Discovery Day Symposium

Program of Events

April 10, 2019
Welcome to Discovery Day 2019

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? It is impossible to attend Discovery Day and not be proud of what Benedictine College is accomplishing in the lives of our students.

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.

President Stephen D. Minnis

Discovery Day 2019 marks the twenty-fourth year of the Discovery Day Symposium. Since 1996, more than 2900 students have presented or co-authored a Discovery Project, involving virtually all the faculty and representing all academic departments. Discovery Day 2019 will present 79 projects, the result of the work of 169 students, 56 faculty/staff, and 24 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
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 Ruth Krusemark (Music), Ryan Maderak (Physics and Astronomy), Bryan Park (Art), Josh Wolf (History), and Terrence Malloy and Julia Bowen (Discovery Program Co-Directors).

Discovery Grants

The Discovery Program committee awarded over $19,000 in Discovery grants to students this year in support of 49 Discovery projects. The 2018–2019 Discovery grant recipients are the following:

Mark Abegg
Samuel Anderson
Luke Armentrout
Joseph Barnes
Rachael Barnes
Kathryn Berry
Katherine Boord
Catherine Boruch
Rachel Boucher
Matthew Branch
Matthew Bridge
Luke Brungardt
Brett Burke
Jack Burke
Elizabeth Ciskanik
Matthew Conner
Helen Cook
Ian Daly
Clare Dea
Anthony DeWitt
Caelan Doran
Anne Duchesne
Angela Erusha
Paul Flickinger
Jack Gara
Daniela Garcia-Perez
Alejandro Gomez
Samantha Gonzalez
Madilyn Gothard
Anna Gowasack
Alex Hammelke
Catherine Hegarty
Jedzia Hicklin
Holly Hicks
Thomas Hoerner
Sophia Holm

Conrad Hoover
John Paul Joachum
Nathan Kabat
Anastasia Kastl
Emily Kennebeck
Catherine Kistler
Timothy Krieg
John Krishnan Myjak
Matthew Krishnan Myjak
Adam Landry
Ashley Langan
Mary Leihy
Mikaela Loucks
Meghan MacLellan
Ella Majerus
Gabriella Mammia
Joseph Marak
Dimitri Maricich
Jacqueline Marko
Bryn Maul
Katherine McLaughlin
Kaitlyn Miller
Miriam Miller
Leandra Morgenthaler
John Morran
Elizabeth Morris
Molly Muchlebach
Connor Muehler
Lillian Nacke
Megan Nault
Ethan Novacek
Olivia Obritsch
Nicholas Olache
Steven Oliver
Eva Pecha
Alex Pogasic

Sabrina Poston
Jeanne-Marie Potthast
Renz Pros
Aaron Ptak
Sara Rahmanzai
Erin Rauber
Margaret Restuccia
Rori Richardson
Marie Rioux
Jacob Roth
Natalie Ruether
Michael Rziha
Nicole Salmon
Bernadette Schrag
Henry Schuberg
Heather Smith
Stephen Smith
Dwight Stephenson
Nathaniel Strandquist, Jr.
Bryant Suellentrop
Benjamin Suhr
Joshua Sullivan
Hannah Thomazin
Monica Treacy
Paul Vanderpool
Luke Wadle
Evelyn Wagner
Olivia Wagner
Kathryn Weaver
John Weber
Catherine Whitfield
Isabelle Wilhelm
Theresa Wood
Andrew Wuller
**Discovery Scholars**

Last year marked the sixteenth 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 2018, these seniors were honored as Discovery Scholars:

<table>
<thead>
<tr>
<th>Name</th>
<th>City</th>
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<tbody>
<tr>
<td>Elizabeth Allard</td>
<td>Troy, MI</td>
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<tr>
<td>Margaret Boone</td>
<td>Olathe, KS</td>
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<td>Adam Burke</td>
<td>Omaha, NE</td>
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<td>Elizabeth Clum</td>
<td>Overland Park, KS</td>
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<td>Caroline Cundiff</td>
<td>Wichita, KS</td>
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<td>Gabrielle Douglass</td>
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<tr>
<td>Cori Drouhard</td>
<td>Danville, KS</td>
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<tr>
<td>Katherine Greenwood</td>
<td>Beloit, KS</td>
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<td>Ann Marie Guernsey</td>
<td>Ave Maria, FL</td>
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<tr>
<td>Daniel Hayes</td>
<td>Howell, MI</td>
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<td>Katharine Hirl</td>
<td>Minnetonka, MN</td>
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<td>Lillian Hoover</td>
<td>Irving, TX</td>
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<td>Mark Horton</td>
<td>Ames, IA</td>
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<td>Matthew Johll</td>
<td>Winterset, IA</td>
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<td>Kayla Johnson</td>
<td>Cumberland, WI</td>
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<td>William Keiss</td>
<td>Aurora, CO</td>
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<td>Michael Klein</td>
<td>St. Louis, MO</td>
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<td>Katherine Lang</td>
<td>DeBois, PA</td>
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<td>Jessica Linton</td>
<td>Olathe, KS</td>
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<td>Emily Marker</td>
<td>Centerville, MN</td>
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<td>Victoria Masucci</td>
<td>Kansas City, MO</td>
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<td>Margaret Masucci</td>
<td>Alexandria, VA</td>
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<td>Ashley Roberts</td>
<td>Waukesha, WI</td>
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<td>Jenna Rudolph</td>
<td>Evansville, IN</td>
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<td>Claire Schroettner</td>
<td>Oconomowoc, WI</td>
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<td>Elizabeth Schuetz</td>
<td>Raleigh, NC</td>
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<td>Jude Severson</td>
<td>Deerwood, MN</td>
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<td>Kasandra Short</td>
<td>Topeka, KS</td>
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<td>Sarah Starrs</td>
<td>South Riding, VA</td>
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<td>Madeline Stella</td>
<td>Stillwater, MN</td>
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<td>Samantha Turner</td>
<td>Fulshear, TX</td>
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<td>Camrie Ventry</td>
<td>Lincoln, NE</td>
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<td>Hannah Voss</td>
<td>San Antonio, TX</td>
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<td>Austin Windsor</td>
<td>Spring, TX</td>
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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 Air-lift 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 Brett Burke and Elizabeth Ciskanik. Both students are presenting the results of their research during today’s Discovery Symposium.

Burke worked on a project called, “Optimization of a Waste Oil Furnace.” The Art Department uses a waste oil furnace to cast aluminum. This project focused on improving the design of that waste oil furnace, which is fueled by used vegetable oil from the Dining Hall. The improvements included redesigning an atomizing nozzle in the burner and constructing two pressurized oil supply tanks.

Ciskanik worked on a project called, “Helping Farmers and Astronauts: A Study on Manipulating Iron Concentration in Soil to Allow Better Crop Growth in Adverse Conditions and Enhance Crop Quality.” This study focused on growing corn with a low iron tolerance and green beans with a high iron tolerance in soils with different levels of iron concentration. This study has practical applications in terrestrial agriculture and, potentially, Martian soil.

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.
Kingsley Leggs ’83
“Putting It Together: Benedictine, Broadway, and Beyond”
1:00–2:20 PM, O’Malley-McAllister Auditorium

Kingsley Leggs grew up in the St. Louis area before coming to Benedictine College, where he earned a Bachelor of Music degree in vocal performance. His classical training at Benedictine contributed to his strong singing voice and commanding stage presence. It also helped him focus his attention so he could deliver a sincere and fresh performance each time he took the stage.

Leggs returned home to St. Louis after graduating and became involved with the St. Louis Black Repertory Company. In 1990 he moved to Chicago to test his talents in a larger market. He landed his first job at the prestigious Goodman Theatre. He auditioned for a role in the touring production of the Tony Award winning musical, Miss Saigon, which would begin performances in Chicago. He landed a part in the ensemble, but while he was waiting for the tour to begin, he received a life-changing call. There was an opening in the Broadway company of Miss Saigon. He accepted, and the name Kingsley Leggs made its first appearance in a Broadway playbill.

In 2000, the Los Angeles Stage Alliance honored Leggs’ powerful work in Ragtime with a nomination for its Ovation Award in the category of Best Actor in a Musical. In 2003, he received another nomination for his role in Dreamgirls. The same year, he auditioned for a role in a new musical production, based on Alice Walker’s Pulitzer-prize winning 1982 novel The Color Purple. Leggs got the role of Mister, the abusive husband of Celie, the story’s protagonist. The show opened at Atlanta’s Alliance Theater and attracted the interest of a group of producers, including media celebrities Quincy Jones and Oprah Winfrey. They took the show to New York and in December 2005, The Color Purple opened on Broadway, with Kingsley Leggs in the role of Mister.

National and International tours include Porgy and Bess, Sister Act, Miss Saigon, Ragtime, It Ain’t Nothing but the Blues, and Forbidden Hollywood. Regional credits include performances at American Repertory Theatre, 5th Avenue, Goodman Theatre, Goodspeed Opera House, Alliance Theatre, Baltimore Centerstage, The MUNY, and the St. Louis Black Rep. He has also made appearances in film adaptations of Broadway productions and on television in The Americans, The Good Wife, and Law and Order SVU.

After more than 35 years in the entertainment industry, Leggs is finding a way to meet the challenges of remaining relevant without giving up his old school values and work ethic. He dedicated himself to a career in musical theatre because he found it fun, exciting, and ultimately rewarding. He is aware of theatre’s ability and responsibility to captivate, educate, and transport audiences while stimulating the mind. He is still determined to find in each character he plays, a powerful message to communicate, to entertain and to inspire.
Kathryn Weishar Dalzell ’80
Accompanist

Kathryn Weishar Dalzell is a 1980 graduate of Benedictine College. Upon graduation, Kathie attended the Conservatory at the University of Missouri-Kansas City earning a Master’s of Music in Piano Performance. She has taught private piano lessons, both directed and accompanied various church choirs, and taught elementary music education. Kathie currently resides in Seattle, Washington.

Today’s performance is co-sponsored by the Discovery Committee and the Kremmeter Series.

Discovery Scholar Medal

The class of 2018 was the first class of Discovery Scholars to wear the redesigned medal upon their graduation from Benedictine. The front of the 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 “Obscula,” 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 Schedule

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

Continental Breakfast
8:30 AM — Napier Foyer (4th floor), Ferrell Academic Center

Morning Sessions
8:40–9:35 | Poster/Exhibit Session #1
McAllister Board Room (4th floor)

1. Alternative Radiosonde Recovery Options
   Samuel Anderson, John Krishnan Myjak, Matthew Krishnan Myjak, Jack Burke, John Paul Jochum, Steve Spencer, Engineering

2. Dendrochronology
   Luke Armentrout, Brent Mortensen, Biology

3. The Effect of Location on Environmental Responses in Microbial Communities
   Katherine Boord, Catherine Whitfield, Catherine Kistler, Leandra Morgenthaler, Janet Paper, Biology

4. Architectural Survey of St. Benedict’s Abbey
   Matthew Bridge, John Weber, Mary Leihy, Dwight Stephenson, John Haigh, Architecture

5. Optimization of a Waste Oil Furnace
   Brett Burke, Nicholas Olache, Jeanne-Marie Potthast, Bryan Park, Art

6. The Effects of Substrate pH on Plant Growth
   Sophia DeBenedetti, Taylor Middleton, Graham Grisedale, Terrence Malloy, Virginia Winder, Biology

7. How Literature Can Influence a Classroom About the Needs of Others
   Kateri Determan, Abigail England, Matthew Ramsey, Education

8. Edinburgh Etch Effects on Modern Printmaking
   Alejandro Gomez, Anthony DeWitt, Jay Wallace, Art
9. Will There Be Fewer Babies in Your Future? A Spatial and Demographic Analysis of Future Childbearing Plans Among College Students
   {Althea Heinen, Jazmine Luebbert, Laura Moley, ESL}

10. The Annoying Neighbor: The Lespedeza cuneata Outcompetes in Shady Environments
    {Jedzia Hicklin, Samantha Gonzalez, Brent Mortensen, Biology}

11. Winter Ground Bird Survey — Benedictine Bottoms Wildlife Area
    {Thomas Hoerner, Holly Hicks, Clare Dea, Virginia Winder, Terrence Malloy, Biology}

12. Silica Fume in Lightweight Concrete
    {Nathan Kabat, Scott Newbolds, Engineering}

13. Effects of Storage on Microbial Community Composition
    {Ella Majerus, Katherine McLaughlin, Anne Duchesne, Janet Paper, Biology}

14. The Effect of Hydrazine Sulfate on Cancer Cells in Vitro
    {Joseph Marak, Eva Pecha, Daniela Garcia-Perez, Mark Abegg, Martha Carletti, Biology}

15. Air Drying Lab Construction
    {Kaitlyn Miller, Anastasia Kastl, Alex Pogasic, Caelan Doran, Jack Gara, Scott Blonigen, Engineering}

16. Aeroponic Systems Optimized for Low Cost Part Construction and Replacement
    {John Morran, Peter Merkle, Engineering}

17. Register — and Vote! An Exercise in Mobilizing Voters in Atchison, Kansas
    {Rita Maslanka, Spencer Peterson, Matlin McFarren, John Settich, Political Science}
    9:45–10:05 * Room 109

18. Interacting With the Nanoscale Landscape of Molecular Systems Through Virtual Reality
    {Joseph Barnes, Andrew Wuller, Juan Araque, Engineering}
    9:45–10:05 * Room 124
19. Helping Farmers and Astronauts: A Study on Manipulating Iron Concentration in Soil to Allow Better Crop Growth in Adverse Conditions and Enhance Crop Quality
Elizabeth Ciskanik, Brent Mortensen, Paul Steinbach, Patrisha Bugayong, Biology, Chemistry and Biochemistry
9:45–10:05 * Room 125

20. Does Studying Abroad Affect Personality? An Examination of the Florence Experience
Erin Farrell, Amy Posey, Andrew Salzmann, Psychological Sciences, Honors Program
9:45–10:05 * Room 208

21. Senior Thesis: Newton’s Flaming Laser Sword and Meaning Beyond the Planck Length, “Shut up and calculate!”
Marie Rioux, Anthony Crifasi, Philosophy
9:45–10:35 * Gangel Seminar Room

22. The Muse Meets the Artist: The Role of Relationship in the Artistic Process
Olivia Wagner, Gabriella Mammia, Jay Wallace, Art
9:45–10:05 * Room 323

23. Turn Up the Heat: A Study of Religion and Attractiveness
Rachael Barnes, Catherine Boruch, Isabelle Wilhelm, Jacob Roth, Margaret Restuccia, Adam Buhman-Wiggs, Psychological Sciences
10:15–10:35 * Room 109

Grayson Feist, John Settich, Political Science
10:15–10:35 * Room 124

25. The True Cost of Study Abroad: The Abroad Budget
Sabrina Poston, Ashley Langan, Angela Erusha, Chris Glenski, Brian Henry, School of Business
10:15–10:35 * Room 125

