A multidisciplinary exposition and presentation of student research and academic accomplishments in business, communication, computing, education, humanities, fine arts, mathematics, natural sciences, social sciences and other fields.

2:30 to 7 p.m. Wednesday, April 24, 2019

Sis and Herman Dupré Science Pavilion
Dear Saint Vincent College Community and Friends,

We welcome you to the 16th annual Saint Vincent College Academic Conference, during which we celebrate the interesting and often innovative work our students produce throughout the year. This conference is a testament to the dedication of Saint Vincent faculty and administrators who encourage and support students in conducting advanced scholarly inquiry and creative work in their disciplines. Saint Vincent faculty dedicate their time to mentoring students in critical scholarship, as well as in classroom projects in the Humanities, Natural Sciences, Computer Sciences, Social Sciences, Arts, and Business. The students who present at this conference have ambitiously seized these opportunities and brought their projects to completion. We are very proud of their work, and we invite you to take part in this event which recognizes their achievement. This conference is an opportunity for our students to enlighten our academic community by sharing new ideas and creative expression.

The Academic Conference is held in the Sis and Herman Dupré Science Pavilion. This venue facilitates engagement and interaction among Saint Vincent College students, faculty, administrators, staff, friends and family. The central atrium and surrounding hallways are the site of art demonstrations, photo galleries, and poster presentations from students in diverse disciplines. The classrooms on the first and second floors of the atrium, and the east wing of the complex hold panel sessions that include oral presentations of research and critical analysis papers, literary readings and musical performances. At the Saint Vincent Gallery in the nearby Carey Center, several senior art students are present to display and discuss their visual art works. We encourage all attendees to explore the many high-quality intellectual pursuits our conference showcases!

This program contains the schedule of oral and poster sessions and abstracts for each presented project. Please peruse this booklet to find presentations that pique your interest and to learn more about the works our students have accomplished. An electronic version of this program is also available – look for signs around the pavilion with a QR code that will bring you directly to the program on the Saint Vincent website.

Many people have dedicated time and energy to bring this conference to fruition. The faculty, students, staff and administrators who were directly involved in planning the conference are listed in this program. This list, however, is far from comprehensive in recognizing the many individuals who extended themselves at this busy time of year to make this conference possible. This conference is truly a community-wide effort.

We hope that you emerge from your time at the conference with a fuller appreciation for the intellectual dynamic that lies at the center of our work at Saint Vincent College.

Sincerely,

Derek Breid, Ph.D.  Pete Smyntek, Ph.D.
Department of Engineering Science  Interdisciplinary Science Department
Conference Co-chairs
Saint Vincent College
Sixteenth Annual Academic Conference
2019 Committee

Dr. Derek Breid, Co-chair
Dr. Pete Smyntek, Co-chair

Faculty and Student Representatives

Dr. Tim Kelly  Dr. Terrance Smith
Dr. Devin Fava  Dr. Kayla Jachimowski
Dr. Mark Rivardo  Mr. Russell Clark, SGA representative

Donors
Support for the Academic Conference is given in memory of Dr. Greg Howard C’68, by Donna Howard

Acknowledgements
The committee wishes to thank everyone who helped to prepare for this conference. We especially thank the following people and groups for their assistance:

Ms. Lee Ann Ross, for overseeing the printing of this program
Mr. George Fetkovich, for designing the cover and promotional materials
Ms. Suzanne English and Ms. Carol Riddle, for proofreading student names, titles, and abstracts
Ms. Cindy Hoffman, for her help managing the online resources of the Conference
Ms. Susan Yackovich, for her technical and acquisition expertise
Ms. Tammy Marsh for her assistance in the final set up of the event
Ms. Angela Zalich and Ms. Kathleen Pantalone, for their direction and assistance for the entire event
Sydney Ball, Marion D’Aurora, Courtney Maslanka for their assistance setting up posters
Vicki Booth and the FMO staff, for their efficient set-up efforts
Kaylee Goykovich, for assisting in creating the abstract submission page

The students and committee are also grateful to the faculty who assisted the students with the preparation of their work. Names of faculty sponsors appear in their students’ entries in this program.
Grant Support for Student Research

The following grant programs support student-designed research and study at Saint Vincent College. Individual project entries indicate grant-supported projects, where applicable, throughout the program.

The A.J. Palumbo Student Research Endowment

Established in 1996, the Palumbo grant program supports student-initiated learning and discovery in the arts, sciences, humanities and professional programs. Grants are awarded on the basis of proposals submitted by the students and reviewed by a committee consisting of both faculty and students. The endowment memorializes the late Mr. A. J. Palumbo, a noted Pittsburgh industrialist.

The Elizabeth and Tom Andreoli Traveling Scholar Endowment

Established in 1997, the Andreoli Traveling Scholar Endowment funds students who wish to enrich their education through special opportunities that require travel in the U.S. or abroad.
# Overview of Sessions

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### Session One: 2:45-4:00

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<td>Theresa Thimons and Anna Coletti, “An Introduction to the Cantor Set” Anna Coletti and Theresa Thimons, “Properties of the Cantor Set” Benjamin Watt, “The Platonic Quintet”</td>
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<td><strong>E106</strong></td>
<td><strong>Liberal Arts</strong></td>
<td>Dr. Anthony Serapiglia</td>
<td>Jacob Davis, “The Defense Against Cyber Attacks” Julianna Notto, “Risk Management in the United States Department of Defense”</td>
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Session Two: 4:15-5:30

Luparello Lecture Hall

English I
Dr. Dennis McDaniel
Modern European Literature—A Panel Discussion

Sarah Malone, “An Obsessive Imitation: The Realism of Flaubert in Madame Bovary”
Mallory Truckenmiller, “‘Some Sort of Monstrous Insect’: Translating Ambiguity in The Metamorphosis.”

E103 Engineering Science
Dr. Derek Breid
Engineering Design For Bearcat B.E.S.T.

Nicholas Bohn, Collin Neville, Claire Galvin, Ramon Milke, “Making Kitchen Cutting Safer”
Hannah Rudy, Morgan Smith, Austin Reder, Bruce Johnson, “Fitted Sheet Improvement Process,”
Nicholas Ross, Benjamin Firestone, Danielle Koehler, Jonas Wudkwych, “Designing a Better Way to Rinse Showers”
Justin Newman, Taylor Boring, Mike Marinchak, Dante Fauth, “B.E.S.T. Alarm”

E102 Biology I
Dr. Michael Rhodes

Renee Tempo and Anna Mills, “The Effects of Cannabidiol (CBD Oil) and Nicotine on Chicken Embryonic Development”
Nicholas DiTullio and Taylor Medeiros, “Effects of Peripheral Donepezil on Memory Using Holeboard and Central Denepezil Stress Hormone Release Following Stereotaxic Surgery”
Bailey Scheider, “The Effects of Vanillin on Pheromone- and Predatory Odor-Induced Stress and Depressive Behaviors”

E104 Criminology, Law and Society
Mr. Bruce Antkowiak

The moderator will determine the order and breaks for the Criminology sessions. All student names and paper titles are listed under Session Three.

E106 History I
Dr. Timothy Kelly

Rachel Mattica, “Is it Just the Electrified Key Attached to Your Kite or Do I Feel a Spark Between Us?: Examining the Myth Surrounding Benjamin Franklin”
Ben Selep, “Coal Miners in Western Pennsylvania”
Kyle Donovan, “Swingin’ into the Future: A Brief History of the Swing Dance Revival”

E108 Marketing and Economics
Dr. Thomas Cline and Dr. Zack Davis

Christina Davis, Erin Giancola, Jason Walko, Samuel Wingrove, Taylor Ankney, Alexandra DeMarco, Hannah Gross, “Marketing Research: Student Housing and Recreation Center”
Cody Adams, “Localized Effects of Economic Health on College Major Choice”

S201 Politics II
Dr. Jerome Foss
The Fragility of Political Life

Paul Weisser, “I Believe We are Lost: The Worst Casualties of the Great War”
Joseph Natali, “Towards a Postliberal Feminism”
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<th>Session Three: 5:45-7:00</th>
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**Luparello Lecture Hall**  
**E102**  
**English II**  
Ms. Michelle Gil-Montero  
Bridget Fertal, “Generation Magazine 2018-2019 Reading”

**E104**  
**Criminology, Law and Society**  
Mr. Bruce Antkowiak  
Antonina Clay, “Effects of Socioeconomic Status and Age on Drug Use in Maryland”  
Jason Scagline, “Modernizing Terry: Drug Stops, Empirical Models, and Reasonable Suspicion”  
Maria Morgan, “The Relationship Between Gender and Sentencing in Drug Related Crimes”  
Mackenzie Gostomski, “The Effects of Ban-the-Box”  
Allison Dengler, “First Amendment Freedom of Religion”  
Emily Joseph, “Prison Corruption: Bribery and Assault”  
Chad Painter, “An Analysis of Texting and Driving”  
Kaitlynn Piper, “Fentanyl – Why Is It Still Around”  
Michaela Rice, “Reducing Recidivism Rates Through Vocational and Educational Prison Programs”

| **E106**  
**History II**  
Fr. Brian Boosel, OSB  
Raymond Aguiar, “Dracula or Dragulus: A Look into the Varying Interpretations of the Historical Dracula”  
Jaime Witham, “Depictions of Mythical Castles in Arthurian Manuscripts”

**E108**  
**Management II**  
Dr. Jeff Godwin  
Jill Cline, Anthony Rosso, Matt Andrejcak, “Business Policy and Strategy Case Study of Fitbit, Inc.”

