ❖ Room 208

Chytrid disease, caused primarily by the deadly fungus *Batrachochytrium dendrobatidis* (*Bd*), poses a significant threat to amphibian populations worldwide. Chytrid is responsible for the decline of 200 species worldwide every year. This fungus infects the dermal systems of various amphibian species and can be fatal. While not common in Kansas yet, there is a general lack of focus in the state. As of 2015, *Bd* had not been found in Atchison; a researcher from Fort Hayes sampled the Benedictine Bottoms, with negative results. However, chytrid was found in nearby watersheds, including the Marais Des Cygnes Wildlife Refuge. The goal of this study was to determine if Atchison County has *Bd* in its watersheds. We hypothesize that Atchison County amphibians do not yet have *Bd*.

To investigate, we captured 15 frogs using established netting techniques. Swabs were used to collect samples gently from the skin of each specimen. We extracted the DNA from samples, and are currently using qPCR testing to detect the presence of *Bd* DNA. Results will be presented.

63. Freedom of Speech as Evaluated by Those of the Vendée Region: The Difference Between Freedom of Speech and Expression

Kassidy Neuner, Nathan Orlando, John Settich, Political Science

4:05–4:25 ❖ Room 219

This project seeks to understand the difference between freedom of speech and freedom of expression according to students living in the Vendée region of France. A series of questions were posed in a Google form, allowing for each student to give his or her own definition of both terms. It is clear that France has

been under serious scrutiny as to what is protected by the government pertaining to the freedom of speech and the freedom of expression. The significance is understanding how students in this region would define both freedoms because the word expression means both speech and expression in French. While translating data, responses were summarized to analyze better.

64. How to Live Intentionally in an Isolating World

Benjamin Hoopes, Joshua Heidenry, Lucia Fisher, Julia Jochum, Jeremy Sienkiewicz, Theology

4:05–4:25 ❖ Room 307

For the past two years, twenty or more students have chosen to live in dorms with their Wi-Fi turned off, living a weekly and daily routine of intentional community life. Together we have been seeking to answer the question of how to live intentional community life in a world that inundates us with isolating technology. Central to the discussion and answering of this question is the understanding that technology is not neutral, and we need to understand how the technology we use affects and uses us. Together, we have been trying to restore a worldview of the world as a gift given by our trinitarian God, a gift our world often tries to get us to forget or ignore. In this presentation, we will share our thoughts and reflections on living an intentional lifestyle and community life of prayer, conversation, singing, and events together. In living this lifestyle, we discovered that not having Wi-Fi-constantly available and living intentional technology use gave us freedom and free time. This allowed us to provide over twenty hours of events for the entire Benedictine College community each week and for our specific friend group. In providing our thoughts and reflections on the past two years, we hope to deepen the conversation on intentional living on campus.

65. Photometric and Spectroscopic Monitoring of SRd Variables

Timothy Rosno, Lucia Fisher, Ryan Maderak, Max Saylor, Physics and Astronomy

4:05–4:25 ❖ Room 324

The luminosities of Semi-Regular type d (SRd) stars typically vary with consistent periods due to pulsation of stellar material. These yellow supergiants are in the short transitional evolutionary phase following the asymptotic giant branch on the Hertzsprung-Russell diagram, preceding the white dwarf stage. Despite decades of research, these stars are not well understood. To gain new insight into this important phase in the life of low mass stars, a photometric and spectroscopic monitoring study of SRd variable stars has been underway at Benedictine College's Daglen Observatory since summer 2020, beginning with V441 Herculis, and adding UU Herculis in summer 2023. We will discuss the data obtained to date, with an emphasis on 2023. In contrast to studies over the past three decades, V441 Her no longer exhibits a well-defined pulsational cycle. It also shows evidence of irregular shocks and mass ejections, demonstrating a probable transition to a white dwarf, the last stage of its evolution. UU Her

was previously regarded as the archetype of a class of high galactic latitude SRd variable stars. However, no studies of UU Her have been published for over two decades. It exhibits irregular pulsational behavior that is not consistent with the current models used to describe pulsating yellow supergiants. Fourier analysis of archival photometric data indicates that UU Her's pulsational cycle either shut down or was obscured from 1990–2010, and our data may suggest that it now has a semi-detached circumstellar envelope. Further analysis of the archival data through a non-uniform fast Fourier transform (NUFFT) indicates that the periods of pulsation are not stable in time.