26. Genera Index of Native Bees of the Benedictine Bottoms and Investigation of Neonicotinoid Insecticides
Rori Richardson, Katherine Boord, Katherine McLaughlin, Terrence Malloy, Virginia Winder, Paul Steinbach, Biology, Chemistry and Biochemistry
10:15–10:35 * Room 208
27. Crisis and Struggle: The Case of Guatemalan Migration  
Rachel Medara, Filiberto Mares Hernández, Susan Traffas, World and Classical Languages and Cultures, Honors Program  
10:15–10:35 * Room 219

Matthew Swoboda, Joshua Wolf, History  
10:15–10:35 * Room 323

29. Room Draw 2019  
Eli Pruneda, Alejandro Maese, Michael Grimmig, Donald Bagert, Sean Mulcahy, Michael Rolling, Mathematics and Computer Science, Residence Life, Student Life  
10:45–11:05 * Room 109

30. The Gaze of Christ and an Art of Bookbinding  
Jacqueline Marko, Renz Pros, Jay Wallace, Aaron Riches, Art, Theology  
10:45–11:05 * Room 124

31. The Effects of Just World Belief and Primed Religiosity on Reactions to Homelessness  
Natalie Finn, Dean Elmore, Psychological Sciences  
10:45–11:05 * Room 125

32. Religious Upheaval in Egypt: Akhenaten and the Amarna Revolution  
Kelsey Runge, Joshua Wolf, History  
10:45–11:05 * Room 208

33. The Passage of the 19th Amendment: Who the Hell is Harry Burn, Mate?  
Maura Buhler, Jessica Carney, Collette Valenzuela, Emily Sanderlin, Elisabeth Fanning, William Raymond, Political Science  
10:45–11:05 * Room 219

34. Trauma-Informed Care in Schools and Classrooms  
Kate Wallin, Adriana Aguirre Cortes, Matthew Ramsey, Education  
10:45–11:05 * Gangel Seminar Room

35. Magnetic Accelerator  
Luke Wadle, Nathaniel Strandquist, Jr., Georgiy Shcherbatyuk, Physics and Astronomy  
10:45–11:05 * Room 323
36. Teaching Future Scientists Through Comics  
   Ethan Novacek, Janet Paper, Biology

37. Concrete Canoe Transportation Cart  
   Olivia Obritsch, Monica Treacy, Joshua Sullivan, Benjamin Suhr, Scott Newbolds, Charles Sprouse, Engineering

38. Concrete Canoe Strongback  
   Nicholas Olache, Brett Burke, Steve Spencer, Engineering

39. Simplified Geolocation Using Time Difference of Arrival (TDoA) and Coordinate Transformation  
   Jeanne-Marie Potthast, Eric West, Nickolas Hein, Mathematics and Computer Science

40. Rosemary and Its Effect on Cervical Cancer Cells  
   Sara Rahmanzai, Megan Nault, Lillian Nacke, Kathryn Weaver, Meghan MacLellan, Martha Carletti, Biology

41. The Genotoxicity and Apoptotic Effects of Resveratrol  
   Erin Rauber, Molly Muehlebach, Brynn Maul, Mikaela Loucks, Martha Carletti, Biology

42. The Effect of Hospitalization on Children  
   Elizabeth Roth, Jennifer Zrubek, Michele Hinds, Nursing

43. Elmore Project: The Complete Genealogy of Benedictine College Psychology Students  
   Jared Roush, Erin Farrell, Amy Posey, Psychological Sciences

44. Benedictine College Students’ Perceptions of Vaccinations  
   Matthew Scavuzzo, Joseph Tynan, Frank Paolucci, Lynne Connelly, Nursing

45. Identification of Potential Antibiotics Against *A. baumaunnii* Using Virtual Screening Software  
   Anna Schreffler, Nicholas Brose, Mark Schramp, Biology

46. The U.S. Economy: Past, Present, and Future  
   Stephen Smith, Bryant Suellentrop, Michael Rziha, Matthew Branch, Paul Flickinger, Evelyn Wagner, Catherine Hegarty, Henry Schuberg, Michael King, David Harris, Joshua Wolf, School of Business, Economics, History
47. Academic Freedom Under Attack? An Exploration of Book Banning
   Christian Spesia, Jared Nigrin, Jennifer Ahlers, Stephen Mirarchi, Christina Adams, English, Education

48. Go-Kart: Suspension and Control
   Joshua Sullivan, Alex Hammek, Heather Smith, Dimitri Maricich, Steven Oliver, Charles Sprouse, Engineering

49. Redesign Existing Engineering Go-Kart Frame
   Hannah Thomazin, Joshua Sullivan, Charles Sprouse, Engineering

50. Behavioral Testing of Altruism Between Mice
   Theresa Wood, Rachel Boucher, Elizabeth Morris, Virginia Winder, Biology

51. Student Perceptions of Human Papilloma Virus
   Madeleine Zignego, Renee Setter, Wendy Woolston, Nursing

11:30 AM–12:50 PM ◊ Lunch – Dining Hall
◊ Jazz Band Entertainment ◊

Keynote Address
Kingsley Leggs ’83
“Putting It Together: Benedictine, Broadway, and Beyond”
Kathryn (Weishar) Dalzell ’80
Accompanist
1:00–2:20 PM
O’Malley-McAllister Auditorium

Afternoon Sessions

52. Queerness in the Works of Mary Renault
   Melody Wiklund, Michael Stigman, Julie Bowen, English
   2:35–2:55 ◊ Room 109

53. A Survey of the Distribution and Abundance of Asian Carp in Deer Creek
   Madilyn Gothard, Nicole Salman, Adam Landry, Terrence Malloy, Virginia Winder, Biology
   2:35–2:55 ◊ Room 124
54. 3D Ping Pong Game Simulator in MATLAB® - Simulink®
   Andrew Wuller, Juan Araque, Engineering
   2:35–2:55 * Room 125

55. Music’s Effects on Self-Control
   Joseph Butler, Dean Elmore, Psychological Sciences
   2:35–2:55 * Room 208

56. Mount Rushmore: Why There? Why Then? Why These Four Because of These Six?
   Elizabeth Lademan, Peter Hockel, Marie Stender, Miguel Monteclaro,
   William Raymond, Political Science
   2:35–2:55 * Room 219

57. How Does Music Express Emotion?
   Nathaniel Strandquist, Jr., Jamie Spiering, Philosophy
   2:35–3:25 * Gangel Seminar Room

58. From Drawing Board to Reality: Designing a Dedicatory Garden for the Abbey
   Margaret Jones, Adèle Bischel, John Haigh, Architecture
   3:05–3:25 * Room 109

59. The Effect of Gender and Ideological Similarity on Perceptions of a Persuasive Source
   Anna Gowasack, Amy Posey, Psychological Sciences
   3:05–3:25 * Room 124

60. Offering an Industrial Management Degree at Benedictine College
   Matthew Conner, Stephen Minnis, Darrin Muggli, Michael King, President’s Office, Engineering, School of Business
   3:05–3:25 * Room 125

61. The Secret to a Successful Supreme Court Nomination
   Matlin McFarren, Catherine Tighe, Miriam Miller, Isis Perez, William Raymond, Political Science
   3:05–3:25 * Room 208

62. Wildlife Vehicle Collision Location Based on Environmental Variables
   Bernadette Schrag, Sophia Holm, Virginia Winder, Terrence Malloy, Biology
   3:05–3:25 * Room 219
63. **Art Therapy, Art as Therapy: What’s the Difference?**
*Sara Hutchens, Lindsay Muse, Matthew Ramsey*, Education

3:35–3:55 * Room 109

64. **The Heavy Crown of Perfection: Perfectionism and Loneliness at Benedictine College**
*Angelica Nguyen, Grace Stotzer, Amy Posey*, Psychological Sciences

3:35–3:55 * Room 124

65. **Rugby Scrum Sled**

3:35–3:55 * Room 125

66. **St. Pius the XII or Hitler’s Pope? — A Look at Pius XII’s Role in the Holocaust**
*Helen Cook, Miriam Miller, Richard Crane*, History

3:35–3:55 * Room 208

67. **“Rhapsody in Blue” by George Gershwin: An Exploration of Its Inception, and the Merging of Classical and Jazz Elements**
*Marcela Heffernan, Christopher Greco*, Music

3:35–3:55 * Room 219

68. **Exploring Imagery**
*Nina Carraway, Michael Stigman*, English

3:35–3:55* Gangel Seminar Room

69. **Magic Metals: Harnessing the Shape Shifting Power of Nitinol**
*Conrad Hoover, Gail Blaustein*, Chemistry and Biochemistry

4:05–4:25 * Room 109

70. **Establishing an Aquaponics System in the Benedictine College Greenhouse**
*Natalie Ruether, Ian Daly, Terrence Malloy, Peter Merkle, Virginia Winder*, Biology, Engineering

4:05–4:25 * Room 124

71. **The Beloved Sinner Effect**
*Jacob Roth, Margaret Restuccia, Adam Buhman-Wiggs*, Psychological Sciences

4:05–4:25 * Room 125
72. **Stuck Between a Broken Door and a Hard Place**  
*Emily Kennebeck, Kathryn Berry, Matthew Ramsey,* Education  
4:05–4:25 * Room 208

73. **Stonehenge in the Pre-Romantic Era**  
*Mary Catherine Willacker, George Nicholas,* English  
4:05–4:25 * Room 219

74. **Temperature and Time Effects on the Synthesis of PbS Colloidal Quantum Dots**  
*Nathaniel Strandquist, Jr., Georgiy Shcherbatyuk,* Physics and Astronomy  
4:05–4:25 * Gangel Seminar Room

75. **Nanotechnology and Glowing Polymers: Long-Term Solar Energy Harvesting at BC**  
*Marie Rioux, Georgiy Shcherbatyuk,* Physics and Astronomy  
4:35–4:55 * Room 109

76. **The Effect of Barrel Length on Effectiveness of a Potato Cannon**  
*Connor Muehler, Matthew Conner, Steve Spencer,* Engineering  
4:35–4:55 * Room 124

77. **The Magic of Walt Disney and His Princesses: Transformational Leadership in Action**  
*Natalie Smaron, Rachael Baumgartner, Amanda Stockman, Erin Ziebarth, William Raymond,* Political Science  
4:35–4:55 * Room 125

78. **The Modern Hijacking of Greek Goddesses**  
*Francesca Del Curto, Claire Smeltzer, Sarah Young,* English  
4:35–4:55 * Room 208

79. **Game Theory and Tic-Tac-Toe**  
*Cecily Vandenhousten, Eric West,* Mathematics and Computer Science  
4:35–4:55 * Room 219
1. Alternative Radiosonde Recovery Options

*Samuel Anderson, John Krishnan Myjak, Matthew Krishnan Myjak, Jack Burke, John Paul Jochum, Steve Spencer, Engineering*

This project is a continuation of a senior capstone that concluded in May from Embry Riddle Aeronautical University.

Radiosondes are weather instruments sent daily into the atmosphere by balloon to provide vital weather information for aeronautical and non-aeronautical purposes around the world. Little effort is being put forth to recover these reusable craft, and there is little data on their recovery rates; the average estimate is that fewer than 25% are recovered.

The problem mainly consists in the fact that the radiosondes land, on average, 60 miles away from their original launch site, making recovery expensive. This is because current radiosondes float back to earth using an unguided parachute, making them vulnerable to winds.

The original solution was to use an UAV (Unmanned Aerial Vehicle) to bring the payload back to the launch site. Our project was to develop a steerable parachute as a proof of concept for this approach. This parachute was lifted to about 200 ft. using a quadcopter, where it was released, and flown back to earth by a pilot on the ground. Our results demonstrated the viability of this type of recovery system.

2. Dendrochronology

*Luke Armentrout, Brent Mortensen, Biology*

Dendrochronology is a scientific technique that is used to date trees based on their ring structure. The ring size also can show environmental and climatic weather patterns from its specific year. I prepared a cross section from a maple tree cut down during the Westerman Hall expansion to demonstrate how these methods can be used in an educational context. First, I planed the tree stump to level out the entire surface of the stump. Second, I sanded the rings to see them more distinctly. The third and final task was applying the finish, which serves to protect the stump from wear and tear.

The tree will be put on display in the Biology Department where it can be used as an educational tool in many ways. I demonstrate several examples, including showing people how tree rings form and what affects the growth of the rings. Additionally, I describe historical events that occurred over the life of the tree. Finally, I use this as a resource to teach the scientific method of Dendrochronology. The tree will also allow future students to analyze climatic changes. We can also use this tree to determine roughly the ages of other trees around campus.
3. The Effect of Location on Environmental Responses in Microbial Communities

Katherine Boord, Catherine Whitfield, Catherine Kistler, Leandra Morgenthaler, Janet Paper, Biology

Microbial communities have been known to affect groundwater chemistry, soil nutrition, and organic matter decomposition processing in streams and rivers, which affects downstream water quality. Thus, microbial communities are integral to entire aquatic ecosystems. Researchers frequently collect microbial communities from different environments to be used as a source of inoculum for laboratory experiments. However, in the past, studies have assumed that soil sources provide the same results regardless of their source. We hypothesize that the source of microbial inoculum affects the results of common laboratory experiments. To test this, we collected soil samples from two different locations on the Benedictine College campus: one dry, fertilized location and one moist, shady location. We then used these samples to inoculate cultures held under the same conditions for six weeks. We determined the resulting microbial communities by extracting the total DNA in each culture and sending it for Illumina MiSeq sequencing to identify all species in each sample. After sequencing results are complete, we will use QIIME, a free bioinformatics software package, to analyze the microbial community results.

4. Architectural Survey of St. Benedict’s Abbey

Matthew Bridge, John Weber, Mary Leihy, Dwight Stephenson, John Haigh, Architecture

Analyzing the structure of St. Benedict’s Abbey, through an architectural survey and examination of construction documents, students will study the building typologies, such as the monastic cloister. They seek to contextualize these studies with historical precedent through comparisons between the monastic plans of the Middle Ages, such as the St. Gallen plan, and observe the relationship to ‘city’ structure.