**E103**  
**Education and Special Education**  
Fr. Philip Kanfush, OSB  
Juli Cahula, “A Case Study Review: Depression in High School”  
John Malone, “A Case Study: Bear Hoskin”

Floyd Nichols, “Microbial Community Shifts in Response to Alkaline Mine Drainage in the Loyalhanna Creek System”  
Lauren Gugliotti and Rebecca Bell, “The Effects of Nicotine and Cystisine Exposure on Feeding Behavior in Adult Female Zebrafish”  
Jessica Packard, “The Effects of Caffeine on Embryonic Heart Development in Zebrafish”
Illustration Demonstration

Paisley Adams
Faculty Sponsor: Br. Mark Floreanini, O.S.B.

Art is poetry in motion. It’s the erratic movement from thought to hand and from soul to direction. If you open up your mind like a child and free it from the confines of the mundane fetters of normalcy and reality, you can better experience and manifest who you are internally with a celebration of creativity. Art opens our limited minds to perceptions and communications that mere words cannot define and allows us to share our most human aspects without the filter of right or wrong, real or unreal, and true or untrue. It is not what an artist creates that is the message but rather the catalyst for that creation bleeding through from the artist’s deepest emotions and beliefs. I want to inspire the next generations of artists to go out and not be afraid to embrace their deep human desires and emotions through artistic practice.

Wheel-Thrown Pottery Demonstration

Connie DiFrancisco
Faculty Sponsor: Br. Mark Floreanini, O.S.B.

This demonstration will be showcasing the artistic technique of wheel throwing. I will be constructing various shaped ceramic pieces such as, bowls, cups, pots, and vases. The step-by-step process of creating ceramic pieces will be physically demonstrated and verbally communicated with visitors. The demo will begin with centering pre-wedged clay on the potter’s wheel. After centering, the pulling and shaping of the body into the different dimensions will take place. Each piece will then be removed and displayed before repeating the process. A finished piece of pottery will be on display to convey the result of the clay after it leaves the wheel. Visitors will be able to communicate any questions regarding the journey of the clay into the many ceramic pieces we use in our daily lives.
Printmaking Demonstration

Robbie Kollar, Clair Sirofchuck
Faculty Sponsor: Br. Mark Floreanini, O.S.B.

Studio art majors Robert Kollar and Clair Sirofchuck will be demonstrating Linoleum block printing. The students will be demonstrating the technique which begins with carving a reverse design into the linoleum block using linoleum cutters. Once the design is completely carved, ink will be rolled onto the block with a brayer in preparation for the transfer of the design. The ink design is transferred onto the paper using a tool called a baren. Upon completion of the transfer, the prints are hung to dry. Previously completed prints will be displayed and will be available for sale, along with items completed throughout the demonstration.

Stained Glass Demonstration

Madelyn Montefour, Jonas Wudkwych
Faculty Sponsor: Br. Mark Floreanini, O.S.B.

This demonstration of stained glass will display the skills necessary to create a stained glass work of art. Processes included will include the cutting of glass, use of a wet stone grinder, copper foil tape, the use of acids and bases, melting solder, and eventually joining the pieces together. We will require a source of electricity near our station so as to plug in our necessary equipment. At our station we will have multiple containers of water to rinse and clean our cut pieces of glass. Premade pieces will be displayed as examples of our finished work. Pieces made may be available for sale as well as the premade pieces. We will demonstrate stained glass processes for every session.

Senior Art Exhibit

Rachel Murphy
Faculty Sponsor: Br. Mark Floreanini, O.S.B.

Creating a complete work of art has always felt like putting together a difficult puzzle; there are many pieces, which sometimes make it look impossible to complete; some areas are easier than others, and there’s no guessing as to when it is completely done. As I have progressed as an artist and teacher, I have realized that I enjoy learning new mediums and styles of art. Piecing together all my new skills to create new works of art has become enjoyable. Even though I adore many mediums, my favorites tend to be oil paints and charcoal drawings. I have always found joy in the blending and mixing of these materials to get the perfect tints and shades. Human anatomy has always been an interest of mine, and more recently the muscles of the body have intrigued me. Strength and confidence play an important part in living a healthy and happy life. The use of my own muscles has produced a stronger, more confident person, which is shown through my artwork.
Senior Exhibition

Ningyouru Hong
Faculty Sponsor: Br. Mark Floreanini, O.S.B.

Hello, I’m Ning and thank you very much for taking your precious time in viewing my works.

I used to be an emotional girl. So unlike other kids, I was sensitive and lived entirely in a world of poetry and imagination. I love to design something that could symbolize the feelings I have and my imagination from inner space. In a sense, my devotion to art started from the art style that combines symbolism and the illustration from mythology books. I have a lot of experience working with numbers, diagrams and data because I was a finance major. I changed my major to graphic design in my sophomore year; hence my fascination with geometrical figures and logical expression is shown within my art.

Death in Flying Colors

Carson Snyder
Faculty Sponsor: Br. Mark Floreanini, O.S.B.

I have loved art from the beginning of my time here on earth, whether it was admiring or creating it. Art can be found anywhere, in everything. I like to create art for how it makes me feel. Creating is calming and expressive. My projects consist of many mediums including, pencil, colored pencil, marker, charcoal, pastels, and acrylic paint. I am a fan of pop art, as well as modern art. In my pieces, I tend to attract the eye with pops of color and my creative processes. Color is attractive and turns heads. Even though I catch myself creating pieces of bright color and black outline, I am capable of making more mature drawings, as well. My projects are random thoughts in my mind that transpire into an artistic experience. I want people to interpret my work in any way they want. Art is a conversation piece with yourself or others. I want my expression to make people feel something. Art takes you to another place, much like a dream, or an alternate universe.

*Additional senior artwork is on display in the Carey Center gallery*
A Hidden Wholeness: Photography Inspired by Thomas Merton (2nd floor Dupre)

Maria Belitsky, Paige Copper, Taylor Easter, Sarah Malone, Julia Snyder, Madison Starliper, Troy Wade
Faculty Sponsor: Dr. Patricia Sharbaugh, Andrew Julo

Merton's photography, like his writing, reveals his contemplative vision of the world. Students in TH 346: Thomas Merton: Monk, Writer, Spiritual Master participated in an assignment designed to give students the opportunity to express the contemplative vision that studying Merton's art and writing have inspired. Each student submitted a photograph with an accompanying paragraph or poem. These photographs and accompanying texts will be mounted and displayed at the Academic Conference.

The DaVinci Man Project (1st floor Dupre)

Ashley Aloi, Gretchan Baker, Halle Blair, Alice Bortz, Taylor Collins, Hannah Devine, Jordan Dykes, Maura Hevey, Samantha Kenjorski, Sarah Maidment, Megan Manion, Lisa Marthens, Tan Nguyen, Christopher Paluzzi, Derrick Pham, Ximena Smyntek (X. Alejandra), Anthony Vanden Berk, Charles Wolenter,
Faculty Sponsor: Br. Placid Sellers, O.S.B.

A visual project combining Leonardo da Vinci's iconic Vitruvian Man image representing the sciences, blended with the beauty of personal photography and imagery.
Properties of the Cantor Set

Anna Coletti, Theresa Thimons
Faculty Sponsor(s): Dr. Daniele Arcara

As introduced by Georg Cantor in 1883, the Cantor set is a set of points between 0 and 1 that has various interesting mathematical properties. In this talk we will explore some of these properties and their significance to the study of real analysis.