66. Are Community Bathrooms Correlated With Success in College?

John Welte, David Harris, Economics

4:35–4:55 ❖ Room 109

The first moment you step on Benedictine's campus as a man you are exposed to one of the biggest rivalries on campus, Turner vs. Newman. Starting with ROC week and continuing through homecoming, this rivalry never dies. One of the major differences between these two dorms is their style of living arrangements, namely their bathrooms. Turner has community-style bathrooms, and Newman has suite-style bathrooms. I have always wondered if the type of bathroom you have freshman year affects your college career in any tangible way.

To investigate this claim I modeled it with a multiple-variable linear regression model. The independent variable was whether or not you had communal bathrooms your freshman year. I asked the senior class through a survey a series of questions that were the independent variables: 1) How many times do you attend Mass? 2) How confident are you in your plans after college? 3) Are you involved in leadership on campus? 4) Of your five closest friends at BC how many lived in the same dorm as you freshman year? 5) What is the range of your GPA? I will present the results on Discovery Day.

67. Software and Positioning for a Parabolic Reflector Radio Telescope

Joshua Mansfield, Joel Iwanski, Christopher Shingledecker, Physics and Astronomy

4:35–4:55 ❖ Room 125

While the concept of optical astronomy is well known to us, visible light is only one of the major wavelengths that astronomers use to study the universe. Due to the invention of the radio telescope in 1937, we can now study the universe using radio waves. The radio telescope has many unique and practical applications. For example, radio waves make up a larger portion of the electromagnetic spectrum than visible light. Due to this, radio telescopes can view different types of celestial objects, such as black holes and remnants of the Big Bang. Because it measures radio waves instead of visible light, it can also function during the daytime and in inclement weather. To help the Benedictine College Department of Physics and Astronomy, we have taken part in a multi-year effort to construct a radio telescope for the campus's Daglen Observatory.

This Discovery presentation is dedicated to the user-interface and positioning components needed to construct the telescope. This telescope will have similar functionality when compared to the other telescopes at Benedictine—the students will be able to control the telescope through a computer and take in data from the celestial body they wish to study. Once this telescope is completed, any student in the Physics and Astronomy Department can work on research projects related to radio wave astronomy, perhaps to create his or her own Discovery project!

68. Effects of *Sericea Lespedeza* on a Restored Prairie Ecosystem

George Gigstad, Samuel Chaney, Jonah Honerman, Johnathan Olivier, Brent Mortensen, Biology

4:35–4:55 ❖ Room 208

Sericea lespedeza (*Lespedeza cuneata*) is an invasive plant and widely considered as a noxious weed that can outcompete native species and reduce diversity in grasslands. These negative effects are, in part, due to harmful chemicals released by the plant from roots and dead stem and leaves into the soil (i.e., allelopathy). Compounds released from *sericea lespedeza* can inhibit seed germination and growth, altering the composition of a plant community; however, nitrogen additions have been shown to reduce these negative effects. Less is known about the effects of other nutrients, such as the addition of phosphorus, on mitigating the negative effects of *sericea lespedeza*. *Lespedeza* has infected and negatively impacted many pastures, prairies, and restored prairie ecosystems from the East Coast to the Midwest. We examined the effect of *sericea lespedeza* leaf and stem litter, and the associated chemicals released into the soil (i.e., exudates), on plant germination and growth in a restored prairie ecosystem. We collected soil samples with seeds from the Benedictine Bottoms Nutrient Network research plots, which have had nitrogen and other nutrient additions applied since 2018. We then allowed seeds in each sample to germinate and grow in a greenhouse in the presence or absence of dried *sericea lespedeza* leaf and stem litter. The seed bank represented within the soil cores were allowed to germinate and grow for approximately five months. We compared above-ground biomass and species diversity in the presence and absence of *sericea lespedeza* with and without nutrient additions. Understanding restored prairie ecosystems and the factors that seek to undermine their success is vitally important for conservation. We hope that our project can provide some insight into the complex relationship that invasive species have on native flora and perhaps a way to fight back.