5. Optimization of a Waste Oil Furnace

Brett Burke, Nicholas Olache, Jeanne-Marie Potthast, Bryan Park, Art

A waste oil furnace is a device that utilizes exhausted motor oil or cooking oil as a fuel source to generate heat. The Art Department currently casts aluminum using a waste oil furnace fueled by used vegetable oil from the Dining Hall. The scope of this project was to provide the furnace with some much-needed operational and performance upgrades. Foremost, the atomizing nozzle in the burner was redesigned to better atomize the oil for combustion. Second, two pressurized oil supply tanks were constructed to provide a steady flow of oil to the burner for a longer time. With the addition of inline pressure regulators and an adjustable atomizing nozzle, the furnace can be fine-tuned to optimize combustion, which should allow the furnace to get hot enough to cast bronze. This project also provided the Art Department with eight ingot molds for recovering extra metal after a pour.
6. The Effects of Substrate pH on Plant Growth
   Sophia DeBenedetti, Taylor Middleton, Graham Grisedale, Terrence Malloy, Virginia Winder, Biology

Substrate pH plays an important role in the life of a plant and contributes to determining a species’ geographical distribution. Substrate pH directly affects a plant’s ability to assimilate and use nitrogen to generate growth. Our project explored the relationship between the pH of a plant’s growth medium and plant growth rates by growing black seeded Simpson lettuce plants in small hydroponic systems with three different pH levels: 4.5, 6.0, and 7.5. We hypothesized that lettuce would have the highest growth rate at pH 6.0 because the optimal pH for lettuce plant growth is within the range of 6.0 to 6.5. We grew lettuce plants from seed in 96 individual hydroponic containers (n = 32 containers per pH treatment) and measured the growth of lettuce plants five times over the 20-day growing period. Plants grown in hydroponic systems with pH 6.0 water had higher growth rates compared to the other two treatments. Lettuce plants grown at pH 4.5 and pH 7.0 showed faster growth directly after germination. However, by the end of 20 days, growth in this treatment had slowed and lagged behind the overall growth in the pH 6.0 treatment. Lettuce biomass appeared to be similar across treatments after two days, ranging from an average mass of 0.072 g ± 0.008 g in the 7.5 pH treatment to 0.088 g ± 0.009 g in the 4.5 pH treatment. Our data supported our hypothesis that pH indirectly affects growth rate in plants by affecting the ability of the plant to assimilate nutrients. Our research has implications for understanding the effects of acid rain and pollution. These implications are rooted in the importance of maintaining soil pH levels that are compatible with normal growth of native vegetation.

7. How Literature Can Influence a Classroom About the Needs of Others
   Kateri Determan, Abigail England, Matthew Ramsey, Education

While enrolled in Psychology of Individuals with Exceptionalities (EDUC-2222), one of the authors completed an independent learning activity designed to expand personal awareness related to autism. Through reading a number of titles related to the history and personal experiences of those with autism, we began to wonder how literature could serve as a tool for teachers to develop their own understanding of autism, thus improving their professional practice and how young adult literature relating to autism could serve to increase the awareness of autism within non-disabled students. This Discovery project continued our work from EDUC-2222, expanding the list of titles we read towards the creation of a resource for teachers that includes a paper on the history of autism and a book list of lower elementary-level books, young adult books, and adult books about and/or written by people with autism. After the Discovery Day presentation the resource developed through answering our question, “How can Literature serve the needs of teachers and students related to autism?,” will be made available to professional teachers through the Education Department’s network of partnership schools.
8. **Edinburgh Etch Effects on Modern Printmaking**  
*Alejandro Gomez, Anthony DeWitt, Jay Wallace, Art*

The objective of this project was to experiment and test different ways to make inexpensive and readily available splash tanks and to make improvements on the existing prototypes we have. We looked for and tested inexpensive material for a compact and portable etching tank that people could easily build on their own. Etching in printmaking is a process of using a copper plate covered in a type of acid resistant compound. The printmaker removes the compound in the form of an image. The acid will corrode the copper and create recesses for the ink to rest. The plate can then be used to print the image onto paper. The Edinburgh etch method is a far contrast from the traditional acid etching methods. Traditionally, the copper plate used as the printing matrix would be set to soak in the acid bath to etch over time. In the Edinburgh method, a splash tank is used to cascade the acid onto the plate in an upright position. In research done thus far on the topic, it has proved to be faster and more efficient than the traditional method.

9. **Will There Be Fewer Babies in Your Future? A Spatial and Demographic Analysis of Future Childbearing Plans Among College Students**  
*Althea Heinen, Jazmine Luebbert, Laura Moley, ESL*

Recent population data in the United States indicate that the birthrate has dropped, particularly among college-educated adults. We wanted to find out whether this trend seems set to continue as current college students enter likely childbearing years and to determine which factors (such as childhood family size, urban or rural background, region of the country, religion, gender, ethnicity, or occupation) might have the greatest influence on their plans for children. This project is based on an anonymous survey of college students, asking them about their childhood hometown, number of siblings, ethnicity, religious affiliation, and career plans, along with the number of children they expect to have in the future. We will present data collected from sample groups of undergraduate students at Benedictine College and undergraduate students from outside the college, using a paper survey administered in classes and an electronic survey administered online. Our analysis will compare geographic and demographic information, with participants’ expected number of children, in order to determine any correlations or other statistical patterns that may exist between childhood background, demographics, or location, and stated plans for children. We will put our results into a larger context by examining recent trends in national and regional population data, to see how our glimpse of the potential future compares or contrasts with the present.

10. **The Annoying Neighbor: The *Lespedeza cuneata* Outcompetes in Shady Environments**  
*Jedzia Hicklin, Samantha Gonzalez, Brent Mortensen, Biology*

*Lespedeza cuneata* (serica lespedeza or Chinese bushclover) is an invasive legume native to Japan and introduced to North America for soil stabilization.
However, *L. cuneata* is a strong competitor for nutrients and water causing population decrease and possible extinction of other species. Due to previous studies, it is known that *L. cuneata* is shade tolerant, giving it a competitive edge over other species as it can allocate more resources to growth in shaded conditions. Therefore, we predict that *L. cuneata* will show superiority in growth while under shade but that this superiority will be diminished in full sunlight.

We examined the effects of *L. cuneata* on two other native species, *Rudbeckia herta* (black-eyed Susan) and *Schizachyrium scoparium* (little bluestem), and one other invasive species, *Bromus inermis* (smooth brome), in relation to shade tolerance by comparing the average biomass and specific leaf area of each species placed in four different treatments. Each pot contained two plants grown in monoculture or grown with the invasive *L. cuneata*. These two treatments were crossed with light or reduced light, where half the plants were placed under a shade cover and the other half was exposed to direct sunlight.

Shading had a weakly positive effect on plant growth; however, the positive effects of shade were not consistent across species. Moreover, the competitive effects of *L. cuneata* changed in response to shading. Overall, the competitive effects were minimal; however, *L. cuneata* performed better in the shade than in the sun. Our results can help characterize potential invasive species before introduction.

11. Winter Ground Bird Survey—Benedictine Bottoms Wildlife Area

*Thomas Hoerner, Holly Hicks, Clare Dea, Virginia Winder, Terrence Malloy, Biology*

The ring-necked pheasant (*Phasianus colchicus*) is a ground bird species native to China and West Asia from the avian order Galliformes. Pheasants have been introduced throughout Europe and the temperate regions of North America where they have been successfully naturalized. The northern bobwhite (*Colinus virginianus*) is another galliformes species native to North America east of the Rockies and south of the Great Lakes into Cuba and Mexico. During the winter, flocks of pheasants segregate into all-male and all-female flocks. In contrast, male and female northern bobwhite tend to exist in mixed flocks in all seasons. Our survey examined wintering flock dynamics, activity patterns, and habitat preferences for pheasants and northern bobwhite. We hypothesized that the female pheasant flocks would be larger than the male flocks and that males and females would mix together at important feeding sites, such as cropland, but would be seen apart where nutrients are more scarce. We expected to see northern bobwhite moving in large groups and concentrated in areas where both food and cover are present.

We used motion activated cameras and walking surveys of transects around the property to quantify numbers and habitat preference. We tethered the cameras to trees and corn stalks in a variety of habitats including crop fields, forest, and field edges. We ensured that the cameras had an open view of the areas we wanted to survey and left the sites unbaited so that the animals would not be artificially moved. We deployed camera traps for 40 nights on the Benedictine Bottoms Wildlife Area, a 854-hectare mitigation site in the Missouri River floodplain. This area has been managed by the Kansas Department of Wildlife, Parks, & Tourism.
to restore former crop fields to the mix of forest, wetland, and grassland present before the channelization of the river. Our cameras most consistently captured both species traveling in the mid-to-late afternoon. Our cameras captured pictures of northern bobwhite most often in forest in which there was a thick layer of brush for cover. In contrast, we captured pheasants exclusively along the edge of forest and cropland. Unexpectedly, we did not see pheasants in groups of more than two individuals. For northern bobwhite, we sighted groups of up to six individuals, with both sexes often present when differentiation could be made. Our research can improve understanding the non-breeding season behavior of these birds, aid in future studies on this population of pheasants, and help to gauge the success of the restoration of the lowlands and the habitat it has come to provide for these and other ground bird species.

12. Silica Fume in Lightweight Concrete

Nathan Kabat, Scott Newbolds, Engineering

This project is performed in conjunction with the ASCE National Concrete Canoe Competition in which schools construct a canoe out of concrete and designed to hold up to four persons. Balancing weight and strength is of utmost importance. Silica fume, a very fine glass dust, is used in the construction industry in high-strength concrete applications, such as structural support columns. In these contexts, the density of the concrete is not a restricting factor; in this project, the effects of silica fume on lightweight, lower-strength concrete mixes are investigated, such that will be used by the 2018–2019 Concrete Canoe Team. Four different mixes were made and tested, each with varying amounts of silica fume. Industry standard is to replace approximately 5% of the weight of standard cement in the mix with silica fume. For example, if there is 100 lbf of cement, 5 lbf of silica fume would replace 5 lbf of cement. A control 0% mix was made, along with varying mixes with 7%, 15%, and 25% silica fume replacement. Higher percentages were explored to push the limits beyond what is used in standard applications, given that our application is nonstandard. Seven percent replacement was discovered to be the ideal mix and was used by the team to construct the canoe for the 2019 competition.

13. Effects of Storage on Microbial Community Composition

Ella Majerus, Katherine McLaughlin, Anne Duchesne, Janet Paper, Biology

A microbial community is a group of different species of microbes living in the same habitat. These species interact with each other and react to different environmental pressures. To study these changes, researchers have conducted laboratory based experiments; they collected soil samples containing microbial communities and used them to inoculate experiments. However, bacterial communities may change over the period of storage, so using the same source of inoculum at different times may result in a different final community. This ultimately may affect interpretations of results. Here, we examined the effects of storing inoculum at four degrees Celsius before use. We hypothesized that the storage of the inoculum would not affect the microbial community after a duration
of six weeks; scientists commonly accept that if slightly different inoculums are put into the same environments over a period of time, the community composition will change in the same way. However, there is currently no experimental data confirming this assumption.

We collected soil samples submerged in a local stream to use as our inoculum. We set up laboratory experiments and inoculated them with either fresh inoculum or a previously stored inoculum. After the six weeks, we extracted the entire microbial community DNA and sent it for Illumina MiSeq sequencing targeting amplicons from 16s ribosomal sequences. When sequencing is complete, we will use QIIME, a free bioinformatics software program, to analyze microbial community composition.

14. The Effect of Hydrazine Sulfate on Cancer Cells in Vitro

Joseph Marak, Eva Pecha, Daniela Garcia-Perez, Mark Abegg, Martha Carletti, Biology

Hydrazine sulfate, a component of jet fuel, has been marketed as an anti-cancer agent that is proposed to inhibit cancer cell proliferation by inhibiting gluconeogenesis. By inhibiting gluconeogenesis in cancer cells, it inhibits chemical reactions that lead to malnutrition in the body that is commonly associated with cancer. The goal of this research is to study the effect of hydrazine sulfate on cancer cells in vitro. The cancer cells that were tested were HeLa cells and Barrett’s esophagus, CPC cells. HeLa cells are cervical cancer cells that are commonly used for scientific research. Barrett’s esophagus is a gastrointestinal disorder that arises from long-term gastroesophageal reflux disease, which regularly causes stomach acids to rise back up to the esophagus. After multiple acid reflux occurrences, these cells undergo mutations increasing the risk of developing into cancerous cells. By testing the characteristics of the hydrazine sulfate via Ames test, the drug was determined to be a mutagen that also inhibits cell growth. The death rate of HeLa cells was tested by treating the cells with different concentrations of hydrazine sulfate. The death rate of the treated HeLa cells was 42.67%, compared to the death rate of the control which was 53.26%. In order to determine if the results were statistically significant, a paired t-test was run and the results were found to be not significant with a p-value of 0.8366. The experiment was repeated using CPC cells and resulted in a death percentage of 9.3% for the treated group and 71.43% for the control group. A paired t-test was run on the treated CPC cells and the p-value calculated was 0.3873, which is statistically insignificant. With cancer being the second leading cause of death in the United States and many people looking to alternative forms of treatment, it is important to understand the effects that alternate treatment has on cancer cells.

15. Air Drying Lab Construction

Kaitlyn Miller, Anastasia Kasl, Alex Pogasic, Caelan Doran, Jack Gara, Scott Blonigen, Engineering

The purpose of this project is to add a new lab to the section ENGR-3410, Thermofluids. The focus of this lab is to study the properties of fluids in a
real-life setting. By adding a new lab, students will receive a broader educational experience than before and will be able to apply the knowledge learned in their future classes.

Air drying is commonly used in industry as a way to dehydrate foods. Jerky, apple chips, and dried herbs are all examples of how air drying is used in the food industry. It is also used in the chemical industry as a method to dry slurries or wet solids that do not have a high enough water content to be boiled. Air drying using forced, free, or heated air can prevent spoilage in food and can aid in concentrating a solids product.

Materials for the fabrication of a drying cabinet include a three-shelf wooden cabinet with a door, three wire mesh mats, duct, a hydrometer to measure humidity, and an anemometer to measure air flow. To construct the drying cabinet, the shelves were knocked out and replaced with the wire mesh. A hole was cut out at the top and at the side of the lowest shelf. The anemometer was taped into the duct that enters the bottom shelf, and the hydrometer was taped into the duct exiting the top of the drying cabinet. The duct at the bottom has the heat source blowing hot air in, and the anemometer measures the flow rate. The hot air passes through the wire mesh trays with whatever product to be dried laying on them, and as the hot air exits the cabinet the hydrometer measures the humidity of the air.

16. Aeroponic Systems Optimized for Low Cost Part Construction and Replacement

John Morran, Peter Merkle, Engineering

Aeroponics as a concept is the opposite of materials intensive, with a basic setup requiring only a container, pump, a plant, and water supply with nutrients. The system is especially low waste when paired with an aquaponic system producing an excess of nutrient rich water. This combination of relatively simple parts makes it a system ideal for the future colonization of another planet, such as Mars, where usable soil for plant growth is a resource not at all in common supply, and an artificially created biosphere is much more feasible and easily established. The key to such a system would be whether or not parts that break in the system can be easily replaced, repaired, or refabricated for an economical cost with minimal materials, so in order to explore this question, I turned to the concept of 3D printing the most essential component of the system, the atomizer nozzle, which is responsible for turning the nutrient rich water into droplets small enough to be absorbed by the roots of any plants or plant like organisms, which are being grown in the system. As my primary focus was on the nozzle, the other components of the system remained relatively basic and small, with the container being designed for a single plant basket only. I went through many stages of research, sketching and CAD work and several different principle designs for the nozzle to develop a final model that produces the most ideal conic mist form for the system and is still easily manufacturable on the engineering department 3D printers. This work was primarily done in high-def resin to ensure a smooth surface for the connection to the pump. This project only covers a small aspect of an aeroponic system, but it is
entirely possible that additional parts, such as the pump valves, plant baskets, and even specialized containers, could be 3D printed in the future.