An Introduction to the Cantor Set

Theresa Thimons, Anna Coletti
Faculty Sponsor(s): Dr. Daniele Arcara

As introduced by Georg Cantor in 1883, the Cantor set is a set of points between 0 and 1 that has various interesting mathematical properties. In this talk we will define the set and provide a visual representation of its elements.

The Platonic Quintet

Benjamin Watt
Faculty Sponsor(s): Dr. Jennifer White

It is possible to construct solid shapes, such as the cube or triangular pyramid, where each face is the same regular polygon. In classical Greece, five such convex solids were known, and given their philosophical and mystical significance for Plato, they are called the Platonic solids. Mathematicians have keenly investigated them, too, and Euclid culminated his Elements of Geometry with the Platonic solids, proving there are only five. Today, using a proof that draws on contemporary graph theory, we can readily see that Euclid was right.
SAP Business One Program

Hannah Carey, Amy Figueroa
Faculty Sponsor(s): Mr. Robert Markley Jr.

Within our presentation, we will provide background on SAP and its Business One software. We will also review the program's candidate selection, training, and internship interview process. Our focus will be on how the program has helped us develop professionally through our internships. To conclude, we will state why we recommend the program and discuss our plans after graduation.

Perceptions of Disclosures of Mental Health on Social Media

Sydney Schoff, Aubrey Marquis
Faculty Sponsor(s): Dr. Jessica Harvey

Social media sites can serve as important platforms for people struggling with mental health issues. Furthermore, these platforms can provide people with social support networks that they might not find elsewhere. Presently, only a limited amount of research has explored disclosures of mental health online. The current study investigates reactions of social media users to disclosures about mental health on social media platforms. Thirty-nine undergraduates (M age = 20.2) were interviewed to explore their perceptions of disclosures about mental health on social media. Analyses of interview data revealed the following themes: (1) breaking the stigma of mental health disclosures online, (2) positive and neutral reactions, and (3) appropriate platforms online. Results of this study contribute to a growing understanding of communication about mental health online.
A Mixed-Method Approach to Documenting College Students' Dining Experiences

Victoria Burke, Bayle Shreve, Helena Zrile, Locke Lewandosky, Natalie Kohuth
Faculty Sponsor(s): Dr. Elaine Bennett
A.J. Palumbo Student Research Endowment

This project, designed in partnership with dining services at a small liberal arts college, examines student experiences, perspectives, and expectations related to on-campus dining and assesses student knowledge and interest related to food, food systems, nutrition, and diet. Semi-structured interviews, focus groups, and a questionnaire interrogate students' cultural models of eating and the informational, social, and practical contexts of their experiences. This study also examines the experiences and needs of specific groups of students such as student-athletes, commuters, and those with dietary restrictions. The results are being used to enhance dining services programming and communication efforts.

Using Ethnographic Data for Design of a Student Dining Hall

Mark O'Grady, Moira Sullivan, Patrick Spollen, Jordan Joseph
Faculty Sponsor(s): Dr. Elaine Bennett
A.J. Palumbo Student Research Endowment

This paper presents a project designed to assist in the planning of furniture and other arrangements for a dining hall renovation at a small liberal arts college. We collected observational data on space use, seating patterns, and flow and combined these with semi-structured and structured interview data on the way students interact with space as they select components of their meals and construct meaning regarding their social interactions in dining settings on campus. The results are being used to inform the selection and design of different seating arrangements to facilitate a range of social interactions in a renovated dining hall.

Applied Research with Dining Services Using a Team-Based Mixed-Method Approach

Bayle Shreve, Mark O'Grady, Victoria Burke
Faculty Sponsor(s): Dr. Elaine Bennett
A.J. Palumbo Student Research Endowment

This paper reports on the mixed-method research conducted by an applied anthropology working group in Fall 2018. The project team took on a consulting role for a community partner using a mixed-method approach to address research questions and objectives developed in collaboration with our community partner, Parkhurst Dining. The project was designed to accomplish a set of service objectives for our partner and a set of learning objectives for the students involved. This paper will describe the process and the methods through which we accomplished these objectives.
The defense against Cyberattacks

Jacob Davis
Faculty Sponsor(s): Dr. Anthony Serapiglia, Dr. John Smetanka

Defence against cyberattacks on individuals, institutions, or governments has risen to a top priority and perhaps the largest security challenge today. This thesis examines the beginning of what we could consider the cyberworld and automation. Concurrent with development of the cyberworld with the different devices that we have today was the development of tools that attack that very same technology. The wide variety of attacks show how vulnerable we are to this threat. While there are a number of ways to protect the information on our devices, my conclusion is that much work must be done as a society to protect ourselves. As the cyberworld continues to grow we must keep growing with it and learn new ways to protect our nation.

Risk Management in the United States Department of Defense (DoD) Corroborated with the United Kingdom Ministry of Defence (MoD) to Promote Partnership and Continuity in the Security of Defense Logistics Infrastructure

Julianna Notto
Faculty Sponsor(s): Dr. Anthony Serapiglia, Dr. John Smetanka

This presentation is a comparative analysis of the United States Department of Defense (DoD) and the United Kingdom Ministry of Defence (MoD) in terms of risk management in the security of defense logistic infrastructure. The Department of Defense and Ministry of Defence collaborate to protect their defense logistic infrastructure through Supply Chain Risk Management (SCRM). In this thesis, a deeper insight will be given into who the DoD and MoD are in terms of personnel and function, as well as how both departments are key players in promoting partnership and security. This thesis will explain what role SCRM plays in both the DoD and the MoD to secure defense logistic infrastructure.
Human Resource Management Action Plan

Alexander Ferraro, Bryanna Musser, Tyler Roble, Benjamin Davis, Matthew Morrone
Faculty Sponsor(s): Dr. Michael Urick

Vincent Corporate Technology (VCT) has been a world leader in consumer and business hardware and software since 1935. VCT has decided to take a new approach and become a total technology solutions provider for small businesses based in the United States. In direct relation to the company’s decision to head in a new direction, the VP of Human Resources has hired our team to help achieve its new mission. Our role is to assist VCT in forming their new external IT consultant department through all steps of the components of the HR process: planning and job design, recruiting, selection, training and development, performance appraisal, compensation, and separation. Through this, we work to accomplish our goal to make VCT’s transition as smooth as possible in adding the new IT department and hiring or these new employees.

Human Resource Management Action Plan

Paige Forrai, Walter Bonds, Frank Singer, Joseph Jeffrey, Michael Ramaley
Faculty Sponsor(s): Dr. Michael Urick

In our Human Resource Management class, we are asked to act as an organization titled Vincent Corporate Technology (VCT), which is going through a shift of focus in its business priorities. VCT is converting into an IT consulting firm, and must design new positions and hire a new workforce in order to survive. We have decided to create a position titled Employment, Recruitment, and Placement Manager, and have the position placed directly under the Vice President of Human Resources. This position is meant to heavily assist VCT in restructuring itself and turn into a prominent IT consulting firm. With the creation of this new position, we have taken it through its job design, how we’d recruit for it, how and when we’d select an employee for the spot, how we’d train the new employee, rate his or her performance, compensate the person, and separate him or her, if need be. Our Employment, Recruitment, and Placement Manager position is meant to help transform VCT, and we have full faith that it will.
Human Resource Management Action Plan

Payton Knupp, Alona Sleith, David Yasher, John Paul Maier, Joel Robinson
Faculty Sponsor(s): Dr. Michael Urick

Vincent Corporate Technology (VCT) is undergoing a drastic strategic change. VCT is moving toward repositioning itself as a full-service IT consulting firm for small businesses. With the shift in its business model, the Human Resource Department is responsible for several changes involving the design of its new workforce. Vincent Corporate Technology needs to reorganize major portions of its business to reorganize marketing and sales, finance and accounting, supply chain activities, and operations, among other areas. The changes needed to implement this new reorganization require an entirely new set of knowledge, skills, and abilities within the workforce. In order to enforce these changes, VCT must add a team of technology consultants. We will create this position using the Human Resource Process consisting of seven steps: Planning and Job Design, Recruiting, Selection, Training and Development, Performance Appraisal, Compensation, and Separation.