69. Portable Organ Year 2

Joseph Bourke, Elias Ford, Anna McDonald, Jack Vanderzanden, Lara West, Music

4:35–4:55 ❖ Room 219

Pipe organs have a unique and reverent sound, which has sadly been confined to the building in which it was built. Last year, we set out to bring the organ's concept to the level of a transportable instrument and succeeded. This year, we

have improved the design in multiple ways. First and most important, we have replaced the recorders with true Larigot pipes, which produce a far more resonant sound and are an improvement on last year's recorders. These pipes were graciously sold by Good Shepherd Lutheran in Lawrence. Next, the cleaning and re-fitting of the solenoids ensured that none of the stops were impeded. Then, we rewired the assembly to run through ribbon cables, to allow for easier maintenance to the breadboard. Finally, a raspberry pi microcontroller was configured to run the program between the midi device and the assembly, eliminating the need for a laptop. These changes have lightened the project and moved it closer to the final goal of a portable instrument.

70. The College Knights of Columbus Council's Historical Impact on Benedictine College Today: How It Forms Leaders, Creates Administrative Groups, and Teaches How to Evangelize
Christopher Holzman, Joseph Wurtz, Gregorian Fellows

4:35–4:55 ❖ Gangel Seminar Room

In 1958, the students of St. Benedict's College saw a need for uniting together to serve the College, the Abbey, and the people of Atchison. Inspired by the men on the Councils from their homes and Atchison, the scholars formed their own Knights of Columbus Council and became the second College Council ever created. The purpose of the Council was to get its members involved in the Church through practical, layperson's activity. Centered on the principles of Charity, Unity, and Fraternity, the Council quickly grew and even began to win national awards in recognition of the work it had done. This caused the Council to become what a man would join to become real men of Catholic integrity and how to become a leader. This presentation will explore the real accounts of past leaders on the Council to discover what they learned during their time serving and how it has formed the College, which we all enjoy today. Additionally, it will also show how many groups on campus developed from the starting line that is the Knights Council. The Knights of Columbus are not only active on campus today but also continue to teach its members how to live as a practical Catholic gentleman who not only learns how to lead but also to evangelize and serve.

71. Mercy: The Art of Remembrance

Sister Peter Marie Tran, FSGM, Moriah Lippert, Jeremy Sienkiewicz, Theology

4:35–4:55 ❖ Room 307

In his book *The Shattering of Loneliness*, Bishop Erik Varden states that, "to speak of remembrance is to speak of identity... only in recalling what I was can I acknowledge what, by grace, I have become" (Varden 42). Engaging with salvation history through our collective and individual remembrance, we become rooted in our identity as beloved children of God. Within the framework of our Catholic understanding of jubilee and mercy, we explore remembrance's role in freedom and restoration. In a post-Christian society that lacks horizons of meaning and instead promotes self-determining freedom, we hope to instill in Catholics the art of merciful remembrance.

72. Numerical Analysis of Complex Modes for Guided Wave Dispersion in Plates

Karolek Suchocki, Andrew Downs, School of Engineering

4:35–4:55 ❖ Room 324

Non-Destructive Testing (NDT) is used to detect, locate, and characterize defects in critical infrastructure. In plates and pipes, guided ultrasonic waves are particularly useful, but come at the cost of being difficult to interpret as they are multimodal and dispersive; where the wave packets sent out by the ultrasonic transducer spread out in time and space. This makes understanding the return signal difficult. A step towards solving this problem is to obtain solutions to the physical system's dispersion relation. These solutions are a set of frequency dependent wavenumbers that make up a set of complex modes and are known as the "dispersion curves"; each dispersion curve must be found numerically. The goal of this Discovery project was to create a generalized numerical algorithm to calculate the dispersion curves for a plate bounded on one side by an elastic material. This algorithm works by using the cutoff frequencies as an initial guess and then using Euler's method to approximate the wave number that makes the system of wave equation's determinant equal to zero. Gradient decent, using a modified Newton's method, is used to hone in on a more accurate wave number value before the process repeats.