17. Register — and Vote! An Exercise in Mobilizing Voters in Atchison, Kansas

Rita Maslanka, Spencer Peterson, Matlin McFarren, John Settich, Political Science

Voting is a two-step process: the voter must register and then vote. But how many citizens who register, actually vote? In the course of this research project, our team took a closer look at the mobilization of voters, more specifically, looking at the rate of participation in the 18 to 25 age cohorts. The primary research question focused on the national turnout from the 2010 and 2018 elections. The team evaluated and compared the mobilization of young voters between the two elections. Were they more inclined to vote in the 2018 election than in the past? To help answer the various hypotheses the team constructed, we went back to the 91 Benedictine students we were able to register in the fall and surveyed them. We also gathered another sample of students who were not a part of the 91 registered, and asked them a similar series of questions. Were the 91 students who were registered more likely to vote than those who were not part of this group? The end-goal was to register and vote. This was an exercise in mobilizing voters in Atchison, Kansas, especially the young voters, and an experiment to test whether direct mobilization makes a difference for millennials.

18. Interacting With the Nanoscale Landscape of Molecular Systems Through Virtual Reality

Joseph Barnes, Andrew Wuller, Juan Araque, Engineering

Direct human interaction through immersive multimedia offers the unique opportunity of visualizing high-dimensional molecular systems while interacting with the atomic-scale forces that define their structure and dynamics. Current developments in graphics processing unit (GPU) architectures and algorithms have enabled a new era of Virtual Reality (VR) hardware that overcomes both the technical difficulty and computational expense of interacting with molecular models. In a GPU-enabled VR, human motion can be interactively coupled (‘co-located’) to that of simulated molecules, allowing users to experience (‘feel’) molecular potentials in real time and to steer molecular dynamics at will. In this work, we use a virtual reality (VR) environment to navigate and interact with molecular systems searching for patterns of behavior only perceptible to human judgement. Molecular dynamics models of conventional solvents (CSs) and ionic liquids (ILs) were developed in a GPU-accelerated engine that allows the solution of the equations of motion while virtually interacting with the molecules. The VR-enabled setup uses an HTC Vive headset for immersive visualization and hand controllers to grab and pull molecules. The pulling forces on the controller are translated into an external potential acting on the molecules. To allow the desired interactive exploration of the molecular landscape, we insert a small molecular
probe (methane) within CSs and ILs and pull it through different regions of these liquids. Results from our preliminary investigations seem to agree with previous knowledge about the nanoscale landscape of these systems. We discuss how new insights could be developed through VR and the possibility of acquiring and analyzing data from our VR interaction with molecular systems.

**19. Helping Farmers and Astronauts: A Study on Manipulating Iron Concentration in Soil to Allow Better Crop Growth in Adverse Conditions and Enhance Crop Quality**  
*Elizabeth Ciskanik, Brent Mortensen, Paul Steinbach, Patrisha Bugayong.*  
Biology, Chemistry and Biochemistry  
*9:45–10:05 * Room 125

Contamination by metals, such as iron, in terrestrial and Martian soils has a negative effect on plant growth and agriculture. While iron is a needed micronutrient for plants, an excess of this element could cause toxicity in plants. The iron in both Martian soil and polluted soil on Earth could negatively affect the growth of crops and, consequently, human health if too much is ingested from the plants. However, if the concentration of iron in these soils could be manipulated, it could reduce this toxic effect of excess iron in agriculture and in the future for Mars colonization.

I grew two popular staple crops, *Zea mays* (corn), which has been reported as a low iron tolerant plant, and *Phaseolus vulgaris* (green bean), a high iron tolerate plant, in normal potting soil (control group) and three other treatments of iron. I measured productivity and iron uptake of plants and if this would change with an increase in iron concentration in the soil. The iron levels were measured using a known spectrophotometric iron concentration test. Data was collected and analyzed over four months to test this hypothesis.

This study can be applied to agricultural practices on Earth as well as in the future to condition Martian soil for plants. High iron in soils can be toxic when it is taken up by the plant and ingested by humans. Therefore, it is profitable to identify plants that can safely grow in high iron soils and test ways to condition agricultural soils to promote better crop growth and quality.

**20. Does Studying Abroad Affect Personality? An Examination of the Florence Experience**  
*Erin Farrell, Amy Posey, Andrew Salzmann,* Psychological Sciences, Honors Program  
*9:45–10:05 * Room 208

This correlational study sought to examine the effects of studying abroad on the Big Five personality traits. Benedictine College students studying in Florence, Italy, during the spring 2018 semester, were invited to complete a measure of Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism three times over a span of six months, ranging from pre-departure to post-return. The results suggest a possible relationship between international experiences and personality changes.
21. Senior Thesis: Newton’s Flaming Laser Sword and Meaning Beyond the Planck Length, “Shut up and calculate!”

Marie Rioux, Anthony Crifasi, Philosophy

9:45–10:35 * Gangel Seminar Room

Standard scientific models of matter seem to indicate that the world comes down to fundamental bits—sometimes those bits are particles, sometimes they’re described as ‘wave functions,’ and so on. If they are truly fundamental, then there is some fundamental, discrete length—though how small that length is isn’t clear. However, the ancient Greek philosopher Aristotle asserted that matter is not discrete, but continuous. Philosophy is concerned with principled, abstract knowledge, often about universal truths that do not depend on the development of technology to make a demonstration. We are caught between two principles, then: has modern science corrected an outdated philosophy, or can an ancient philosophy in principle correct modern science?

22. The Muse Meets the Artist: The Role of Relationship in the Artistic Process

Olivia Wagner, Gabriella Mammia, Jay Wallace, Art

9:45–10:05 * Room 323

Throughout art history the relationship between the subject and the artist has been limited to detached instructions and limited interaction. In this project we seek to break down the barriers that exist between the artist and the subject. By engaging in conversation with the individuals of the Atchison and Benedictine College communities in their places of work and study, we hope to learn more about the unique histories, characteristics, and personality traits that make these subjects who they are. Through this process, the individual becomes more than our subject—they become our friend. The friendships we form with these people and our desire to convey not only their physical likeness but also something of their interior essence will influence our photographing and painting of them; our subject matter becomes not just their face but also their heart. It is our duty as artists to be true to the interior reality and the soul of a person, not merely physical attributes. Through experimentation with color, texture, lighting, paint application, line quality, and pattern, we explore the variety of ways in which art can convey deeper truths about a person beyond physical appearance. As two separate artists collaborating in this project, we hope to convey how the unique personality and perspective of the artist will contribute to the portrayal of the individual subject. This project will prove that the interaction between the artist and the individual contributes greatly to the substance of the work. When viewing the painting and photograph of each individual, we want our audience to feel that they are engaging in their own encounter with the unique personality and essence of both the individual subject and the artist.
23. Turn Up the Heat: A Study of Religion and Attractiveness  
Rachael Barnes, Catherine Boruch, Isabelle Wilhelm, Jacob Roth, Margaret Restuccia, Adam Buhman-Wiggs, Psychological Sciences  
10:15–10:35 * Room 109

Many people ask themselves what they find attractive in potential romantic partners. The present study was conducted to test two hypotheses: 1) participants, based on their own religiosity, would rate target subjects as more or less attractive based on whether the target subject’s religiosity was the same, similar, or different in relation to the participant, and 2) participants would find target subjects less date-able as the religiosity of the target subject became increasingly different from their own. Research participants were recruited from both Benedictine College and Amazon Turk, and each identified their own religious affiliation, if any. Using photos from the Chicago Faces Database, each photo was randomly assigned a religion in a brief demographic summary presented with each photo. Participants were asked to rate how attractive they believed the person in each photo was and to rate how likely they were to potentially go on a date with the person. Contrary to hypotheses, a reliable pattern emerged in that Catholic observers consistently rated photos as less attractive and less date-able than Christian or non-Christian observers, regardless of the religion assigned to the photo. The methodological challenges and implications of these findings will be discussed.

Grayson Feist, John Settich, Political Science  
10:15–10:35 * Room 124

Some officials in American government are corrupt. Some are ambitious. Others prize financial gains. Others aim to frustrate the purposes of their agencies. Scott Pruitt, former head of the Environmental Protection Agency, engaged vigorously in public corruption. I know, because I worked in his office in summer 2018 in Washington, DC. This research begins with a meta-analysis of the extensive theoretical foundations on corruption. I will differentiate the official misconduct of the type represented by Director Pruitt in one branch in the corruption literature. My findings include an assessment of both the short-term damage such corruption causes to the mission of this agency and the long-term consequences to public confidence in government. This case study combines the field of public administration and public policy analysis. I rely on established scholarship as the frame for my study and I combine that with my own observations as an employee in the Director’s office during some of his most egregious behavior and during the transition to the acting director. Finally, the case study illustrates the insufficiency of existing governmental ethics standards as restraints on such officials and the timidity of prosecutors to bring charges in cases of documented official misconduct.
25. The True Cost of Study Abroad: The Abroad Budget  
*Sabrina Poston, Ashley Langan, Angela Erusha, Chris Glenski, Brian Henry,*  
School of Business  

10:15–10:35 * Room 125

This project is an in-depth analysis of the Benedictine Florence Study Abroad Program to help future travelers know what to expect and be better prepared for the costs of travel. These costs include travel fees, program fees, and other unexpected fees. This analysis has taken into account our own personal abroad costs and other research to provide as accurate information as possible. Within our presentation, we will include tips to save money and an interactive budget to personalize your costs and see what your individual trip is likely to cost. This presentation will leave you with the tools you need to budget efficiently so that you can start saving up the proper funds you’ll need for your amazing adventures to come.

26. Genera Index of Native Bees of the Benedictine Bottoms and Investigation of Neonicotinoid Insecticides  
*Rori Richardson, Katherine Boord, Katherine McLaughlin, Terrence Malloy, Virginia Winder, Paul Steinbach,*  
Biology, Chemistry and Biochemistry  

10:15–10:35 * Room 208

Neonicotinoids are a widely-used class of insecticides that inhibit nervous system activity. The neonicotinoids imidacloprid and thiamethoxam are highly toxic to bees; the neonicotinoid thiacloprid is less toxic but is used with greater frequency. Studies performed on honey bees show that exposure to sublethal doses of these three pesticides can alter individual behavior with repercussions on the health of the colony. The impact of neonicotinoids on honey bees (*Apis mellifera*) has been more widely studied than the impact of pesticides on other genera and species of bees. Given the significant role that wild and solitary bees have in pollination, it is important to investigate how they are impacted by neonicotinoids. The goals of our research were (1) to identify the bee genera native to Benedictine Bottoms and (2) to use regionally collected honeybee combs as a surrogate to infer the exposure of native bees to thiacloprid, imidacloprid, and thiamethoxam. We sampled native bees with a sweep net and 30 bowl traps throughout 4,422 square meters of grassland in the Benedictine Bottoms throughout October and November. We collected 166 bees over 577 hours, with an average rate of 0.288 bees caught per hour. We pinned these specimens and identified them to genus. We found that Agapostemon, Augochlora, Halictus, and Lasioglossum were the most abundant genera within the Halictidae family in our collection, while the most abundant genera in the Apidae family were Bombus and Apis. Additionally, we contacted local beekeepers and collected samples of wax from local hives. We learned how to isolate the pesticides from the wax using QuEChERS filtration columns. During this presentation we will also discuss ongoing efforts to identify the pesticides in the wax samples using high performance liquid chromatography.
At the beginning of the 20th century, there were less than 500 people of Guatemalan origin living in the United States. By 2010, that number had risen to over 1 million, and has only increased over the past decade, with huge numbers of migrants entering both with and without visas. A major reason for this dramatic upturn in immigrants from Guatemala is the violence the country endured in the mid-20th century at the hands of the far-right government, who came to power with support from the United States. In the aftermath of the violence, the US continued to impose policies on Guatemala that kept the country in poverty and motivated migration. US policy regarding Guatemala during the 20th century destabilized the country and created the migrant crisis that embroils the country today. This thesis explores the historical background of the Guatemalan migrant crisis, the current situation for the country, and the experience of individual immigrants to the United States, dissecting both their motivations for leaving and their perceptions of their journeys’ outcomes.

My paper will look at trade within the Native American Trans-Mississippi West from 1550 to 1850 and will discuss how exactly trade affected various Indian tribes. The focus of this paper will be how the Trans-Mississippi West was changed over time due to the influx of traders from Europe and the United States, all hoping to make a profit, entering into the region. I will primarily be looking at trade within the west from the perspective of the Native Americans. I will examine the reaction of different tribes to the convergence of white men, most of whom were searching for peoples to trade with, in their territories; I will also consider the various benefits and problems for the Native American tribes that were involved in trade with Europeans and Americans.

My thesis is unique in the fact that it specifically looks at the problems brought on by trade in the Native American Trans-Mississippi West for the various Indian tribes living in the region. Trade within this area of North America, especially looking from the perspective of the Native Americans, has not been the primary focus of many monographs or articles concerning Native American history. Typically, trade and its effects in the Trans-Mississippi West are relegated to a secondary or tertiary focus within the written works of Native American historiography, if it is even given that much focus. The fur trade, while it has been the focus of some research on trade amongst Native American tribes east of the Appalachians, has been given little attention in regards to its presence and effects west of the Mississippi River. This paper seeks to take a deeper look at trade and its effects within the Trans-Mississippi West and use this subject as its main focus.
29. Room Draw 2019  
*Eli Pruneda, Alejandro Maese, Michael Grimmig, Donald Bagert, Sean Mulcahy, Michael Rolling, Mathematics and Computer Science, Residence Life, Student Life*

**10:45–11:05 * Room 109**

Each spring, those Benedictine students planning to return next year and live on campus go through the process of selecting their residence halls and rooms, in a procedure commonly referred to as “Room Draw.” This Room Draw procedure has basically stayed the same over the years, still being done with paper applications with staff then converting them manually to a spreadsheet.

The goal of this two-year project is to take the outdated Room Draw procedure, write software to digitalize the student application and room assignment process, and test it in an actual Room Draw. In developing the software, there are two components that have been developed: an API (Application Programming Interface) and the Room Draw website. The API allows both for connection and queries to a database, and to users on the website. The students will be able to create an account, set up their own housing groups, fill out the required paperwork online, and (most importantly) apply for housing.

In spring 2019, the new Room Draw software was to be used by current freshmen for their Draw while the remaining students will proceed as before. This year development has been done as a computer science capstone project; however, two members of this year’s project will return to Benedictine next year and continue with it as a Discovery Day project. The goal is to have the software used by as many students as possible next spring, with results reported on Discovery Day.