Human Resource Management Action Plan

Lucille Volna, Tyler Laughery, Andre Pradia, Kelsey Hood, Tannor Vanyo, Joseph Heldrich
Faculty Sponsor(s): Dr. Michael Urick

Vincent Corporate Technology is a technology consulting firm located in Latrobe, Pennsylvania, and it will become one of the most prominent resources for small businesses. VCT has decided that it needs to change its focus and strategic goal in order to survive. The position of an IT consultant is necessary to the success of the company. The company wants to become an efficient and exceptional IT firm that will include many qualified individuals. The end result is to have a capable IT firm that can provide consulting to small businesses and will aid these customers with network set-up and design, information security, website and custom software design, and help desk/support activities. VCT will need to make some departmental updates and adjustments within marketing, finance and accounting, and supply chain management. The ultimate goal will be accomplishing the Human Resource process which entails Planning and Job Design, Recruiting, Selection, Training and Development, and Performance Appraisal.
A Celebration of Song Through The Centuries

Justin Massetto, Kendra Smithbauer, John Crocetti, Briana Huff, Anthony Massetto, Nicole Reyes, Kathleen O'Reilly, Frannie Andreola, Caroline Nelson, Marisa O'Dell
Faculty Sponsor(s): Mr. Thomas Octave, Christine Mahady, Susanna Lemberskaya

Students from the vocal studios of Thomas Octave, Christine Mahady, and Susanna Lemberskaya will present a recital of art songs and arias from many diverse periods of musical history.

The Evolution of Gregorian Chant

Camden Sarver, Christopher Maier
Faculty Sponsor(s): Mr. Thomas Octave

A look into the evolution of sacred music from the early ninth century until the 14th century, focusing on the influence that the Parisian school of Notre Dame had on sacred music. Using specific examples of Ars Antiqua, such as plainchant, parallel organum, oblique organum, and early polyphony, we will show the progression of music and its theory, harmony, and ability to use the human voice to create beauty to lead to the contemplation of the divine. This talk will discuss the significant contributions of the composers, Saint Hildegard von Bingen, Perotin, Leoin, and Machaut.
James Cardinal Gibbons, Catholicism, and the American Regime

Paul Gnatowski
Faculty Sponsor(s): Dr. Jerome Foss

In this paper, I demonstrate how James Cardinal Gibbons, a Catholic bishop who lived during the late 19th/early 20th century, defends the American regime from the standpoint of Catholic Political Thought. I first explain various challenges to the American regime, namely its apparent conflicts with Catholic principles. Next, I identify and outline Cardinal Gibbons' most important points regarding the relationship between America and Catholicism. And finally, I explore whether Cardinal Gibbons' thought is still applicable today in relation to those challenges. I conclude that Cardinal Gibbons' works evoke key principles for those attempting to reconcile their Catholic faith with their American citizenship and patriotism.

The Constitutionality of Presidential Prerogative

Michael Bethune
Faculty Sponsor(s): Dr. Jason Jividen

In this paper, I examine from where the executive's power of prerogative is derived. In doing so, I began by establishing a strong comprehensive definition of prerogative as it will be understood for the course of the paper. Prerogative exists when the president must use discretion in a time of crisis to protect the people when the laws of the nation do not afford a way to remediate the situation. After this, there were two centers of thought for how the power of prerogative would be understood: the Hamiltonian and the Jeffersonian perspectives. The former characterizes prerogative as a Constitutional power, while the latter finds such power to be extra-Constitutional. After examining both of the frameworks, an example of prerogative in American history was explained. This led to the conclusion that prerogative is an executive power vested to the president by the United States Constitution.
Defending and Defining Rights: How the Supreme Court Ultimately Adopted the Progressive Mantle of Protecting the Common Good

Jessica DeLong
Faculty Sponsor(s): Dr. Bradley Watson, Dr. Jerome Foss

The protection and definition of rights has transferred from being embodied in the Constitution and supported by the States and Congress, to the President, and now falls within the purview of the Supreme Court. Originally, the Constitution was meant to preserve the sovereignty of its citizens. Its restrictions on the general government would allow individual rights to flourish under the purview of the states while Congress established the general federal guidelines. Progressivism later asserted that the real voice of the people rested in the Executive. He possessed the ability to implement strong social policy for the general welfare. The Constitution, however, limited the President in ways that the Progressives could not overcome and a more permanent method of protecting rights had to be established. Proponents of this new understanding of government turned their attentions to the Supreme Court as a body of insulated officials who arguably controlled Constitutional interpretation.
Effects of Peripheral Donepezil on Memory Using Holeboard and Central Donepezil on Stress Hormone Release Following Stereotaxic Surgery

Nicholas DiTullio, Taylor Medeiros
Faculty Sponsor(s): Dr. Michael Rhodes
A.J. Palumbo Student Research Endowment

Disruption of an organism’s homeostasis occurs via the stress response, which is regulated by hypothalamic-pituitary-adrenal (HPA) axis. This study examines the role of cholinergic muscarinic receptors in the regulation of HPA axis activity and memory using the cholinergic drugs scopolamine (SCOP), a muscarinic receptor antagonist, and donepezil, an acetylcholinesterase inhibitor. These same drugs were microinjected into the hippocampus for the stereotaxic surgery and blood samples were collected to assess HPA axis responses. Results from the holeboard memory test indicated that the SCOP group took longer to locate the queued board holes and made more errors than the donepezil group. Results from the stereotaxic surgery indicate that HPA axis responses fluctuated during microinjections when comparing drug groups. There was significance found between the two drug groups over time for HPA axis responses. Decreased HPA responses to donepezil may have contributed to memory enhancement.

Microbial Community Shifts in Response to Alkaline Mine Drainage in the Loyalhanna Creek System

Floyd Nichols
Faculty Sponsor(s): Dr. Jennifer Koehl
A.J. Palumbo Student Research Endowment

Polluted streams from abandoned mines can be acidic, neutral, or alkaline. Sulfide mineral mining products (i.e. FeS2) react with water and oxygen in the flooded abandoned mines. The sulfide becomes oxidized and produces acid (H+) and/or precipitates like ferric iron (Fe3+). Microorganisms play a role in acidic mine drainage; however, little is known about the microorganismal communities in neutral or alkaline pH mine pollution. In this study, samples were collected at stream sites with varying levels of mine drainage. In situ environmental data was collected at each site (pH, [dO2], and [metal]). Microbial DNA was isolated from each site, and the 16S rRNA gene was amplified. Sequencing of the DNA leads to taxonomic data that will be analyzed to further understand the microbial community. Understanding these microbial community shifts in response to mining pollution in streams will provide information for understanding the bioremediation properties of these bacteria.
The Effects of Vanillin on Pheromone- and Predatory Odor-Induced Stress and Depressive Behaviors

Bailey Scheider
Faculty Sponsor(s): Dr. Michael Rhodes
A.J. Palumbo Student Research Endowment

Chronic stress is associated with Major Depressive Disorder (MDD). Individuals with MDD display a heightened stress response. Depression is typically treated with beneficial prescription medications which come with costly side effects. Aromatherapy is a holistic approach through which stress is alleviated in humans by decreasing depressive symptoms. This study used mouse models to test the odor, vanillin, through aromatherapy as a way of decreasing pheromone- and predator odor-induced stress. Estrous cycle staging was conducted to further characterize pheromonal, stress, and treatment effects; analyses are ongoing. Because vanillin produced increased stress responses and anxiety behaviors in the mice of this study, vanillin aromatherapy did not prove to decrease or counteract the symptoms of depression in a mouse model. In conclusion, future studies using a mouse model could potentially use vanillin as a stressor.
Making Kitchen Cutting Safer

Nicholas Bohn, Collin Neville, Claire Galvin, Ramon Milke
Faculty Sponsor(s): Dr. Derek Breid

The current technique used by the Bearcat B.E.S.T. program for knife safety in the kitchen consists of using the “bear-claw method” in which users grip food with curved fingers in one hand, while holding and slicing with a knife in the other. Through on-site observation of the students, our Engineering Design team noted several issues related to safety and effectiveness for the students. We researched and adopted ideas from multiple existing products on the market, specifically, the "Knife Glider." We attempted redesigns for improvement and tested results with our own prototypes. Our report outlines these results and concludes the “Knife Glider” product is the best solution for the Bearcat B.E.S.T. students based on overall cost, availability, and effectiveness. We will also outline further ways to improve knife safety for the Bearcat B.E.S.T. program in this report, such as sharpening the knives on a regular basis and providing a better training video.