The algorithm has worked well with an intermediate problem using a free plate, which has air on both the top and bottom surfaces. This is a simpler problem involving a set of two coupled 2×2 matrices. There were significant problems with last year's method that needed to be solved before transitioning to the bounded plate problem, which uses a 6×6 matrix. This includes handling the transition between negative and positive slopes in the dispersion curves, Newton's method converging to the wrong solution, also known as mode hopping, finding where modes cross each other, and scalable resolution.

These problems were fixed by transitioning from a fixed frequency method, where the frequency was predetermined and a corresponding wavenumber was calculated to a more dynamic vectorized method, in which the frequency and wavenumber can vary as needed. This new approach has been successfully implemented and tested on the two 2×2 matrices. Final tuning / bug fixing is currently being worked on for the bounded plate.

73. Presenting "Agamemnon"

Catherine Harper, Edward Mulholland, Classics

4:35–5:05 ❖ Westerman Hall Auditorium

In "Presenting Agamemnon," we are seeking to recreate the experience of a Classical tragic performance. In doing so, we want to give our audience a deeper understanding of the play than they can get from only reading it, regarding both its setting and its themes. The question we want to answer is "Can we authentically recreate a Classical Greek tragedy and make it understandable to a modern audience?"

We will not perform the tragedy in its original Greek or in a verse translation as this would hinder audience engagement. Instead, I have found a prose translation that is both faithful to the original text and modern-sounding. To convey the original dynamism of the choral song and dance, the members of the chorus will mostly speak in turn while moving around the stage, rather than statically speaking in unison.

To make the experience more authentic, we will perform the play in Westerman Auditorium (because of its amphitheater shape) with minimal set design and full lighting. Additionally, I have researched and replicated garments seen in Classical art, such as actors might have worn for these characters. I have tried to be as accurate as possible to the silhouette and construction of these garments, while staying within budget and adjusting for Catholic modesty standards. To this end, I have reused fabric from previous productions and lent some of my own costume pieces to the department.

Our hypothesis is that the audience will respond positively to the production, both appreciating it as a work of art from a different era and connecting with its timeless themes. Some important themes of “Agamemnon” include the line between justice and revenge, gender roles and power, and the cycle of violence.

To measure audience engagement, we will distribute surveys on paper after the performance the night before Discovery Day. We will ask the audience what they believe to be the message and main themes of the play and whether the period costume and set design helped or hindered their engagement. We will evaluate the accuracy of our hypothesis based on the audience’s participation, their grasp of the play’s main themes, and their level of engagement with the story. At our Discovery Day panel, we will present our findings.

74. “String Quartet no.1”

André Bauer, Timothy Tharaldson, Music

5:15–6:15 ❖ O’Malley-McAllister Auditorium

This is the premiere of a string quartet composed by André Bauer titled “String Quartet no. 1.” It is inspired by my experience of a live performance of Joseph Haydn’s string quartet “Sunrise.” The piece explores form in music using thematic and developmental material. It is three repeated sections with a finale inspired by Mozart. It utilizes theoretical materials studied in the music department. Part of the contributing curiosity was figuring out how to use dissonant chords that don’t have a traditionally pleasant sound in a context that sounded pleasing. A sort of aural subterfuge. The string quartet that will perform it is composed of the following students: Kathleen Smith (violin 1), Paula Buchanan (violin 2), Richard Hernandez (Viola), and Peter Sentmanat (Cello 2).

75. “Suite for Piano”