30. The Gaze of Christ and an Art of Bookbinding  
*Jacqueline Marko, Renz Pros, Jay Wallace, Aaron Riches, Art, Theology*

**10:45–11:05 * Room 124**

This project reflects on the effect of Christ’s gaze on Biblical figures through the use of various forms of art media, such as linoleum prints, photographs, and drawings. These media portray a select group of Biblical figures at the moment they encounter the gaze of Christ. In our presentation we will be exploring the difference between “gaze” and “look.” These New Testament figures were selected and inspired by prominent Biblical stories and verses specifically emphasizing their interaction with the gaze of Christ. We have connected these prints in a book format using the art of bookbinding. These books will be displayed during the Discovery Day presentation. We hope this presentation will teach our audience the significance of the loving gaze of Christ through our connection with historical artists and our pieces today.
31. The Effects of Just World Belief and Primed Religiosity on Reactions to Homelessness

*Natalie Finn, Dean Elmore,* Psychological Sciences

10:45–11:05 * Room 125

Just world belief (JWB) is the well-tested theory that we all want to believe our actions, behavior, and attitudes contribute to our success (or lack thereof) and thus feel threatened when something unjust happens to someone who does not deserve it. Due to this threat, we use certain strategies to lessen our internal conflict, including blame and compensation.

Although JWB has a strong influence on our thoughts and behaviors, there are other factors that are involved as well, namely religious belief. Because the research is currently unclear and somewhat contradictory regarding the relationship between JWB and religiosity, we were interested in assessing whether activated thoughts of God/religion could lessen the effect of JWB in unjust situations. We were particularly interested in the influence of these variables on reactions to persons experiencing homelessness.

In order to test this, we recruited participants to complete a sentence unscrambling task that primed either religious or neutral concepts. After completing this task, participants read a story about the day-to-day experiences of a homeless person and then gave their reactions to his situation. Next, they reported their general attitudes toward homelessness and indicated their interest in an opportunity to help homeless persons in their area. Lastly, participants completed a measure of trait belief in a just world.

Preliminary data suggest that JWB, but not religiosity, had an impact on participants’ reactions to homelessness in the story and at large. This presentation will describe the results in greater detail and report on additional data currently being collected.

32. Religious Upheaval in Egypt: Akhenaten and the Amarna Revolution

*Kelsey Runge, Joshua Wolf,* History

10:45–11:05 * Room 208

The long and storied history of Ancient Egypt reached its zenith in the Eighteenth Dynasty (1539–1292 BCE), a time when gold was as abundant as sand in the powerful empire. Egyptian control stretched from Syria in the north to Nubia in the south. A vast network of alliances brought an abundance of trade into the empire, and the pharaohs were building prolifically all across the land. Egypt was seemingly unstoppable at this time. There were no outside forces who dared challenge the Land of the Pharaohs. It was a disturbance from within that began to cause the seemingly immortal dynasty to slip.

That disturbance was the Amarna Revolution (1353–1336 BCE). The most studied period in Egyptian history has become a bit of an ancient soap opera at the hands of scholars, and a vast array of theories and unchecked claims about the era have caught the attention of historians since the early twentieth century. Akhenaten, the
pharaoh at the center of it all, was the son of the deified Amenhotep III. Instead of following in his father’s footsteps, he broke with thousands of years of Egyptian tradition, building an entirely new capital city at Amarna and demoting the traditional pantheon to make room for the Aten, the physical orb of the sun. There is endless speculation concerning why he made this move, and some have gone as far as to call him the Father of Monotheism. Despite his religious fanaticism, it seems unlikely that Akhenaten’s Amarna Revolution was monotheistic in nature. Rather, he attempted to elevate one god to the highest possible echelon, upending the status quo by reducing the traditional gods to a lower tier.

This presentation will briefly set the stage with the background of the Eighteenth Dynasty before examining the reign of Akhenaten in detail. The Amarna Revolution is the main focus, with a particular emphasis on how the Revolution was not monotheistic in nature, yet was still a dramatic break with tradition. The Amarna Revolution was perceived as an assault on Egyptian religion, as seen in the way the names of Akhenaten and his successors were erased from subsequent king lists and other records. Despite the attempted erasure of the Amarna royals, they left their mark on the next ruling families. The Egyptians attempted to eradicate the Amarna Revolution from memory, yet the pharaohs involved in it are perhaps the most well-known in all of Egypt’s expansive history.

33. The Passage of the 19th Amendment: Who the Hell is Harry Burn, Mate?
   Maura Buhler, Jessica Carney, Collette Valenzuela, Emily Sanderlin, Elisabeth Fanning, William Raymond, Political Science
   10:45–11:05 * Room 219

   America prepares to mark the centennial of the adoption of the 19th Amendment to the U.S. Constitution that granted women the right to vote. This research begins with an appraisal of the complex processes the suffragettes used to gain this right and the key actors instrumental in its ratification. Dr. John Kingdon’s concept of “policy windows” is useful in this appraisal. Our project then offers a comparative analysis by examining whether American women followed the model set by Australian women in their suffrage movement approximately 25 years earlier. Finally, the project uses survey data from Benedictine College women to gauge whether the right to vote is as prized and practiced in the 21st century as it was in 1920. There is a rich literature that describes the potency of women in earning the right to vote. Research, especially the National Election Studies, demonstrates the ebbs and flows in women’s primacy in elections. Such literature informs our critique of the data from research among Benedictine College women and their dispositions about voting.

34. Trauma-Informed Care in Schools and Classrooms
   Kate Wallin, Adriana Aguirre Cortes, Matthew Ramsey, Education
   10:45–11:05 * Gangel Seminar Room

   Many children are victims of traumatic experiences due to various negative events in their lives, such as neglect and abuse. These various negative events have an
adverse impact on children’s emotional, physical, cognitive, and behavioral health. As a result, these children suffer a great academic disadvantage. Their ability to function and succeed in an academic setting has been impaired. One widely utilized method for accommodating for those impairments is the process of trauma-informed care. When a school building utilizes these methods they may be labeled as trauma-informed schools and classrooms. These schools are able to better support all students and more efficiently meet their needs. This trauma-informed system includes an informed and trained staff that provides support at every level: school, classroom, and individual. The authors of this project became interested in how to improve our future professional practices based on the methods utilized in trauma-informed schools. We are also curious about how teachers and administrators transition to these methods and what barriers exist. For this reason, we identified an elementary school in a mid-sized town that had transitioned to this model of care. We conducted semi-structured interviews utilizing the Yin Case Study Methodology (2009) toward the construction of a case study that seeks to share the experience of a school community implementing a trauma-informed system.

35. Magnetic Accelerator

   Luke Wadle, Nathaniel Strandquist, Jr., Georgiy Shcherbatyuk, Physics and Astronomy

   10:45–11:05 * Room 323

Although magnetism has been known to exist since the time of the ancient Greeks, it wasn’t until the late 1500s that people started to study it thoroughly, and it wasn’t until the early 1800s that scientists discovered a link between magnetism and electricity. Due to these delayed discoveries, much of our technology hasn’t used these discoveries until more recently. This project explores the use of magnetism to accelerate metallic objects faster than more conventional methods.

This project will use magnetic fields generated by high voltage flowing through a single coiled wire to accelerate an object capable of delivering a measurable amount of kinetic energy. The study will help to further cement the ideas of acceleration by magnetism and circuit construction and implementation.

Due to the potentially dangerous nature of this experiment involving high voltage and rapid acceleration, proper safety procedures for the operator and surrounding area will be taken. The velocity of the object accelerated by the magnetic coil will be measured by a pair of photogates.

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

36. Teaching Future Scientists Through Comics

   Ethan Novacek, Janet Paper, Biology

The future of science rests in the hands of young students everywhere. Thus, it is crucial for children to be captivated by the fascinating concepts that embody the
field. Because comics are often popular with middle school students, I designed a comic book that goes along with an experiment designed to teach them about bacteriophages (viruses that will infect and kill bacteria). The comic book runs roughly 30 pages long, as it follows a microbiologist who discovers a disease-causing bacterial colony in his lab. The main character works tirelessly to rid the staff of the disease using a bacteriophage. This relates to real science because current research on using bacteriophages as treatment for antibiotic resistant bacteria is promising. Middle school students will perform an experiment using bacteriophage and *E. coli* (bacteria). The students will infect bacteria with the bacteriophage and after incubation will be able to see plaques—zones of bacterial cell lysis—on their plates. They will then observe and record the plaques on their respective plates to quantify their results. Overall, the comic book teaches the students fundamental concepts about viruses and bacteria, food safety, and good sanitation practices. Also, the comic book gives an in-depth look at the bacteriophage life cycle, ultimately showing the students what is going on in their experiment on the molecular level. This project provides a fun and creative structure to learning about microbiology and shows the students that anyone, at any age, can be a scientist.

### 37. Concrete Canoe Transportation Cart

**Olivia Obrutsch, Monica Treacy, Joshua Sullivan, Benjamin Suhr, Scott Newbolds, Charles Sprouse,** Engineering

For the past seven years, Benedictine College School of Engineering has sent a team to the American Society of Civil Engineers (ASCE) regional concrete canoe competition. During the competition, a transportation cart is used to hold and transport the canoe safely and securely over walkable distances. At last year’s competition, the cart underwent catastrophic failure, necessitating the design and construction of a replacement. After analyzing the previous design to identify the cause of failure and areas for improvement to functionality, a new design was created using engineering analysis. Modifications include added support structure to increase strength, use of four versus two swivel casters for greater maneuverability, and replacement of the caster location to minimize risk to users’ feet. Structural integrity was verified via hand calculations including various truss and beam models, and by computer-aided design (CAD) simulations. The final design was built using several manufacturing processes, including drilling, MIG welding, and rust prevention. Multiple administrative tasks occurred throughout the process, such as planning and scheduling, budgeting, parts procurement, and documentation.

### 38. Concrete Canoe Strongback

**Nicholas Olache, Brett Burke, Steve Spencer,** Engineering

When canoe building, it is extremely important that a long, level surface is available to build the canoe on. Whether the canoe is being made of cedar strips or concrete, this long work surface, called a strongback, must be consistently level and strong enough to support the canoe and mold. However, if the canoe
is constructed out of concrete, the strongback must accommodate several new challenges including being able to support a much heavier weight, accommodating a different style of mold, and being adaptable to various curing techniques. This project constructed a strongback that satisfied the unique challenges that arise from constructing a concrete canoe.

39. Simplified Geolocation Using Time Difference of Arrival (TDoA) and Coordinate Transformation  
   **Jeanne-Marie Potthast, Eric West, Nickolas Hein, Mathematics and Computer Science**  
   Time Difference of Arrival, or TDoA, is one of many ways to determine the position of an unknown emitter. This method requires the location of three or more sensors, along with the time differences of the signals’ arrivals between the three sensors. This change in time can be easily translated to a change in distance. From here, we draw a hyperbola of possible locations of the emitter for a set of sensors. To narrow down our options of where the emitter is located, we repeat this process for the other sets of sensors, calculating other hyperbolas, until we have a unique intersection point of the hyperbolas where the emitter is located.

40. Rosemary and Its Effect on Cervical Cancer Cells  
   **Sara Rahmanzai, Megan Nault, Lillian Nacke, Kathryn Weaver, Meghan MacLellan, Martha Carletti, Biology**  
   Cancer cells demonstrate escalated rates of cell proliferation and a resistance to apoptosis. Mutations in vital signaling molecules, which control pathways associated with cell proliferation, are why cancer cells grow uncontrollably and evade programmed cell death (apoptosis). Varying compounds found in plants and foods have raised attraction to scientists as an application for treatment and cancer preventing agents. Some studies have shown that rosemary extract contains anti-cancer, anti-inflammatory, and anti-oxidant properties. *Rosmarinus officinalis* L. and rosemary extract contains many polyphenols with carnosic acid and rosmarinic acid found in highest concentrations. This study examined the rates of apoptosis and mutagenicity after the addition of rosemary extract to cervical cancer cells in vitro. Cervical cancer cells were treated with the rosemary extract for 24 hours and were then dyed with trypan blue to test cell viability. An AMES test was used to determine if the rosemary extract caused or prevented DNA mutations. This experiment also studied the effects rosemary extract had on the heart rates of Daphnia. Throughout the experimentation, sufficient results were reached through multiple AMES tests and a procedure involving the exposure of Daphnia to rosmarinic acid. Through the AMES test, results displayed that after rosmarinic acid treatment, cell proliferation of the bacteria decreased. As for the Daphnia, the organisms demonstrated a significant increase in heart rate in the presence of rosmarinic acid.
41. The Genotoxicity and Apoptotic Effects of Resveratrol

Erin Rauber, Molly Muehlebach, Brynn Maul, Mikaela Loucks, Martha Carletti, Biology

Resveratrol is a compound found in several sources, including the skin of grapes, blueberries, raspberries, and mulberries. Red wine, especially, has a high concentration of resveratrol. Plants produce resveratrol and other antioxidants as a protective mechanism to free radical damage. Both in vitro and in vivo experiments suggest resveratrol influences cell proliferation and apoptosis in cancer cells via the PI3K/AKT and p53 pathways. In this study, we did a genotoxicity test and found that resveratrol does not cause genetic mutations. We also treated HeLa cells in vitro with resveratrol and counted apoptotic cells following treatment.

42. The Effect of Hospitalization on Children

Elizabeth Roth, Jennifer Zrubek, Michele Hinds, Nursing

A hospitalization is a stressful occurrence for anyone, especially children. In 2005, Rhonda Board’s research reported how children perceived their experience in the hospital and their psychosocial effects. Hospitals have strived to ease the experience for children with engaging environments, playrooms, and Child Life specialists who offer the child support and distraction. Despite hospital efforts, children have continued to experience high levels of stress both in the hospital and after their stay. Direct interviews with children revealed feelings of fear and hopelessness. At the same time, the children interviewed also identified the positive impact of nurses and family-centered care. When children who were previously hospitalized in the Pediatric Intensive Care Unit were asked who helped them the most during their hospital stay, 29% reported it was their families, and 43% answered it was their nurses. This project explores short-term and long-term effects of hospitalization in children and appropriate nursing interventions to ease children’s fears during their stay. Through holistic care and consideration of psychosocial development, nurses can determine appropriate interventions for the wellbeing of their pediatric patients.

43. Elmore Project: The Complete Genealogy of Benedictine College

Psychology Students

Jared Roush, Erin Farrell, Amy Posey, Psychological Sciences

Just as we can trace our family lineage through the generations to understand more about our family history, we are also able to trace our psychological lineage through past doctoral advisors to gain insight into our professors’ educational backgrounds. Tracing our professors’ academic lineages allows for current students to see how academic thought pertaining to psychology has evolved through the decades. In past years, psychology students at Benedictine College have traced their psychology family lineage through various members of the faculty. This year, we traced the psychological lineage of our newest faculty member, Dr. Dean Elmore. This archival study involved investigating each doctoral advisor’s previous doctoral advisor, until all individuals were traced back to a first
44. Benedictine College Students’ Perceptions of Vaccinations

Matthew Scavuzzo, Joseph Tynan, Frank Paolucci, Lynne Connelly, Nursing

The Centers for Disease Control (CDC) estimates that 732,000 American children were saved from death and 322 million cases of childhood illnesses were prevented between 1994 and 2014 due to vaccination. These numbers show the importance of vaccination to the livelihood of the U.S., and the research has shown that more people are misinformed than properly informed when it comes to vaccination education. Vaccine information is received through a variety of different sources and much of the research concludes with a need for formal education and other programs to be put into place to properly educate everyone. While most of these previously performed studies have engaged in research with demographics of adults, there is not a lot of information that looks at college students and their perceptions and education level regarding vaccinations.