B.E.S.T. Alarm

Justin Newman, Taylor Boring, Mike Marinchak, Dante Fauth
Faculty Sponsor(s): Dr. Derek Breid

Dyschronometria is a condition of mental dysfunction in which an individual cannot accurately estimate an amount of time that has passed. The purpose of this project is to create a method of timekeeping for Bearcat B.E.S.T. students or other individuals who face this struggle of grasping the concept of time. Time affects all aspects of people's lives, and without the ability to gauge time, a person's day-to-day activities can become hindered. Many phone applications have been designed to assist with this issue, but this app allows individuals to keep track of time in a way that is both simple and stimulating. This design also allows for various methods of customization, such as the ability to use custom images for backgrounds and app icons, depending on the interests of the user. The application designers will demonstrate a creative way for users who suffer from dyschronometria to keep track of their daily activities while also finding enjoyment in a simple phone application.
Designing a Better Way to Rinse Showers

Nicholas Ross, Benjamin Firestone, Danielle Koehler, Jonas Wudkwych
Faculty Sponsor(s): Dr. Derek Breid

The goal of this project is to aid a Bearcat B.E.S.T. student who works on campus with the process of rinsing a shower. Using the knowledge acquired in the Engineering Design class, our group worked to develop ideas and prototypes to help the student in this difficult task. Our presentation will highlight what we, as a team, have accomplished using the design process to make this task easier. We will have examples from our initial problem, defining what needed to be accomplished with our solution, our brainstorming and idea selection methods, as well as prototypes and tests we developed. Our final results, and final prototype, will be displayed showing how the design and process we developed has fulfilled the problem definition, and compare it to the previous method our Bearcat B.E.S.T. student used to rinse showers.

Fitted Sheet Improvement Process

Hannah Rudy, Morgan Smith, Austin Reder, Bruce Johnson
Faculty Sponsor(s): Dr. Derek Breid

As part of Engineering Design, our task was to design a device that assisted the Bearcat B.E.S.T. students when putting on the fitted bed sheets in Leander Hall. Beginning with observations, our team was able to develop a device that will improve the efficiency of the student when making the beds. Currently, we are in the prototyping stage of the design process but by the Academic Conference, we aim to have a finished product and completed testing.
Effects of Socioeconomic Status and Age on Drug Use in Maryland

Antonina Clay
Faculty Sponsor(s): Professor Bruce Antkowiak J.D.

This study examined the drug issues in the state of Maryland on a county-by-county level by analyzing the relationship between socioeconomic status, age, and drug use. Through analyzing secondary data from three datasets, the researcher drew conclusions as to whether or not there are relationships between socioeconomic status, age, and drug use. This research can be used to identify which counties in Maryland are the most affected by the opioid epidemic. Future research should focus on analyzing non-fatal as well as fatal overdoses in each county.

First Amendment Freedom of Religion

Allison Dengler
Faculty Sponsor(s): Professor Bruce Antkowiak J.D.

First Amendment freedom of religion is a right that has long roots in American jurisprudence. With this liberty, however, has come a great amount of debate. Both religion clauses of the First Amendment have been the object of countless controversial Supreme Court decisions. For the purposes of this legal analysis, the clause will specifically be taken into consideration, with an eye toward religious exemptions said to emanate from this clause. The Supreme Court has been reluctant to grant free-exercise exemptions, but in the few cases that the Court did, confusion and controversy was often the result. Thus, this analysis will consider arguments both in favor of, and opposed to, religious exemptions, as well as offer a criticism to the Court's inconsistent interpretations regarding Free-Exercise exemptions. The Court's inconsistency has proven to be problematic, as there are still questions among citizens related to how far the right to exercise one's religion actually extends.
Prison Corruption: Bribery and Assault

Emily Joseph
Faculty Sponsor(s): Professor Bruce Antkowiak J.D.

Corrupt practices between correctional staff and inmates take shape in a variety of forms including bribery, violent assault, and sexual assault. It is suggested that lack of training, inadequate compensation, and unethical standards increase the likelihood of corruption. Some facilities are under pressure to fill positions which result in new staff members being on the job before they receive training. On average, correctional officers in the U.S. earn an average salary of $43,550. The broad range of prison corruption deteriorates professional boundaries that are needed between inmates and correctional staff to effectively manage facilities and ensure safety. Corrupt practices can go unnoticed due to the closed-off nature of prison facilities and the confined, unsupervised locations within prison walls. Procedures involving recruitment, training, ethical standards, and compensation need to be properly assessed and continuously enhanced to deter corruption.

An Analysis of Texting and Driving

Chad Painter
Faculty Sponsor(s): Professor Bruce Antkowiak J.D.

Texting while driving is a dangerous task that involves countless risks. This work aims to examine the factors that contribute to the decision to engage in texting and driving, offer an analysis of Pennsylvania’s current texting and driving statute, and present policy recommendations to combat the act. An extensive literature review displays three common themes as to why this behavior occurs. Those themes are attitudes toward texting and driving, social factors, and the perception of risk. A criminological theory that helps explain the engagement of texting and driving is Cornish and Clarke's Rational Choice theory. The foundation of this theory explains that humans are rational creatures, and they seek to maximize their pleasure and minimize their pain through rational decisions. Some recommendations include decreasing overall cellphone use, amending Pennsylvania’s current law, and imposing more serious punishments for the act in order to serve as a greater deterrent.
Fentanyl - Why Is It Still Around?

Kaitlynn Piper
Faculty Sponsor(s): Professor Bruce Antkowiak J.D., Dr. Sarah Daly

This capstone explores factors that contribute to the use of opioids, more particularly, fentanyl, and the existence of the narcotic. It discusses what the drug is, the history of the drug, the unique traits and characteristics of the drug, data on fentanyl encounters, an individual/informal interview with former fentanyl addicts who are now currently incarcerated, and the basis of the current life of the drug. The goals are to: 1) document the drug's characteristics, 2) evaluate the correlation of the data, and 3) determine why the narcotic is still in existence today. The research found has proven that fentanyl is currently one of the leading narcotics on the market for various reasons.

Modernizing Terry: Drug Stops, Empirical Models, and Reasonable Suspicion

Jason Scagline
Faculty Sponsor(s): Professor Bruce Antkowiak J.D., Ms. Kayla Jachimowski

In Terry v. Ohio (1968), the Supreme Court established reasonable suspicion as a new legal standard for temporary, investigative stops of civilians without probable cause. This study highlights the Fourth Amendment conflict that the Terry ruling has created in modern policing and integrates recent attempts by researchers to provide empirical guides for improving the particularity, and thus the constitutionality, of Terry stops. The author of this study created a logistic regression model to predict the likelihood of a successful Terry stop in Charleston, South Carolina, during 2017. The author of this study also hypothesized that the likelihood of a successful stop would decrease with a suspicion of drug contraband possession, but this hypothesis was unsupported. Nonetheless, the results suggest that the model developed in this study can serve as an example for future predictive models in order to restore particularization to the reasonable suspicion standard for Terry stops.
The Effects of Ban-the-Box

Mackenzie Gostomski
Faculty Sponsor(s): Professor Bruce Antkowiak J.D., Dr. Eric Kocian

Ban-the-Box (BTB) policies restrict employers from asking about applicants' criminal histories on job applications. These policies do not permanently restrict employers from performing criminal background checks; they simply prohibit employers from asking about criminal history on the initial job application and in job interviews. Employers can conduct a background check, but it must occur at or near the end of the employment process. BTB is an important tool in reducing racial discrimination. Understanding the barriers ex-offenders face when released will aid in improving their chances for employment. Cornish and Clarke's Rational Choice Theory and Tannenbaum's Labeling Theory can be used to describe ex-offenders' actions once out of prison. Several states and cities have adopted BTB policies, and if more states adopt these policies, ex-offenders can become productive contributing members of society.

The Relationship between Gender and Sentencing in Drug-Related Crimes

Maria Morgan
Faculty Sponsor(s): Professor Bruce Antkowiak J.D., Dr. Sarah Daly

The study presents research on the effects of gender and sentencing outcomes in drug-related crimes. This project focuses on using deterrence theory, labeling theory, and educating judges to decrease the gap in gender and sentencing outcomes in drug-related crimes.