Kathleen Smith, John Paul, Dermot Trainor, Music

5:15–6:15 ❖ O’Malley-McAllister Auditorium

Inspired by Bela Bartok’s “Mikrokosmos,” “Suite for Piano” is written for solo piano and consists of four unique movements. This piece was composed with the intention to serve as suitable repertoire for intermediate piano students, and each movement provides a unique challenge to help the student develop in specific areas of piano technique. Each movement is brief, but all very distinct in style and character. The first movement, entitled “Melancholy Musings” is reminiscent of a slow rag. This movement was inspired by the musical “Ragtime,” and is melancholy and reflective in character. It presents two unique challenges to the student: mixed meter and a key signature of five flats with frequent accidentals. The second movement, “March of the Minutiae,” is a quick-paced march, which explores a wide range on the piano and maintains a repetitive grace note figure throughout the movement; this demands precision and accuracy in both of the hands. Partially due to the quick pace of the tempo and partially due to the necessary precision in the grace note figure, this movement is the most difficult of the four movements. The third movement has a Spanish/Gypsy like flare and is entitled “Distant Dreams.” This movement consists of an ostinato in the left hand and a simple melody in the right hand. The main challenge in this movement is the necessity of independency of the hands. Although the rhythms of each hand are not particularly challenging, when put together, they become much more difficult. The last movement is entitled “Rustic Rumpus” and is reminiscent of a rowdy folk dance. The main challenge in this movement is being able to quickly change chords in both hands. Dr. Trainor, an accomplished pianist and professor of history at Benedictine College, will be performing the suite. Rehearsals leading up to the performance of this work are student led and directed. These rehearsals consist of the student composer working with Dr. Trainor and giving him insight into the interpretation of the piece, as well as preparing him for the performance of the piece. This project gives the student leadership experience by leading rehearsals, time management skills by preparing the performer for the performance by a set date, and serves as an enriching experience in preparation for the student composer’s future career as a professional musician.

76. Mission, Poetry, and Music: The Transformation of Human Hearts

Zavier Tarrant, Benjamin Hoopes, Ellen Glynn, Alexa Harper, Timothy Tharaldson, Music

5:15–6:15 ❖ O’Malley-McAllister Auditorium

This is a premiere of an art song, with text by Benjamin Hoopes, and music by Zavier Tarrant. The piece and the poem are titled, “Love’s Sweet Bitterness,” and explore how each human person struggles with the poverty of loneliness and needs God to fill that hole in our hearts. The piece will be performed by Ellen Glynn, vocalist, and Alexa Harper on harp. A presentation will be given of which the first half will be about the inspiration behind the text, which primarily was a mission trip with Christ in the City. Christ in the City is an organization

whose mission is to let the homeless know they are known, cherished, and loved. The second half of the presentation will be about how that message is conveyed through the music. All those involved in this Discovery project have gone on a mission trip with Christ in the City. This piece is dedicated to all those who have or will serve with Christ in the City.

77. Developing an Arranging Process That Maximizes Student Success in Performance, for Marching and Pep Bands in High School and Small College Settings

Stephanie Schrader, Thomas Davoren, Music

5:15–6:15 ❖ O'Malley-McAllister Auditorium

Across the main music publishing houses, there is a distinct lack of a consistent difficulty grading scale for music. This presents unique challenges for band directors of high schools and small colleges who are looking to select music for their ensembles. Because these ensembles may face challenges in instrumentation and ability, the music that would be most successful for them is often limited and difficult to find.

To address this, several pieces from different publishing houses were compared. Their shortcomings, successes, and relation to each other in terms of difficulty were all analyzed. For further exploration of how these issues impact directors, a small sample of directors of small high school and college marching bands were surveyed. Because there is not a consistent grading scale, directors had difficulty selecting music they knew would be successful for their whole ensemble.

These issues and positive attributes are explored again in the context of an original Grade 3/Medium arrangement of Taylor Swift's "New Romantics." Comparisons of different versions of the arrangement will be shown to illustrate how decisions in instrumentation, rhythm, and range can help lead to success for an ensemble. Special attention is given to how this arrangement leads to success and overcomes challenges in instrumentation and ability. This presentation will conclude with a performance of Taylor Swift's "New Romantics" by the Benedictine College Wind Ensemble.



The Discovery Program Committee

The Discovery Program Committee is committed to the advancement of Discovery learning at Benedictine College. The committee's responsibilities include encouraging and supporting faculty and students in their own Discovery activities, the awarding of Discovery grants, planning the Discovery Day Symposium, and designating the Discovery Scholars. Members of the committee for the current year are Andrew Downs (Engineering), Chris Shingledecker (Physics and Astronomy), Jeremy Stubblefield (Biology), and Julia Bowen and Terrence Malloy (Discovery Program Co-Directors).