The study in this proposal aims to investigate the relationship between college students’ major topic of study and their opinions and/or other factors surrounding their intention to receive vaccinations or not in the future. Sampling will occur with the students at the Catholic liberal arts school Benedictine College using SurveyMonkey®. Methods include the use of a 14-item survey, consisting of yes/no questions, open-ended questions, and multiple-choice questions, requesting information about gender, age, major topic of study, previous vaccinations, level of education on vaccinations, and the source of this education.

45. Identification of Potential Antibiotics Against A. baumaunnii Using Virtual Screening Software

Anna Schreffler, Nicholas Brose, Mark Schramp, Biology

Antibiotic resistance is a major obstacle in medicine, and many pathogens can rapidly develop resistance to new antibiotics as they are developed. Acinetobacter baumannii is a gram-negative pathogen that is becoming increasingly problematic in medicine due to its ability to persist in hospital settings and to readily develop multi-drug resistance to most antibiotics. One of the ways that it develops antibiotic resistance is by modulating the permeability of porins to reduce the amount of antibiotic that enters the cell, preventing the uptake of an effective dose of antibiotics. Omp-33 is an outer membrane protein that is essential for the cytotoxicity of A. baumaunnii and controls the influx and efflux of water into and out of the cell. By reducing the amount of water and hydrophilic substances that enter the cell, A. baumaunnii can develop resistance to antibiotics. The goal of this project is to use a computer program to screen a library of compounds to identify a molecule that can bind to the Omp-33 porin in A. baumaunnii, inhibiting its ability to modulate the permeability of its Omp-33 porins. We hope that an inability
to modulate membrane permeability will allow the influx of clinically relevant levels of antibiotics and reduce or eliminate antibiotic resistance in *A. baumannii*. We used the computer program PyRx to screen a compound library from ZINC12 to identify molecules that bind to Omp-33 and selected the molecules with the best binding affinity. Our future work will include toxicity screens of the selected molecules to determine if they could be safely administered to patients as antibiotics, and potentially testing the nontoxic molecules in *A. baumannii*.

46. The U.S. Economy: Past, Present, and Future  
*Stephen Smith, Bryant Suellenentrop, Michael Rziha, Matthew Branch, Paul Flickinger, Evelyn Wagner, Catherine Hegarty, Henry Schuberg, Michael King, David Harris, Joshua Wolf,* School of Business, Economics, History

The current U.S. economy has been formed by so many different factors, but which have had the greatest influence in creating the present situation? Between the Fed, interest rates, bubbles, trade wars, inflation, presidential policies, and other topics, there are almost too many options from which to choose. Through research, critical thinking, and data analysis of trends and statistics, this project set out to discover the most important U.S. economic factors since the Great Depression, revealing the people and events that truly shaped today’s world. Culminating in the creation of a brand new and original website to present its findings (complete with a useful timeline and dozens of brief biographies and summaries of individuals and events), the venture sheds light on the present situation by looking at the past and has allowed the team to draw conclusions about both the probable and preferred future of the U.S. economy.

47. Academic Freedom Under Attack? An Exploration of Book Banning  
*Christian Spesia, Jared Nigrin, Jennifer Ahlers, Stephen Mirarchi, Christina Adams,* English, Education

The American Library Association receives requests for certain books to be banned from curriculum, schools, and public libraries. The main reason for banning or challenging a book is to protect students from ideas or information deemed either too difficult or too mature for the reading audience. However, does restricting a student’s ability to read “banned” material inhibit their academic freedom? What effect, in turn, does this restriction have on the abilities of students to practice and strengthen their morality? In this exploration, we are seeking to answer these and other questions by looking through three separate but distinct lenses: English, education, and theology. With an English approach, we are looking at how books contribute to society through their language, structure, and content. Author Wayne C. Booth talks in his book, *The Company We Keep: An Ethics of Fiction*, about the ethical criticism applied to books, specifically *Huckleberry Finn*, and how although the literature of Twain may contain content deemed controversial, the lessons to be gleaned from the literature provide benefits that outweigh the perceived controversy. In the educational approach, we are looking at educators’ reactions to the banned and challenged books and the perceived or experienced impact banning books has on the educational experience of students.
Testimonies will be viewed from the article “The Messages We Miss: Banned Books, Censored Texts, and Citizenship,” taken from the Journal of Social Sciences Education Research, in order to see firsthand the effect banned books, or the possible deficiencies from the lack of banned books, has on the classroom. In the theological approach, we are looking at what the Catholic Church, through its Catechism, teaches on freedom and responsibility. With this knowledge and the perspective of Rev. Joseph Koterski, an academic in the fields of philosophy and theology and President of the Fellowship of Catholic Scholars, a commentary on what academic freedom truly is will be synthesized. Exposure to contrary viewpoints and ideals and responding to these ideas is an essential element for the growth and development of students, not just intellectually but morally. However, is limiting student exposure to “banned” ideals ultimately permissible, or is the restriction leaving students vulnerable to deficiencies in their intellectual and moral growth?

48. Go-Kart: Suspension and Control

Joshua Sullivan, Alex Hammeke, Heather Smith, Dimitri Maricich, Steven Oliver, Charles Sprouse, Engineering

The purpose of the suspension project is to learn and utilize methods of mechanical control systems to increase the effectiveness of a go-kart in off-road conditions and to collaborate with engineering students of different backgrounds to make improvements. The project took the go-kart previously created in 2015 for a Discovery project and used the methods learned in previous classes to make invaluable improvements to the overall control and versatility of the go-kart. The suspension design used preliminary testing to compare how well the go-kart could be controlled under various conditions and how smoothly and comfortably the go-kart ran before the improvements were made. This information determined how to orient the materials for a sturdy system that could withstand rough conditions. The overall plan is to have this Discovery project continue for the next couple of years so that each new class can take the knowledge that it gains and apply it in ways that is both constructive and enjoyable.

49. Redesign Existing Engineering Go-Kart Frame

Hannah Thomazin, Joshua Sullivan, Charles Sprouse, Engineering

The goal of the frame redesign team is to create and analyze CAD drawings of a newly proposed frame, fabricate the new frame, and install it onto the 2015 Discovery Go-Kart project. This project harnesses classroom applications and students in different grades work together to apply their different levels of knowledge. The frame redesign team collaborated with the suspension and control team to improve the 2015 go-kart. Constant communication is required, and we are able to integrate both improvement solutions to the 2015 go-kart. The aim is to provide students to pursue further challenging engineering projects in the future.
50. Behavioral Testing of Altruism Between Mice

Theresa Wood, Rachel Boucher, Elizabeth Morris, Virginia Winder, Biology

Altruism is colloquially defined as an organism behaving in a way that benefits another individual at no apparent benefit to itself. Research has shown that these behaviors are often linked to benefits from indirect fitness due to kin selection. We tested for the presence of altruistic behavior in mice, investigating whether familiarity between individuals was related to higher or lower levels of altruistic helping behavior. We hypothesized that mice that were previously familiar with one another would be more likely to behave altruistically towards one another. To test this we constructed a two-chambered behavioral arena with the two chambers separated by a plexiglass wall. One chamber was higher and dry inside, and the other chamber was lower and the floor was covered in 2.5 cm of water. A door connected the two adjacent chambers. We tested timing and frequency of altruistic helping behavior in this arena using six male feeder mice. Throughout our trials, we housed the mice in two separate living quarters (four in one group, two in the other) so that each group developed familiarity amongst its members but not with members of the other group. We conducted 60 trials consisting of two mice on separate sides of the two-chambered behavioral arena. In each trial, we used a random number generator to assign one mouse to each side and recorded the time it took the wet mouse to get through the door to the dry side of the arena, whether the mouse on the dry side helped, and whether the mice were from the same or different social groups. In 43% (26 of 60) of the trials, the mouse on the dry side of the arena exhibited helping behavior, in some cases making a sustained effort to help the other mouse. Contrary to our hypothesis, we observed a higher frequency and faster timing of helping behavior when the mice paired for a trial were not from the same social group. In trials with pairs of mice that were unfamiliar with each other, helping occurred 62% (16 of 26) of the time with an average time of 30 ± 5.7 s SE for the mouse on the wet side to gain access to the dry side. This was in contrast to helping occurring in 38% (10 of 26) of trials with an average of 116 ± 24.3 s SE for the mouse on the wet side to gain access to the dry side when both members of the pair were from the same social group. These results provide evidence for altruistic behavior in mice and can be used to give insight into its causes and evolutionary benefits.

51. Student Perceptions of Human Papilloma Virus

Madeleine Zignego, Renee Setter, Wendy Woolston, Nursing

The Human Papilloma Virus (HPV) vaccine was introduced to the United States public in 2006. The vaccine has since been updated to include multiple strands of HPV, which have been linked to cervical cancer. The vaccine has been controversial in many groups referencing side effects, lack of knowledge, or moral objections as reasons for not receiving the vaccine. The purpose of this study was to explore if Benedictine College students’ perceptions of the HPV vaccine correlates with their gender, religious beliefs, and/or knowledge about the HPV vaccine. A paper survey was distributed exclusively to Benedictine College students. The participant was first asked to complete a demographics
questionnaire and then completed a series of questions related to the virus and the vaccine against it. Data was analyzed using Statistical Packages for the Social Sciences 25 software. The potential benefits of the study include the researcher gaining more knowledge related to Benedictine College students’ perceptions to receive or not receive the HPV vaccination. The survey may prompt students to seek more information about the vaccine; this allows them to personally weigh the risks and benefits of receiving it. The information gathered from this survey could help the researchers develop education to help eliminate misperceptions about the vaccine. As healthcare providers, information gathered through the survey could improve understanding of why students and patients may choose to receive or not receive the vaccine. There were 238 students surveyed. The majority of the students were between the ages 18 and 22, the youngest being 18 and the oldest 27. Of the 238 students, 69.3% were female, and 29.8% were male. Of the surveyed students 33.2% report that they were vaccinated; 35.3% reported they were not vaccinated; 31.5% did not know.

52. Queerness in the Works of Mary Renault
Melody Wiklund, Michael Stigman, Julie Bowen, English

The question I hope to answer is essentially: How does Mary Renault portray same-sex relationships in her works, and on the other hand, how does she portray “queerness” as a personal identity? Currently my answer to that question would be that she portrays same-sex attraction as natural and relatively innocent, and in fact idealizes same-sex relationships, but only when they are handled in certain ways. She is very positive about relationships where the love between the members is highly romantic in a Platonic fashion and not overly sexualized. She is also positive about relationships where one character serves as a mentor or idol for another.

On the other hand, as regards “queerness” as a personal identity, she is largely negative. Part of this seems to stem from the fact that she regards “queerness” as a modern and weakening concept. Within her ancient Greek fiction, it does not exist—there are men who are more attracted to men or more attracted to women or to both, but there are no dividing lines, and it is not seen as essential to individuals’ identities. Within her modern fiction (e.g., The Charioteer and The Friendly Young Ladies), Renault takes the view that it is better to keep one’s sexuality as a less essential part of oneself. Often her queer characters express negative opinions toward making one’s sexuality too central to one’s identity, expressing pity or disgust towards people who are too flamboyantly gay or who confine themselves to LGBTQ social circles. This negative view towards “queerness” (and towards the LGBTQ+ community) is one aspect of her work that makes her writing controversial to modern readers of her work.

To explore this apparently contradictory attitude of positivity towards same-sex relationships and negativity towards queer identity, I intend to use several of Renault’s novels, particularly The Charioteer, Fire From Heaven, The Persian
Boy, and *The Friendly Young Ladies*. Additionally, I am referencing secondary sources of scholarship on her works, including David Sweetman’s *Mary Renault: A Biography*, Peter Wolfe’s *Mary Renault*, Bernard Dick’s *The Hellenism of Mary Renault*, and Caroline Zilboorg’s *The Masks of Mary Renault*.

53. A Survey of the Distribution and Abundance of Asian Carp in Deer Creek

*Madilyn Gothard, Nicole Salman, Adam Landry, Terrence Malloy, Virginia Winder, Biology*

2:35–2:55 * Room 124

Asian carp are a group of fish including the Bighead carp (*Hypophthalmichthys nobilis*), Silver carp (*Hypophthalmichthys molitrix*), Black carp (*Mylopharyngodon piceus*), and Grass carp (*Ctenopharyngodon idella*). In 1970, fish farmers brought them to the United States for aquaculture purposes. Due to flooding on the Mississippi River, the fish escaped and quickly expanded into its tributaries—the Ohio and Missouri Rivers. Asian carp are considered invasive because they are planktivores and often outcompete native species by monopolizing this resource. It is valuable to understand the extent to which Asian carp have colonized streams because this information aids in understanding how to best combat their spread and how to mitigate their effects in infested waters. Our study site, Deer Creek, is a first order stream that runs about nine miles long, and its headwaters are in eastern Lancaster. It feeds into Independence Creek, which has an established population of Asian carp. Independence Creek is a fourth order stream that feeds into the Missouri River. The goals of our project were to investigate and map the distribution of Asian carp and to quantify the abundance of Asian carp relative to native species in a first order stream. We sampled using seines and an electrofishing unit at six, 50-m stretches of Deer Creek, from near its headwaters to its confluence with Independence Creek. We standardized efforts by seining two times per point in approximately 10 m stretches. At these points, we electrofished for 90 seconds per point. We found Asian carp at three of our six sampling locations. These three points were the closest to Independence Creek. The point nearest to Independence Creek contained eight Asian carp, the next closest contained six, and the next closest contained five. These three points are all located within one mile of Deer Creek’s confluence with Independence Creek. We caught a total of 19 carp of four different species and 794 native fish of 11 different species; however, 250 of these natives were too small to be identified to the species level (all at the point closest to Independence Creek). The average ratio of Asian carp to native species was very low, at 0.058 carp for every native species caught. Our study demonstrates that Asian carp are present in Deer Creek, but at this point, their abundance is low compared to native species. Asian carp may exist at fairly low densities because our study site is a first order stream and may not be a suitable habitat for Asian carp.
Many computer games aim to bring meaningful entertainment to their players while recreating reality at the same time. To provide a realistic immersive experience, game designers must incorporate as many elements as possible from the real-world situation being represented. Human perceptions, such as sound, motion, color, texture, and space, must be emulated through the computer peripherals (video monitor, speaker) to enhance the user’s sensorial perception. In order to address the challenge of providing an experience similar to that of the real world, the complex laws of physics that rule natural phenomena must be translated into computer code. Thus, an efficient simulation engine that models real-life physics needs to be integrated tightly to the rest of the computer game. Such an engine should be able concurrently to solve a large number of physics equations multiple times per second to make the game look and feel realistic. Sports-based games are particularly challenging in this respect because animation algorithms need to anticipate natural reactions to every possible game situation. In this project, a physics engine has been developed to simulate realistically the dynamics of the ball, paddle, and table in a ping pong (table tennis) game using the mathematical and programming tools available in the MATLAB® and Simulink® softwares. It will take into account many essential elements that influence the in-air trajectory of the ball and the subsequent trajectory after bouncing, considering factors, such as velocity, spin, inelastic collision, drag force, and Magnus Effect. Using these figures, it will draw an accurate representation on the computer screen of these physical phenomena.