Reducing Recidivism Rates Through Vocational and Educational Prison Programs

Michaela Rice
Faculty Sponsor(s): Professor Bruce Antkowiak J.D., Ms. Kayla Jachimowski

Incarceration has been and is continuing to be a growing problem in America. As of 2018, the incarceration rate in the United States is the highest in the world at almost 2.3 million inmates. Recidivism is one of the main causes of high incarceration rates. The average national recidivism rate for released prisoners is averaged between 60%-70%. The prison system is designed, primarily, for punishing an offender. In the United States, when it is shown that harsher punishments and longer sentences do not have a deterring effect on crime or recidivism, society shifts to rehabilitation. Two types of reforms that many correctional facilities find useful are the introduction of vocational and educational prison training programs. Research suggests that by providing in-prison programs, like vocational training and education, they can play a role in reducing the likelihood of recidivism upon release while providing the offender with a smoother and well-ordered reintegration back into society.
Swingin’ Into the Future: A Brief History of the Swing Dance Revival

Kyle Donovan
Faculty Sponsor(s): Dr. Tim Kelly

The existence of contemporary swing dance culture raises a number of questions: Where did this social phenomenon come from? Why is it still around? It is these questions that I have attempted to answer in my analysis. First, I related a history of swing dancing from its roots in West African dances to the modern day. This history revealed two distinct stages in the history of swing dance, a classical period and a revival period. Later, I offer some explanations for the emergence of the revival period. Technology exposed people to the dance and made dances easier to teach and organize. At the same time alternative communities from punk, ska, and rockabilly backgrounds were searching for a new mode of expression and found it in swing dance. This leapt to popular culture as the end of the Cold War helped create a romantic view of the World War II-era aesthetic.

Is It Just the Electrified Key Attached to Your Kite or Do I Feel a Spark Between Us?: Examining the Myth Surrounding Benjamin Franklin’s Relationship with the Female Sex

Rachel Mattica
Faculty Sponsor(s): Dr. Tim Kelly
The Elizabeth and Tom Andreoli Traveling Scholar Endowment

Benjamin Franklin is remembered as one of America’s founding fathers due to his seemingly endless list of contributions to society, but he is also remembered for his popularity with the ladies. It was never a secret that he fathered an illegitimate son, but popular mythology would also suggest that Franklin had numerous romantic affairs with women with whom he became close throughout his life, particularly in England and France. I argue that this perception of Franklin’s relationships with his female friends is false, having little basis in historical evidence, and that this salacious gossip stems less from Franklin’s actions and writings than from human psychological flaws. Franklin simply possessed an appreciation for women and because of this he developed and maintained strong friendships with them, often treating the women with whom he corresponded as family rather than as friends, or as flirtations as the myth would have people believe.
Coal Miners in Western Pennsylvania

Benjamin Selep
Faculty Sponsor(s): Dr. Tim Kelly

This thesis explores coal mining in Western Pennsylvania in the first half of the 20th century. It was not an easy occupation, and the story surrounding my maternal great-grandfather's death is what prompted me to research the topic. More specifically, this thesis focuses on the lives of the coal miners: where and how they lived, the roles of men, women, and children, and the dangers these people faced both inside and outside the mine as well as what the job entailed. Comparing my great-grandfather's life to that of the average coal miner from there, I was able to draw my own conclusions as to what I think really happened to him. Whether it was an accident or not, coal companies were quick to cover up any death or injury that occurred in and/or around the mine.
Marketing Research: Student Housing & Recreation Center

Christina Davis, Erin Giancola, Jason Walko, Samuel Wingrove, Taylor Ankney, Alexandra DeMarco, Hannah Gross
Faculty Sponsor(s): Dr. Thomas Cline

Throughout the semester, student-centered research was conducted on two campus-related topics: housing and recreational facilities. The marketing research projects included problem definition, research design, qualitative research, on-line survey design and launch with Qualtrics, and data analysis using SPSS. The broad problem definitions were to determine the strengths and weaknesses of the existing products, vis-a-vis major competitors, with respect to the factors that influence student and faculty choice. Two focus groups were conducted to gain insight into people's underlying views of the existing and proposed products. The focus groups provided information that helped detail the criteria consumers use when deciding whether to patronize the existing products and how students evaluate the current attributes of the products. Surveys were launched via social media to test specific hypotheses. The programs of research and findings will be presented using inferential statistics.

Localized Effects of Economic Health on College Major Choice

Cody Adams
Faculty Sponsor(s): Dr. Zachary Davis,
A.J. Palumbo Student Research Endowment

In this paper, I examine the relationship between college students' exposure to localized measures of economic health and their investment in Science, Technology, Engineering, and Mathematics (STEM) classified degrees. I focus on two-year and four-year institutions at the county, commuting zone, and state level and find that students attending four-year public institutions that are exposed to higher unemployment during the period where they must complete their major are more apt to change their major to a STEM-related field. I also find that students attending two-year institutions (public, non-profit, or for-profit) are unresponsive to fluctuations in local measures of economic health. I estimate that in four-year public schools, an increase in the unemployment rate will lead to roughly a two-percentage-point increase in the percentage of students pursuing STEM degrees at the county, commuting zone, and state levels.
The Semi-Automatic Woman: Feminism in the Surrealist Work of Gisèle Prassino

Bridget Fertal
Faculty Sponsor(s): Dr. Dennis McDaniel

This researched literary analysis examines the poetry of André Breton and Paul Eluard, both members of the surrealist movement, and how their portrayal of women is depersonalized and sexual. Surrealism is rooted in Sigmund Freud’s theories of psychoanalysis, which began with his research of hysteria, a diagnosis typically given to women with mental disorders. Breton and other male surrealists were fascinated by this research, and referred to this hysteria as “the greatest poetic discovery of the 19th century.” However, from the lens of feminist literary criticism, this project argues that some women reclaimed the movement for themselves, such as Gisèle Prassinos, a woman surrealist poet who subverts the male gaze in her writing and becomes a part of the movement as something other than a muse.

Support, Society and the Samsas: Disability in The Metamorphosis

Courtney Kloos
Faculty Sponsor(s): Dr. Dennis McDaniel

As the world becomes more inclusive, the view of disability has begun to change drastically. However, in 1915, those who were disabled seldom lived happy nor productive lives. Instead, society excluded the disabled and argued that they could not be intermixed with others due to their non-uniform looks and behaviors. Perhaps to spread awareness of the consequences of such behavior, Franz Kafka created a typical everyday businessman who awakes one morning to a concerning transformation. In “The Metamorphosis,” Gregor Samsa’s struggle with disability, provoked by high societal pressures and lack of support from family, ultimately hinders his self-worth and overall life potential. Although critics acknowledge Gregor’s struggles with disability in their analyses, they fail to discuss his initial acceptance of his transformed state which, if supported, may have led to an extended and more meaningful life.
An Obsessive Imitation: The Realism of Flaubert in Madame Bovary

Sarah Malone
Faculty Sponsor(s): Dr. Dennis McDaniel

This paper discusses several critical approaches to the literary realism found in Gustave Flaubert's novel, "Madame Bovary," and argues for one understanding as that which best suits a strong reading of the text. In order to show this, each of the approaches is introduced and briefly explained, and then held in comparison to the traditional understanding presented by author and critic, Erich Auerbach. By exploring the deeply detailed world of Emma Bovary, each critic has created his or her own understanding of the role and function of the realism at play within the novel, and it is my hope to showcase this dialogue by my own analysis of the text.

Some Sort of Monstrous Insect: Translating Ambiguity in The Metamorphosis

Mallory Truckenmiller
Faculty Sponsor(s): Dr. Dennis McDaniel

"The Metamorphosis" by Franz Kafka poses a challenge to translators as Kafka's use of linguistic ambiguity can produce multiple interpretations and varying analyses. With my paper, I study Susan Bernofsky's recent translation of "The Metamorphosis" and analyze how she recreates Kafka's purposeful ambiguity in her text. I also explore Bernofsky's translation in juxtaposition with other translations, translation theory, and critical analysis regarding Kafka's unique linguistic style. Ultimately, I conclude that a translator must preserve Kafka's literary murkiness to be faithful to Kafka's original purpose.
I Believe We are Lost: The Worst Casualties of the Great War

Paul Weisser
Faculty Sponsor(s): Dr. Jerome Foss

This paper compares Hannah Arendt's "Origins of Totalitarianism" with Erich Maria Remarque's "All Quiet on the Western Front," examining how the concrete account of the latter gives substance to the theoretical approach of the former. Remarque's gripping novel recounts the wartime experience of German soldier Paul Baumer. As the war progresses, he steadily loses his faith in his education, culture, and nation, ultimately becoming disillusioned and forlorn. His final separation from his beloved comrades is what finally breaks him, leaving him completely isolated and superfluous. This condition is exactly that described by Arendt as essential to the rise of totalitarian governments. Her account of the pre-totalitarian society is vindicated and reinforced by a novel based upon the experiences of actual soldiers, thus increasing the importance of Arendt's theory. A careful understanding of "All Quiet" will therefore allow a better understanding of the modern political problem of totalitarianism.