Discovery Grants

The Discovery Program committee awarded over \$16,770 in Discovery grants to students this year in support of 41 Discovery projects. The 2023–2024 Discovery grant recipients are the following:

Joseph Accurso	Catherine Harper	Liam Philbin
Emma Antczak	Daniel Haunert	Peter Pustejovsky
Emma Baucom	Madeline Hays	Faith Quinn
Augustine Blosser	Richard Hernandez	Grace Quinn
Renée Bodoh	Isabella Hodgins	Mary Ellen Raymo
Joseph Bourke	Jonah Honerman	Domenico Ricciardi
Katherine Brandenburg	Emma Kaminski	Stephanie Schrader
Alexander Buman	Juliette Lange	Benjamin Schuberg
Paul Bytnar	Damien Langfels	Jessie Sonnen
Samuel Chaney	Anne Marie LeDoux	Hagan Stovall
Kirstyn Crane	Wolfgang Louk	Levi Streit
Mae Danaher	Rebecca Madden	MaryGrace Thompson
Daniel Draftz	Leah Mages	Sophia Valdivia
Elias Ford	Jackson Maldonado	Mary van Auken
Ryan Fricker	David Mannella	Jack Vanderzanden
Gabriel Friess	Itxel Martin-Huesca	Gwenyth VanLeeuwen
Joanna Gambino	Anna McDonald	Amelia Vopat
Gracie George	Catherine Moraghan	Abby Walterscheid
George Gigstad	Austin Nobis	John Welte
Alondra Gomez	Johnathan Olivier	Kera Willoughby
Gabriel Guzman	Julia Ondracek	Anna Wingbermuehle
Caeli Haigh	Michaela Palmer	Lily Yandow
Paul Hanson	Bytnar Paul	Katie Youll
Alexa Harper	Julianne Peichel	



Wangari Maathai Discovery Award

When Wangari Maathai accepted the Nobel Peace Prize in 2004, she made her alma mater the only Catholic college in America with a Peace Prize winner among its alumni. She won the Nobel for her efforts to promote democracy, peace, and sustainable development and is the first Peace Prize winner to have an environmental focus. Maathai, from Kenya, came to the United States as part of the Kennedy Airlift in 1960 and earned a degree in biology from Mount St. Scholastica College, now Benedictine College, in 1964. In 2014 the college marked the 10th Anniversary of the Nobel ceremony by announcing the winners of two new Maathai Discovery Awards.

Maathai passed away in 2011 after battling cancer. Since then, the College has remembered her in several ways. Her classmates from the Mount Class of '64 planted a tree in St. Scholastica Plaza on the college campus, and in 2015 her statue was erected next to that tree. In 2014 Sister Helen Mueting, OSB, announced the first recipients of the awards, funded by a generous donor.

This year's winners of the Maathai Discovery Award are Kirstyn Crane, Juliette Lange, and Abby Walterscheid. These students are presenting the results of their research during today's Discovery Symposium.

Kirstyn and Juliette explored the impact of S-Methoprene, the pesticide used in Amdro mosquito dunks, on bee larvae of both Blue Orchard Mason bees and Leafcutter bees.

Abby conducted research on the *Mycobacterium tuberculosis*, the strain of bacteria that causes tuberculosis. In particular, she explored how it combats a host's immune cells using the ESX-1 secretion system, a group of proteins that deploy proteins.

Each Maathai Discovery Award carries a \$500 stipend for the student, and up to an additional \$500 to complete the proposed Discovery Project. The award supports projects that focus on stewardship, sustainability, women's equality, and/or environmental justice.



Michael Raia

President
Studio io Liturgical Design & Consulting



“A Church of the True Presence:
An Integrated Theology for Engaging the Culture”

Michael Raia, an architect and president of Studio io Liturgical Design & Consulting, is this year’s Discovery Day keynote speaker. He leads a team of Catholic design professionals who are passionate about beauty and renewal through the sacred arts. After 12 years of managing various religious and institutional projects for a commercial architecture firm, he felt called to pursue a graduate degree in liturgy and attended the Liturgical Institute at the University of St. Mary of the Lake in Chicago, where Bishop Barron was rector at the time. In 2018 he founded Studio io and has since been blessed to serve over 100 Catholic clients with design consulting, beautification, and construction planning projects around the country.