Ego depletion is the idea that self-control is a finite resource, like energy, that can be used up and replenished. In this experiment, we explored the possibility that listening to music might diminish the ego depleting effects of tasks that require self-control. In order to achieve this, we had participants complete (1) an e-hunting task, in which participants rapidly searched for and crossed out e’s from a block of text; (2) a math test, consisting of 40 multiples choice and division problems; and (3) a mood questionnaire to control the changes in mood throughout the experiment. Depending on the condition, participants completed a simple version of the e-hunting task (control group), a complex version of it (ego depleted group), and some listened to music while doing the complex version of it (experimental group). We randomly assigned participants into these three groups. All groups completed the math questionnaire to assess the amount of ego depletion they experienced. We hypothesized that ego depletion (as indicated by performance on the math worksheet) would be strongest for the ego depleted group, weakest for the control group, and the experimental group would be in the middle but closer to the control group. According to our preliminary data, the
length of time working on the math worksheet significantly differed based upon the group that the participants were in. The number of math problems that the participant completed did not significantly differ between groups. More findings from a second round of data collection will be discussed in greater detail at the presentation.

56. Mount Rushmore: Why There? Why Then? Why These Four Because of These Six?
   Elizabeth Lademan, Peter Hockel, Marie Stender, Miguel Monteclaro, William Raymond, Political Science

   2:35–2:55 * Room 219

Mount Rushmore is one of the most visited national monuments in the United States with nearly three million visitors annually. Its momentous size and history has engulfed the curiosity of tourists since the unveiling of the first figure, George Washington, upon the mountain in 1934. Through an extensive literature review of both the monument and the four presidents, talking with a park ranger educational specialist and a Native American Lakota Chief, this project explores why Mount Rushmore exists, specifically through the efforts of Gutzon and Lincoln Borglum, Doane Robinson, Peter Norbeck, William Williamson, and John Boland. These men fought for a symbol of pride and hope that would inspire a new wave of patriotism within the country. Whether it was through legislative work, fundraising, or the actual carving, each man proved to be a necessary contributor to the completion of Mount Rushmore. The project also explores the key leadership qualities of the four presidents as well as their impact on American history. The presidents were honored for the impact they each had on America’s preservation, success, and growth.

57. How Does Music Express Emotion?
   Nathaniel Strandquist, Jr., Jamie Spiering, Philosophy

   2:35–3:25 * Gangel Seminar Room

Music is near-universally considered to carry emotional content of some kind, to the point that we frequently judge music on the manner and kind of its emotional expression. This presents a philosophical problem because music seems to be non-sentient and non-linguistic and, therefore, incapable of emotional expression. This thesis proposes to solve that problem by showing how the form of music is such that it imitates the movement of the emotions in an objectless way, making it unique among the arts. The works of Aristotle, Karol Wojtyla, and Arthur Schopenhauer especially are drawn upon in order to answer the crucial questions of what music is, what the emotions are, and how the two are related.
58. From Drawing Board to Reality: Designing a Dedicatory Garden for the Abbey
*Margaret Jones, Adèle Bischel, John Haigh, Architecture*

3:05–3:25 * Room 109

Tucked behind St. Benedict’s Abbey in Atchison, KS, is a place well-known to the Benedictine College community. Endearingly known as “The Lookout,” this spot is situated on top of a towering bluff, boasting breathtaking views of the Missouri River Valley. The current arrangement of this area features a single concrete path from campus that leads to two benches overlooking the river. While the view is beautiful, the layout does little to provide onlookers with a meaningful experience, nor does it optimize the Abbey grounds as a peaceful and prayerful space for the monks.

In this project, the Abbey tasked students with designing a prayer-garden, dedicated to the Holy Family, that would occupy the current lookout area. With funding by generous benefactors, this project offered the unique opportunity for students to design a space that would actually be constructed. In so doing, students were able to build upon the design process taught in their architecture courses through hypothetical projects. They were afforded the invaluable experience of discovering what the actual design and construction of a space entailed.

In comparing the processes of hypothetical and actual design, students were able to manage the real-life tasks and obstacles that frequently occur in the professional field of architecture. From balancing the wants of a client with the reality of site constraints to providing quality results while adhering to a budget, students discovered the enormity of an architect’s responsibility when completing a project.

This presentation will highlight the findings and experiences of the students as they accomplished each phase of the design process and compare them with their preconceived notions of the nature of real-life project work. Students will also reveal their plans for the garden and describe the next steps in moving forward with the construction of the space.

59. The Effect of Gender and Ideological Similarity on Perceptions of a Persuasive Source
*Anna Gowasack, Amy Posey, Psychological Sciences*

3:05–3:25 * Room 124

This study explored whether the gender of a writer affects readers’ perception of the writer, and the writer’s ideas, specifically when the ideas contradict readers’ beliefs. To do this, we first administered a measure of participants’ attitude regarding President Trump. All participants then read an editorial that criticized Trump and were randomly assigned to conditions in which the author was either male or female. Following the article, participants completed measures assessing how likable and how competent they believed the writer to be. Based on the backlash effect described by Heilman et al. (2004), we expected that the female author would be judged more harshly when participants’ beliefs were contrary to
those expressed in the article. Our findings did not support the hypothesis. We did, however, find a significant effect of Trump attitudes on the author’s perceived competence.

60. Offering an Industrial Management Degree at Benedictine College
Matthew Conner, Stephen Minnis, Darrin Muggli, Michael King, President’s Office, Engineering, School of Business

3:05–3:25 * Room 125

Industrial Management programs have become more common across the last several years, training students for a career focused on efficiency, logistics, and cost management for companies of all sizes and concentrations. This is a highly profitable career, with an average salary of around $86,000. With some websites reporting that over 30% of those currently employed in this field have been there for over twenty years, it is a field that will continue to experience growth in the near future.

Those trained in Industrial Management are given instruction in both business management and engineering, specifically engineering as it relates to efficiency, production, safety, and cost analysis. This fits a niche that many employers, such as EPIC Management, Liberty Mutual Insurance Group, Eaton Corporation, and PepsiCo, are seeking out, as graduates have the knowledge to serve as an effective bridge between those in the production facilities and the corporate offices.

With this knowledge, I began researching the plans of study from some of the top Industrial Management programs in the United States, including those of Stanford University and Purdue University. Next, I cross-checked the courses these schools required with those offered at Benedictine College and found that there was a significant level of overlap. A tentative plan of study was created and reviewed by both the school of business and the school of engineering. The research conducted strongly suggests that Industrial Management could be offered as a major at Benedictine without the addition of any new courses or the hiring of any new faculty members.

61. The Secret to a Successful Supreme Court Nomination
Matlin McFarren, Catherine Tighe, Miriam Miller, Isis Perez, William Raymond, Political Science

3:05–3:25 * Room 208

The chance to nominate a judge to the highest court in the land is a chance of a lifetime for any president. There have only been 163 nominations for the Supreme Court, but only 126 have been confirmed. The primary research question focused on the differences between a successful nomination and a failed nomination. The team researched four Supreme Court nominations for seats to fill what would be the current bench today. Two of the four nominations were nominations that ultimately failed: Robert Bork and Harriet Miers. The other two nominations were successful: Justice Clarence Thomas and Justice Elena Kagan. We evaluated each nomination based on a variety of factors: the role of the media, the role of public opinion, the political climate of the Congress and the Executive Branch at the
time, and the role of interest groups. Each factor affects the nomination in such a way that may or may not cause the breakdown of the nomination. The research discovered the secrets to a successful Supreme Court nomination.

62. Wildlife Vehicle Collision Location Based on Environmental Variables
   Bernadette Schrag, Sophia Holm, Virginia Winder, Terrance Malloy, Biology
   3:05–3:25 * Room 219

Wildlife vehicle collisions (WVCs) are common worldwide and negatively affect both drivers and animal populations. The goal of our study was to analyze whether landscape or highway characteristics were predictive of roadkill locations. We hypothesized that there would be uneven distribution of WVCs both within and between the two highway stretches we studied. We expected proximity to water, wooded areas, and houses to be linked to a higher frequency of WVCs. To test these hypotheses, we surveyed 40-mile portions of two Kansas state highways (Hwy 7 and Hwy 59) for roadkill over the course of two months. We drove each stretch of the highway once per week, scanning the road and shoulder for evidence of roadkill. When we spotted roadkill, we stopped and marked the location in UTM's on a Garmin handheld GPS. We recorded the species, characteristics of the surrounding landscape, and weather. We also photographed the animal and the habitat at the point. We marked the animal with spray paint to prevent pseudo-replication. We used QGIS software to plot our data and random locations along the highways to compare our data to random points. We also plotted all houses, water sources, and county road intersections along the highways to see if there were any links between these variables and WVC location. Our data suggest that there are roadkill hotspots on both stretches of highway. With this knowledge, people can take precautions to reduce WVC frequency.

63. Art Therapy, Art as Therapy: What’s the Difference?
   Sara Hutchens, Lindsay Muse, Matthew Ramsey, Education
   3:35–3:55 * Room 109

Last year, I participated in the Discovery project, “Life’s Assignment,” an original theater production exploring disabilities effect on the family structure. Through last year’s work, I became interested in how music, theater, and fine arts can be used for therapeutic purposes with children and adults. In order to better understand this questions, my partner and I created a project that involved a literature review and seven semi-structured interviews of those with specific knowledge of art therapy. We discovered the difference between art therapy and art as therapy, how art can be utilized in the therapeutic environment, what qualifications exist for art therapists, and how/who can benefit from engaging in the healing process within a school context. The result of this research led to several new discoveries as well as a deeper understanding of the topic of art therapy. Findings from our research will be discussed.
64. The Heavy Crown of Perfection: Perfectionism and Loneliness at Benedictine College

*Angelica Nguyen, Grace Stotzer, Amy Posey, Psychological Sciences*

*3:35–3:55  Room 124*

This study is intended to test the correlation between perfectionism and loneliness among undergraduate students of Benedictine College with the assumption that perfectionism may come at the price of loneliness. Additionally, the experience of perfectionism-related loneliness may differ among demographic groups. By method of surveys, we will administer the Revised UCLA Loneliness Scale to participants, a 20-item scale used to determine their level of loneliness in their everyday experience. Participants will also complete the Multidimensional Perfectionism Scale, a 45-item scale designed to determine their self-oriented, other-oriented, and socially-prescribed perfectionism. The goal of our data analysis will thus be to gain insight on the experience of loneliness as it relates to perfectionism, granting a better understanding of the loneliness experience overall.

65. Rugby Scrum Sled

*Paul Vanderpool, Timothy Krieg, Aaron Ptak, Luke Brungardt, Patrick O’Malley, Engineering*

*3:35–3:55  Room 125*

In the sport of rugby, one of the most common and yet most technical and challenging interactions is known as the scrum, in which opposing teams pack together and attempt to drive their adversaries back to gain possession of the ball following a stoppage in play. Due to the high levels of skill required and risk involved in this interaction, one of the most useful pieces of practice equipment in rugby is the scrum sled, which is used to simulate an opposing team. Commercially available sleds, however, can be used even with poor technique, such as failing to get low enough on the pad or pushing at an upward angle rather than straight forward. This often leads to the development of poor habits and increased possibility of injury. The goal of this project was to remedy this issue, which was done by designing a new sled such that if players used improper technique, they would be unable to move the sled. By analyzing applied forces in conjunction with varied methods of inhibiting the motion of the sled, an improved model of the scrum sled has been built. This sled will be used by the Black Monks Rugby Club, aiding instruction of players, reducing risk of injury, and contributing to team success.

66. St. Pius the XII or Hitler’s Pope? — A Look at Pius XII’s Role in the Holocaust

*Helen Cook, Miriam Miller, Richard Crane, History*

*3:35–3:55  Room 208*

For the last 40 years, Pope Pius XII has been at the center of a raging debate concerning his involvement in the Holocaust of the European Jews during World War II. Due to the intensity and severity of how he has been condemned for inaction
and silence, Pius XII’s canonization has failed to take place. But what if his condemnation was actually rooted in a media smear campaign against the old order of the Catholic Church? This is what many supporters of Pius XII have argued, stating that his critics are really those of the Church. This project examines which side of the argument is most factual, supported, and believable in order to paint a realistic picture of who Pius XII truly was and what his role in the Holocaust entailed.

67. “Rhapsody in Blue” by George Gershwin: An Exploration of Its Inception, and the Merging of Classical and Jazz Elements

Marcela Heffernan, Christopher Greco, Music

3:35–3:55  * Room 219

George Gershwin’s 1924 musical composition “Rhapsody in Blue” has been hailed as one of the most iconic pieces of music in America. It remains one of the most renowned pieces of early twentieth century modern literature, combining elements of classical music and jazz. Gershwin’s composition was premiered on February 12, 1924, at a concert known as “An Experiment in Modern Music,” under the direction of Paul Whiteman, an American band leader and a significant figure in the world of American jazz. Little is said about how Gershwin had a short period of time to write his composition, his inspiration behind it, and how he handed it to Ferde Grofé, the orchestrator of the work. The piece was originally intended for two pianos, but it eventually became the idea for a piano concerto. The goal of this project will focus on the piece in its historical context, the inspiration behind Gershwin’s masterpiece, and details of the piece itself. Audio and visual examples will be shown to explore the classical and jazz elements of this great work.

68. Exploring Imagery

Nina Carraway, Michael Stigman, English

3:35–3:55  * Gangel Seminar Room

In my project I intend to discuss the use of imagery in Catholic American spiritual works of creative writing, specifically selected works of Thomas Merton and Flannery O’Connor. I have selected these two authors because they are Catholic writers from geographical areas I am familiar with and whose writing in particular I admire. Imagery in writing is something that holds a great personal interest for me, and I intend to examine how these two authors handle imagery in their works. I will attempt to imitate their styles while also developing my own personal creative style. I will then present selections from my own work and evaluate my own creative stance on the subject in comparison with those of these two authors.

69. Magic Metals: Harnessing the Shape Shifting Memory of Nitinol

Conrad Hoover, Gail Blaustein, Chemistry and Biochemistry

4:05–4:25  * Room 109

Nitinol is a nickel titanium alloy composed of roughly equal parts of nickel and titanium by atomic weight and is structured in a near perfect crystal lattice within
each grain of the metal. This crystal lattice allows nitinol to possess unusual material properties, including extreme ductility and elasticity as well as a shape memory effect. This shape memory effect allows nitinol to “store” physical shapes within its crystal lattice, undergo massive physical deformations, and to return to the stored shape under a small heat treatment. Nitinol owes this amazing property to a reversible solid state phase transformation known as martensitic transformation. This set of phase transformations turns martensite, the standard phase of nitinol, under physical load into a deformed phase of martensite called twinned martensite. When a heat source that surpasses the transition temperature of nitinol’s martensite is introduced, the crystal structure in the nitinol transforms into austenite altering the physical shape of nitinol into its original shape as the crystal structure resets. Once the nitinol has cooled after heating, it has completely transformed back into martensite, and the process can be repeated. To harness the power of this material’s properties, thin strips of the nitinol alloy were placed in a circular restraining apparatus and treated in a muffle furnace at 1000ºF over a range of tempering times to induce a coil shape. The coils that were treated for longer periods of time were extremely elastic, but their transition temperature was severely lowered and reverted to their coil shape at low temperatures under deformation. The coils that were treated for shorter times were just as elastic as their counterparts, but required a heat source to revert back into a coil shape when deformed as their transition temperature was much higher. The nitinol coils that were treated for shorter times were used as springs in wind-up clockwork motors to test if a self-winding clockwork mechanism could be created.