Toward a Postliberal Feminism

Joseph Natali
Faculty Sponsor(s): Dr. Bradley Watson

Feminist claims of equality have shifted from legal to philosophic arguments. I contend that equality is no longer an adequate basis for the feminist position. Instead, I argue that a transcendent concept of flourishing ought to permeate the feminist position. Rather than argue that women are denied some nebulous form of equality, I contend that feminists should understand their critique in relation to the ability of women to participate in the good life. In light of this reconstruction of the feminist project, a political theory that emphasizes flourishing is necessary to achieve the project's goals. Liberal political theories, like those of Hobbes and Rousseau, lack a concrete understanding of flourishing and instead define it in relation to subjective individual desires. I contend, therefore, that a re-articulation of Aristotle's political theory is ultimately the best way for feminists to achieve their political goals.
The Effects of Nicotine and Cytisine Exposure on Feeding Behavior in Adult Female Zebrafish

Lauren Gugliotti, Rebecca Bell
Faculty Sponsor(s): Rev. Shawn Anderson, O.S.B.
A.J. Palumbo Student Research Endowment

Although many Americans attempt to stop smoking, many start again due to symptoms associated with nicotine abstinence, like weight gain and anxiety. Nicotine, a psychoactive agent in tobacco, exerts its effects in the brain via nicotinic acetylcholine receptors (nAChRs). Adult female zebrafish were exposed to 0 or 1 mg/L nicotine for six days. Subsequently, zebrafish received daily exposure to 0 or 1 mg/L of cytisine, a partial agonist of nAChRs that is used in Europe to curb smoking, for six weeks. Food consumption levels were assessed by visual and video observation. In the feeding study, fish exposed to 1mg/L nicotine and 0mg/L cytisine (1NIC/0CYT) consumed more food than fish exposed to 0mg/L nicotine and 0mg/L cytisine (0NIC/0CYT) (P's < 0.05). In conclusion, data from the feeding study suggest that 1NIC/0CYT zebrafish expressed higher levels of hunger than all other treatment groups and that cytisine treatment reduced nicotine-withdrawal induced binging.

The Effect of Caffeine on Embryonic Heart Development in Zebrafish

Jessica Packard
Faculty Sponsor(s): Br. Albert Gahr, O.S.B.
A.J. Palumbo Student Research Endowment

Humans through coffee, tea, and sweets ingest varying amounts of caffeine. Moderate amounts of caffeine may result in smaller heart size and increased heart rate. If the same dosage of caffeine is applied to embryonic zebrafish, then size will be smaller compared to a control group. In the current experiment, caffeine was applied to zebrafish embryos at 24-, 36-, and 48-hours post-spawning. After hatch, the zebrafish were reared for six weeks then adenosine receptors and GATA transcription factors' expression was determined. Although no significant correlation between exposure time and gene expression was found, trends for A2aR and GATA-4 indicate later exposure increased expression. There was an indication of overall growth modification as a result of exposure. These data indicate that moderate intake of caffeine by pregnant mothers may influence overall growth and expression of the A2aR and GATA-4 genes suggesting alteration of heart development, which is retained as the fish matures.
The Effects of Cannabidiol (CBD Oil) and Nicotine on Chicken Embryonic Development

Renee Tempo, Anna Mills
Faculty Sponsor(s): Dr. James Kellam, Br. Albert Gahr O.S.B.

This experiment investigated the effects of cigarette and marijuana smoking on fetal development. The effects of nicotine and CBD oil on the relative gene expression of CB1R, CB2R, and \( \alpha 3 \) nAChR and \( \alpha 5 \) nAChR receptors in chickens were measured via Real-Time PCR Analysis. Their effects on overall growth were quantified by measuring the weight, whole-body length, wing length, and leg length of each chicken. These measurements were taken at 18 days of development. It was predicted that the treatment group inoculated with nicotine would have lower overall growth than that inoculated with cannabis (CBD) oil. It was also predicted that the treatment group inoculated with CBD oil would have significantly higher relative gene expression of CB1Rs and CB2Rs than that inoculated with nicotine. Overall growth and relative gene expression were inconsistent in the results. The effects of cigarette and marijuana smoking on fetal development cannot be concluded from this experiment.
A Case Study Review: Depression in High School

Juli Cehula
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

Carly, a 15-year-old high school student, has always been a high achiever. She has excelled in academics and extracurriculars. However, recently, Carly has been distant from peers and showed a lack of interest in things that she used to enjoy. The review of this case study will look at Carly's symptoms and explore the ramifications of depression and other mental health disorders that Carly may have.

A Case Study: Bear Hoskin

John Malone
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

For this project, I analyzed a case study about a 16-year-old Native American student who finds himself in the hospital after an evening of inappropriate activity. My objective is to develop an effective treatment plan to provide for the individual based on lifestyle. For the case study, the student has a number of physical and mental health problems that affect his everyday life. Many of these factors are dependent upon one another, so it is vital to develop an effective plan to curb his lifestyle. By using details from the case study, references from other cases, and an overview of the DSM-V, an effective treatment plan will be created that is both realistic and attainable based on the interests and self-awareness of Bear.
Dracula or Dragulus: A Look into the Varying Interpretations of the Historical Dracula

Raymond Aguiar
Faculty Sponsor(s): Rev. Brian Boosel, O.S.B.

The historical Dracula, Vlad the Impaler (1431-1476), is often disregarded from European history despite his importance in the defense of Europe against the Ottomans. Although documented to have committed numerous atrocities, he is the subject of many polarizing interpretations that have emerged surrounding him. Within Romania and Russia, he is depicted as a just ruler who defended State and Church from the Ottomans. Meanwhile, the Ottoman Empire and Germany depicted him as a tyrant who ruthlessly slaughtered anyone in his path. Although these interpretations have persisted since his own time, I argued that Dracula was actually a combination of these two interpretations -- that while he can be seen as a hero for defending Romania, he has also committed many atrocities on the Ottomans, Germans, and on criminals and vagabonds in Romania.

Solidarity and Social Cohesion: Aristotelean Political Friendship in Pope St. John Paul II's Response to the Soviet Union

Joseph Natali
Faculty Sponsor(s): Rev. Brian Boosel, O.S.B.

In this paper I will argue that Pope St. John Paul II's response to the terror and oppression imposed by the Soviet Union upon the Polish people made practical use of Aristotle's theory of political friendship. This was accomplished specifically in John Paul II's use of cultural revolution to cultivate a sense of universal agreement upon the good throughout the Polish people that was distinct from and opposed to the existing Soviet governmental structure. The success with which John Paul II used this tactic shows both the historical agency of particular principle in classical political philosophy as well as its efficacy for addressing contemporary political problems.
The Battle between Blood Supply and Beauty: Sir Harold D. Gillies and the Advent of Modern Plastic Surgery

William Vana
Faculty Sponsor(s): Rev. Brian Boosel, O.S.B.
The Elizabeth and Tom Andreoli Traveling Scholar Endowment

World War I, one of the most devastating wars in history, caused millions of casualties throughout the world. Those who survived the war were sometimes left with horrific injuries. While the war destroyed bodies, doctors worked tirelessly to save lives. Dr. Harold Gillies was one such doctor who developed ground-breaking work in facial reconstruction. He and his team ran the most efficient face hospital in the war, Queen Mary’s Hospital. Thousands of patients were treated by Gillies and often with amazing results. He restored noses, reformed sunken faces, restored scarred and burned skin, and so much more. The work he did was essential for restoring these men’s dignity and his work deserves particular attention.