This year, the firm completed numerous projects, including the new church for St. Mary’s Catholic Center at Texas A&M University in College Station, Texas, and a new chapel and seminary addition for St. John Vianney College Seminary in St. Paul, Minnesota. A core component of the firm’s mission involves liturgical catechesis, and Raia has been blessed to present to many different groups around the country. He is a native Texan and lives in Austin with his wife Hannah and their daughter Clare. His brother, Fr. Jonathan Raia, serves as the chaplain and director of the University Catholic Center at the University of Texas at Austin, their undergraduate alma mater.



Discovery Scholars

Last year marked the twentieth year that students were honored as Discovery Scholars. This award recognizes students who have demonstrated an outstanding commitment to Discovery learning while at Benedictine College. Awardees receive the Discovery Scholar Medal to be worn during Commencement ceremonies, signifying their exceptional contribution to the Discovery Program. In 2023, these seniors were honored as Discovery Scholars:

Natalee Brake
Isabel Friedrichs
Virginia Jarvis
Claudia Kammerer

Daniel Lopez-Sanders
Bich Diep (Mary) Nguyen
Aubrey Pichler
Leah Sattler

TRANSFORM

CULTURE IN AMERICA

Discovery Scholar Medal





The front of the Discovery Scholar medal combines images of a set of books and a tree with a landscape symbolizing both the academic and experiential nature of scholarship in the Discovery Program. The books are titled “Community,” “Faith,” and “Scholarship” in Greek. The rear of the medal features a soaring raven with the Latin word “Obsculta,” the first word of the *Rule of St. Benedict*, through which Benedict compels us to listen to God with the ear of our hearts, that is, to seek to discover the Lord in everything. The words “Benedictine College Discovery Scholar” are inscribed around the rim of the medal.



Discovery Day 2024 Schedule Overview (Presentation number in parentheses)

All presentations will take place in the Ferrell Academic Center unless otherwise indicated.

 All are invited to a light breakfast in the Napier Foyer (Fourth Floor), Ferrell Academic Center (FLC) 							
Poster/Exhibit Session #1 – Ferrell Academic Center (McAllister Board Room) (1–11)							
	FLC 109	FLC 125	FLC 208	FLC 219	Gangel Sem. Room	FLC 307	FLC 324
8:30							
8:30–9:35							
9:45–10:05	Winger <i>Depressed Drosophila, Morose Melanogaster Stubblefield</i> (12)	Gambino <i>The Bad Test-Taker Notion: ... Test Anxiety and the Bad Test-Taker Identity</i> Posey (13)	Hodgins <i>St. John Chrysostom's Divine Liturgy and the Tridentine Latin Mass</i> Romano (14)	Rumpza <i>Tracking Statistics for UBBA (Underground Benedictine Basketball Association)</i> O'Malley (15)	Heitdry <i>Thesis Defense – Theory, Practice, and the Rehabilitation of Certitude</i> Petruccielli (16)	Ort <i>Student Perceptions of Academic Coaching in the Benedictine School of Nursing</i> J. Harris (17)	Caskey <i>How Kids Learn to Read: What the Research Says</i> Adams (18)
10:15–10:35	Crane <i>Expediting Diapause and Testing the Effects of SMethoprene on Bee Larvae</i> Winder (19)	Rolwes <i>Anxiety and Scrutiny: Performance Anxiety and Its Effect on Social Judgements of Others</i> Elmore (20)	Raymo <i>The Resurrectionists: Six Feet Down for Science</i> Romano (21)	Fricker <i>Rocket-Launched RC Glider</i> O'Malley (22)		Nowicki <i>Thesis Defense – Edith as Educator: A Holistic Education of Woman Rooted in</i> Sternian Theology Courtois (23)	Del Castillo <i>Regrafting English Education: New, Old, and Eternal Stories</i> Schmerbeck (24)
10:45–11:05	Palmer <i>Injuries Suck. Period. – A Dive Into the Menstrual Cycle and Athletic Injury</i> Winder (25)	Bodloh <i>The Effect of Early Exposure to Technology on the Deal. of Children's Creativity Part I</i> Chen (26)	Houska <i>Anti-Zionism and Antisemitism: A Catholic Perspective</i> Crane (27)	Ricciardi <i>Non-Intrusive Mechanization of Pianos</i> Modlin (28)	Johnson <i>Grafting Person-Centered Theory Into a Catholic Christian Worldview</i> Rzilha (29)		Werth <i>The Validity of Audiobooks</i> Wise (30)
11:15–12:10	Poster/Exhibit Session #2 – Ferrell Academic Center (McAllister Board Room) (31–40)						
11:30–12:50	Lunch – Dining Hall						
1:00–2:20	• Keynote Address: Michael Raia • – O'Malley-McAllister Auditorium						