70. Establishing an Aquaponics System in the Benedictine College Greenhouse
Natalie Ruether, Ian Daly, Terrence Malloy, Peter Merkle, Virginia Winder,
Biology, Engineering

Aquaponics systems combine the rearing or harvesting of fish with hydroponics, which is the process of cultivating plants in a variety of media (e.g., water) without soil. These systems can provide solutions to many current sustainability problems, such as the rise in greenhouse gas emissions, food waste, and crop yields affected by drought and soil diseases. Our goal was to start an aquaponics system and establish the trophic relationships among the fish, bacteria, and plants in the system. We examined our project from both biological and civil engineering perspectives. After the initial construction of the system, lowering the water pH to between 7.5–8.5 was necessary to support a nitrifying bacteria cycle. This bacteria cycle converts ammonia from goldfish waste into nitrate, which can be taken up and used for new growth in plants. We used AutoCAD design software as a tool to create a full-dimensional layout of the system that acted as the basis for the constructed drainage system. We drained the settling and mineralization tanks biweekly and maintained water level and pH by reintroducing dechlorinated water. We fed 25 goldfish 3.75 grams of flake fish food twice a day. We planted 20 organic romaine lettuce seeds and 15 spinach seed in rockwool in the floating
raft section of the system. The lettuce plants grew an average of 2.44 +/- 0.18 cm SE in height and 3.46 +/- 0.27 cm SE in width over 21 days. The spinach grew an average of 2.28 +/- 0.47 cm SE in height and 3.54 +/- 0.63 cm SE in width over 14 days. The goal of this system for the future is to be a basis for a variety of research projects regarding bacteria, aquatic life, plants, and engineering related fields. Adding a water treatment system will conserve water and also produce a nitrate rich fertilizer, from drained sediment, to support other plants in the green house. The plants in the aquaponics system can be diversified, and Tilapia can replace the goldfish to produce an organic harvest of protein and produce. These products can be sold locally to support the community and create awareness of the system.

71. The Beloved Sinner Effect
   Jacob Roth, Margaret Restuccia, Adam Buhman-Wiggs, Psychological Sciences
   4:05–4:25 * Room 125
   The current political climate seems to suggest that those with high levels of devotion to an individual tend to increase their support after hearing negative information about them. To test this effect, we asked participants to rate their approval of target celebrities before and after reading a positive or negative news article pertaining to the target celebrity. Data was collected in late 2018, and early 2019 results will be presented using the participants’ original answers as a co-variate. If results support our hypothesis it implies that strong supporters will increase support in response to negative information. Social and political implications will be discussed.

72. Stuck Between a Broken Door and a Hard Place
   Emily Kennebeck, Kathryn Berry, Matthew Ramsey, Education
   4:05–4:25 * Room 208
   “Forward, Always Forward” is a phrase plastered everywhere on the Benedictine Campus. For most, this phrase is a part of life. Perhaps it’s something that you don’t even notice anymore as you walk around campus. For others, this phrase is a daily challenge on campus. While the majority of campus is compliant with ADA standards, there are still aspects that make it difficult for students with physical handicaps to go about their daily business. Benedictine College focuses strongly on helping students grow to be able to reach their greatest achievements. After all, this is “where greatness begins.” However, some difficulties in handicap accessibility inhibit students from reaching their greatest potential. All educational institutions have a responsibility to ensure that all of their students are given every tool they need to succeed. However, as not only a Catholic but a Benedictine institution, our college has a greater responsibility to assist those who are in need. We are a college that is proud of our hospitality, but who is our hospitality extended to? We wanted to discover just how we can improve life for students with a handicap on campus. We studied ADA guidelines, building records, and even students’ daily activities on campus to further understand just how we can improve our campus. “Forward, Always Forward” is an amazing idea, but why don’t we find a way to make this concept a reality for all students?
73. Stonehenge in the Pre-Romantic Era
   Mary Catherine Willacker, George Nicholas, English
   4:05–4:25 * Room 219

While megalithic structures have fascinated humans for centuries, certain places have a particular grasp on the human imagination. Stonehenge has enjoyed the interest and admiration of artists, authors, and tourists almost since its erection in the Neolithic Age. However, it attracted a particular upsurge of attention in England in the 16th, 17th and early 18th centuries. An explosion of exploratory, artistic, literary, and popular interest in the structure sparked centuries of research. This paper explores the increase in scholarly attention to Stonehenge in the pre-Romantic era and the cultural currents that led to its popularity at that particular time.

74. Temperature and Time Effects on the Synthesis of PbS Colloidal Quantum Dots
   Nathaniel Strandquist, Jr., Georgiy Shcherbatyuk, Physics and Astronomy
   4:05–4:25 * Gangel Seminar Room

Semiconducting nanoparticles, popularly known as Quantum Dots (QDs) are materials with promising applications in a number of areas, including solar power. They have the unique property of being able to absorb light at one wavelength and emit at another, slightly redder wavelength. Quantum confinement effects resulting from their small size (~4 nm diameter) allow their paired absorption and emission wavelengths to be finely tuned. PbS QDs are popular due to their relatively low toxicity and ease of manufacture but are generally thought to be limited to relatively large sizes due to necessary reaction temperatures.

My research shows that it is possible to synthesize much smaller PbS QDs than initially expected by running the reaction at lower temperatures than normal. Specifically, PbS QDs are typically not synthesized below 90˚C. I have repeatedly synthesized PbS QDs at around 75˚C, much lower than initially expected, which causes a corresponding decrease in particle size. This decrease in size causes PbS QDs to absorb light at near-visible wavelengths, as opposed to the infrared absorption seen in larger samples. This makes them far more suitable for certain research applications, such as solar concentrators.

75. Nanotechnology and Glowing Polymers: Long-Term Solar Energy Harvesting at BC
   Marie Rioux, Georgiy Shcherbatyuk, Physics and Astronomy
   4:35–4:55 * Room 109

With both an increasing demand for energy and decreasing natural resources, the sustainability of renewable energy is an ever-more relevant subject of study—both on a national and global scale. Among renewable energy sources, solar energy remains incredibly desirable: it’s accessible across the globe regularly, and is projected to be available for another five billion years.

Luminescent solar concentrators (LSCs) offer advantages for energy harvesting in several ways: they predominately use inexpensive plastics doped with a
luminescent species to absorb and remit sunlight, much of which is directed to the edges of the plastic via total internal reflection. Here, it can be harvested by photovoltaics. This design allows LSCs to both integrate easily into pre-existing designs—for example, as energy-collecting window-panes—and operate under both direct and diffuse sunlight. Furthermore, in contrast to the more commonly used solar panels, LSCs have comparatively fewer steps in fabrication, facilitating widespread production.

This project has a twofold purpose: first, to continue research on the effectiveness of LSCs as an alternative solar energy harvesting method through long-term studies of efficiency and degradation over time under diverse physical circumstances. Second, to compare three different doping species within an inexpensive PMMA-medium: RhB fluorescent dye, synthesized PMI (perylene-monoimide), and quantum dots synthesized at Benedictine College.

In order to effect these goals, this project intends to produce LSC samples using primarily the in-house facilities at Benedictine College, doping the samples with both luminescent species, and varying the polymerization method as needed to avoid damage to each luminescent species. After producing a sufficient number of samples for comparison, the samples will be subjected to a variety of conditions for observation of the effects of low and high temperatures, UV-exposure, and oxidation over time.

76. The Effect of Barrel Length on Effectiveness of a Potato Cannon

Connor Muehler, Matthew Conner, Steve Spencer, Engineering

4:35–4:55 * Room 124

Potato cannon designs are comprised of three main sections: the pressure chamber, the valve, and the barrel. This project keeps two of these three design elements constant: pressure chamber and valve size. Other variables include the size and shape of the potato and the pressure in the supply tank. This project investigated the effect of barrel length on distance the average potato will travel for a fixed supply pressure. We sought to achieve the best balance between the barrel being long enough to let the gasses impart a large enough force to reach the maximum acceleration while being short enough to reduce the distance friction will act upon the potato within the barrel. If barrel length is too long, the pressure of the gas would not be able to overcome the resistance of friction of the potato in the barrel and over-expansion of the propellant gas, resulting in low potato velocity. Conversely, if the barrel is too short, the gasses would not have enough space to fully expand, thus resulting in less than optimal acceleration.

77. The Magic of Walt Disney and His Princesses: Transformational Leadership in Action

Natalie Smaron, Rachael Baumgartner, Amanda Stockman, Erin Ziebarth, William Raymond, Political Science

4:35–4:55 * Room 125

Women today require powerful models to learn how to lead. Most models are real; fictional models may also be useful. It takes a little more than some pixie
dust to become a great leader. Walt Disney was a transformational leader. He was creative, determined, innovative, and had a great appreciation for his guests. One big attraction at the Disney theme parks are the princesses, not to mention their blockbuster movies. But are Disney princesses leaders? And if the answer is yes, what qualities do they possess that make them leaders? After a thorough literature review, the team used the U.S. Army’s definition of leadership and Dr. James MacGregor Burns’ classic definition of a transformational leader to build a framework to analyze if Disney princesses are transformational leaders. Eight princesses were analyzed including Ariel, Belle, Cinderella, Merida, Moana, Mulan, Snow White, and Rapunzel. Additionally, the team surveyed Benedictine students for their answers to the project’s research questions. The team concluded Disney princesses are transformational leaders who exhibit many leadership qualities and can serve as a role model for children and others.

78. The Modern Hijacking of Greek Goddesses
Francesca Del Curto, Claire Smeltzer, Sarah Young, English
4:35–4:55 * Room 208

In Greek mythology, women play a large and crucial role. Women in the myths are multi-dimensional and powerful characters. When looking at modern adaptations of the myths, however, the same cannot always be said. In many of the modern adaptations of Greek myths, the power of some goddesses, such as Hera and Demeter, are diminished while others, such as Artemis, are not. Using Hera, Demeter, and Artemis as a point of reference when looking at works like Disney’s Hercules (1997), The Hunger Games (2012), and Brave (2012), we can see how the modern characterizations of Hera and Demeter have diminished their power while Artemis’ characterization from the Greek myths has largely remained intact. This comparison of modern adaptations to the original myths brings into question how the empowerment of women has changed throughout the ages. It causes us to question what it is we value as a society and how our expectations of women have shifted.

79. Game Theory and Tic-Tac-Toe
Cecily Vandenhouten, Eric West, Mathematics and Computer Science
4:35–4:55 * Room 219

Game theory often focuses on games where neither player has perfect information of the game-play, and must then make randomized moves. Games like tic-tac-toe and chess have no room for randomized strategies, and thus these sorts of games belong to a sub-field of game theory called combinatorial game theory. We will be looking specifically at solutions and possible strategies for different sized variations of tic-tac-toe including an infinite board as well as three-dimensional tic-tac-toe.
**Discovery Day 2019 Schedule Overview** (Presentation number in parentheses)
All presentations will take place in the Ferrell Academic Center unless otherwise indicated.

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<td>All are invited to a light breakfast in the Napier Foyer (Fourth Floor), Ferrell Academic Center (FLC)</td>
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| 8:40–9:35 | Poster/Exhibit Session #1 — Ferrell Academic Center (McAllister Board Room) (1–16) | FLC 109 | Maslanka
Register—and Vote! An Exercise in Mobilizing Voters in Atchison, Kansas
Settich (17) |
|       |       | FLC 124 | J. Barnes
Interacting With the Nanoscale Landscape of Molecular Systems ... Virtual Reality
Araque (18) |
|       |       | FLC 125 | Ciskanik
Helping Farmers and Astronauts: ... Iron Concentration in Soil
Mortensen (19) |
|       |       | FLC 208 | Farrell
Does Studying Abroad Affect Personality? ...
Florence Experience Posey (20) |
|       |       | FLC 219 | —|
|       |       | FLC Gangel Seminar Room | Wagner
The Muse Meets the Artist: The Role of Relationships in the Artistic Process
Wallace (22) |
| 9:45–10:05 |  | FLC 323 | M. Rioux
Senior Thesis Defense: Newton’s Flaming Laser Sword and Meaning Beyond the Planck Length, “Shut Up and Calculate!”
Crifasi (21) (9:45–10:35) |
| 10:15–10:35 |  |  | Buhman-Wiggs (23) |
|       |       | FLC 109 | R. Barnes
Turn Up the Heat: A Study of Religion and Attractiveness
Settich (24) |
|       |       | FLC 124 | Feist
A Witness to Corruption
Poston (25) |
|       |       | FLC 125 | The True Cost of Study Abroad: The Abroad Budget
Richardson (26) |
|       |       | FLC 208 | Genera Index of Native Bees of the Benedicite Bottoms
Madera (27) |
|       |       | FLC 219 | Crisis & Struggle: The Case of Guatemalan Migration
Glenski (28) |
|       |       | FLC Gangel Seminar Room | Madera
Crisis & Struggle: The Case of Guatemalan Migration
Hernandez (27) |
|       |       | FLC 323 | Swoboda
The Smoke of a Hundred Fires: Trade ... in the Native American Trans-Mississippi West, 1540–1850
Wolf (29) |
| 10:45–11:05 |  |  | Bagert (29) |
|       |       | FLC 109 | Pruneda
Room Draw 2019
Marko (30) |
|       |       | FLC 124 | The Gaze of Christ and an Art of Bookbinding
Wallace (31) |
|       |       | FLC 125 | The Effects of Just World Belief and Primed Religiosity on ... Homelessness
Finn (32) |
|       |       | FLC 208 | Religious Upheaval in Egypt: Akhenaten and the Amarna Revolution
Runge (33) |
|       |       | FLC 219 | —|
|       |       | FLC Gangel Seminar Room | Runge
The Passage of the 19th Amendment: Who the Hell is Harry Burn, Mate?
Wolf (34) |
|       |       | FLC 323 | Buhler
Trauma-Informed Care in Schools and Classrooms
Ramsey (35) |
<p>| 11:15–12:10 | Poster/Exhibit Session #2 — Ferrell Academic Center (McAllister Board Room) (36–51) | FLC 109 |  |
|       |       | FLC 124 |  |
|       |       | FLC 125 |  |
| 11:30–12:50 | Lunch — Dining Hall |  | Jazz Band Entertainment |
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