	FLC 109	FLC 125	FLC 208	FLC 219	Gangrel Sem. Room	FLC 307	FLC 324
2:35-2:55	Calderon The Fourteenth Amendment Shankman (41)	Accurso Differential Architecture Search (DARTS) Algorithm ... Transformer Signals Saylor (42)	Beecher Bacterial Presence in Recreational Facility on BC Campus Paper (43)	Haigh Early Byzantine and Christian Mosaic Park (44)	Spierting Thesis Defense – Anchor to Windward: Mooring Thomas's Account of Love Pierson (45) (2:35-3:25)	Stovall Thesis Defense – The Role of the Emotions ... Through the Lens of Karol Wojtyła's Person and Act Criffast (46) (2:35-3:25)	Sreit Interactome of a Known Virulence Factor Sanchez (47) Walterscheid Is EspG a Protein Chaperone? ... Sanchez (52)
3:05-3:25	Bynar Capital Punishment Courtis (48)	Langfels Femtosecond Laser Restoration Saylor (49)	Louk A Comparison of Microbiomes ... Paper (50)	Gomez Stained Glass: Focused Exploration on Painting Park (51)	Walter The Ethics of Storytelling Madden (57) (3:35-4:25)	Holzman Atmosphere of the Encounter With Christ ... Nearmyer (58)	Hawley Approachable Nuclear Fusion Wurtz (59)
3:35-3:55	L'Ecuier Would AI Be Better Described as Automated Reasoning? Courtis (53)	F. Quinn Making Plastics for Luminescent Solar Concentrators Shcherbatyuk (54)	Thompson Oyster Mushroom ... Paper (55)	Pustejovsky Recreating Traditional Animation Techniques ... Leco (56)		Hoopes How to Live Intentionally in an Isolating World Stenkiewicz (64)	Rosno Photometric and Spectroscopic ... SRd Variables Maderak (65)
4:05-4:25	Duggan Humans' Ability to Detect AI-Generated Writing Page (60)	G. Quinn Synthesis of PkS Colloidal Quantum Dots ... Shcherbatyuk (61)	Maldonado Chyrid Disease in Atchison's Watersheds Paper (62)	Neuner Freedom of Speech As Evaluated by Those of the Vendée Region Orlando (63)		S. Peter Marie Tran Mercy: The Art of Remembrance Stenkiewicz (71)	Sudhocki Numerical Analysis ... Wave Dispersion in Plates Downs (72)
4:35-4:55	Welte Are Community Bathrooms Correlated With Success in College? D. Harris (66)	Mansfield Software and Positioning for a Parabolic Reflector Radio Telescope Shingeldecker (67)	Gigstad Effects of Sericea Lepedeza ... Mortensen (68)	Bourke Portable Organ Year 2 L. West (69)	Holzman The College Knights of Columbus ... Wurtz (70)		
			Harper – Presenting "Agamemnon" – Mulholland (73) Westernman Hall Auditorium (4:35-5:05)				
			O'Malley-McAllister Auditorium				
5:15-6:15	Bauer "Sting Quartet no. 1" Tharaldson (74)	Smith "Suite for Piano" Paul (75)	Tarrant Tharaldson (76)		Schradler Developing an Arranging Process ... for Marching Bands Davoren (77)		
			Spring Band Concert				

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