Depictions of Mythical Castles in Arthurian Manuscripts

Jaime Witham
Faculty Sponsor(s): Rev. Brian Boosel, O.S.B.
The Elizabeth and Tom Andreoli Traveling Scholar Endowment

Although they often have very little space available to them, a common and beloved trait of medieval artists is that they create elaborate, detailed, and colorful illuminations and miniatures in manuscripts. This is especially true in Arthurian literature; the purpose is to depict the text meant to entertain and inspire. Different artists use different styles, but many of these miniatures or illuminations contain depictions of castles. The various stories in Arthurian literature feature many different castles, often magical or fantastic. My thesis addresses the probability that artists drew these mythical castles from imagination. Research done in the British Library in London, England, on a small portion of manuscripts whose miniatures were drawn near Flanders during the late 14th and early 15th centuries shows that although medieval artists used contemporary architectural elements, they did not use significant existing castles as a model for their depictions of fantastical castles.
Business Policy and Strategy Case Study of Fitbit Inc.

Jill Cline, Anthony Rosso, Matt Andrejcak
Faculty Sponsor(s): Dr. Jeffrey Godwin

Seniors Anthony Rosso, Jill Cline, and Matt Andrejcak analyze Fitbit's key metrics that indicate its historic performance. Fitbit is a well-known name in the wearables industry that once took the fitness market by storm. As the industry innovated, Fitbit's sales began to fall because the company was caught between inexpensive fitness bands and high-end technologically advanced internet-of-things watches. Fitbit continues to hold onto a strong following of loyal customers as it releases new products but is continually losing market share to competitors. Fitbit should adjust its strategic objectives and implement its amended strategies. This is a case study that analyzes the internal and external environment surrounding Fitbit and offers recommendations to Fitbit. These recommendations focus on new target demographics and product awareness, current things the Fitbit brand lacks. Using these tactics could assist Fitbit in being successful as it once was.
Generation Magazine 2018-2019 Reading

Bridget Fertal
Faculty Sponsor(s): Ms. Michelle Gil-Montero

"Generation Magazine's" launch will include a reading by the authors whose work is included in this year's publication. Reading attendees will receive a copy of "Generation" and hear poetry, fiction, and nonfiction pieces written by fellow students. This year, the following writers and artists are featured in the magazine: Irina Rusanova, Christian Crowley, Bridget Fertal, Nicole Fratrich, Troy Wade, Kate Bell, Zelie Hummer, Alyssa Mountan, Micaela Kreuzweiser, Sarah Malone, Kaitlin Repp, Johanna Philips, Eddie Kunz, Zachary Folk, Benjamin Watt, Danny Whirlow, Julia Snyder, Paige Copper, Jessica Ackerman, Mallory Truckenmiller, Emily Daily, Gabriella Petruccelli, Connie DiFrancesco, and Shaye Beeman.
1. Broad-Based Vocational Experiences to Build Background: Internship Experiences in the Bearcat B.E.S.T. Program

Zachary Clarke
Bearcat B.E.S.T.
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

Applying the skills I built in my social and vocational courses, I successfully completed internships at Saint Vincent in the Book Center, Fitness Center, Shack and in externships at Applebee’s Restaurant in Greensburg and the Giant Eagle grocery store in Latrobe. Through these experiences, I have built the skill set needed to be successful in future competitive employment.

2. Custodial and Culinary Capability: Creating Competence in Food and Custodial Services through Supervised Internship Experiences

Justin Miklos
Bearcat B.E.S.T.
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

In order to prepare for competitive employment in either custodial or culinary settings, my internships at Saint Vincent College included the Shack snack bar, the Bakery, the Community Center and Facilities Management. Off-campus, I competed externships at the Springhill Suites by Marriott and the Eat’n Park restaurant, both in Latrobe.

3. Culinary Competence: Combining Social and Vocational Skill Sets to Conquer Client Service in Culinary Settings

Madison Orendi
Bearcat B.E.S.T.
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

Experiences in which I developed a variety of client service and other work skills. My placements included the College’s Book Center, the Community Center and Shack at Saint Vincent College, as well as Eat n’ Park restaurant in Latrobe and Bethlen Homes in Ligonier.
4. **Fitness and Filing: Forming Finesse in the Workplace**

Ryan Relosky
Bearcat B.E.S.T.
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

*This project describes my experiences in vocational placements at Saint Vincent College including the Fitness Center, College Bookstore, and the Community Center, as well as in community settings like Eat’n Park restaurant and Bethlen Homes, I have developed the skills needed for competitive employment.*

5. **Dinner and a Show: Honing Vocational Skills in Food Prep and Client Service**

Colin Russel
Bearcat B.E.S.T.
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

*Through a series of internship placements at Saint Vincent College including the College Bookstore, the Shack, and client services at Bethlen Homes, I have developed the skills needed for competitive employment.*
6. The Writing Club: Implementing Delayed Reinforcement to Enhance Handwriting Skills

Sean Ernst, Sarah Simsic, Maddie Spittler, Carolyn Welka
Education
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

A 19-year-old student in the Bearcat B.E.S.T transition program was recommended for handwriting intervention indicated by a functional behavior assessment (FBA). The student has an intellectual disability with a secondary diagnosis of a speech and language impairment. The goal of the intervention was to improve the student’s handwriting. During baseline and intervention, the student scored significantly low on a rubric based grading scale which evaluated different aspects of the handwriting. Results suggest the instructional intervention was effective in improving overall quality of the student’s handwriting.

7. Using Repeated Readings to Improve Reading Fluency

Grace Harris, Ryan McElhinney, Heather Ramsey
Education
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

Over a period of nine weeks, our group worked with an 18-year-old, male Bearcat B.E.S.T. student with an intellectual disability and speech and language impairment who struggles with reading fluency. Each week, a variety of reading-fluency strategies were used with the student focusing on repeated readings or reading a passage multiple times. At the end of each session, the student’s words per minute were recorded and used to track his progress. This project summarizes the outcomes of this intervention.
8. Levels of Sall4 Expression as a Function of Location in the Body of an Axolotl

Maria Franey  
Biochemistry  
Faculty Sponsor(s): Dr. Matthew Fisher,  
A.J. Palumbo Student Research Endowment

Axolotls, or Ambystoma mexicanum, are a type of salamander that is able to heal superficial wounds without any type of scarring. Sall4 is a transcription factor that has been found to be expressed in axolotls in greater levels post-wounding than is found in humans, and evidence has suggested that this may be one of the main reasons that their bodies are able to perform healing so well. It is unknown at this point whether axolotls experience expression of sall4 evenly throughout the body, or if certain areas contain cells prone to higher levels of sall4 and therefore higher rates of healing. In order to gather knowledge about sall4 in axolotls, 12 juvenile axolotls were wounded using a 2mm punch biopsy, with several different groups having different sites of wounding, including central ventral, central dorsal, near the left front foreleg, and on the right side of the tail fin. Using Western Blot analysis, the wound sites were tested for sall4 levels of expression.

9. Chemical Repellents in Polymers Undergo Environmental Strains

Brody Halliwell  
Biochemistry  
Faculty Sponsor(s): Dr. Daryle Fish  
A.J. Palumbo Student Research Endowment

The goal is to develop polymers containing known chemical repellents for mice and small rodents and to place them under environmental strains to observe how they react. The polymers contain two known repellents, cycloheximide and tri-nitrobenzene. These repellents have shown significant repellency in past experiments. The first round of polymers have been cast in petri dishes and placed in various environments. These environments consist of the greenhouse to simulate humidity and moisture, an oven set at 40 degrees Celsius to simulate a hot day in the summer, and a control group that was placed in a room temperature hood. UV-Vis spectra have been obtained over the course of the experiment in order to formulate a dissipation plot for the chemicals in the polymers. The experiment will continue with the second round of polymers being placed in the same environments for a similar amount of time. During the second round, the UV-Vis spectra will be obtained to create a plot.
10. Analysis of Antibacterial Properties of Phlox Divaricata

Allison O'Rourke
Biochemistry
Faculty Sponsor(s): Dr. Matthew Fisher
A.J. Palumbo Student Research Endowment

Phlox divaricata, or wild blue phlox, is a flowering plant that is native to the forest and fields of eastern North America. This plant has been used for decades by multiple populations to treat conditions such as burns, eczema, gastrointestinal problems, and used as an eyewash. There is some evidence from history to suggest that this plant may have some antibacterial activity. In this project, different parts of the plant are being analyzed by using water, methanol, and chloroform to extract different molecules. The roots, stems, and leaves are separately extracted to determine if their antibacterial activity localized to a specific part of the plant. A disk diffusion antibiotic sensitivity is being used against both gram-positive and gram-negative bacteria to negative bacteria to determine ability of the extractions to inhibit bacterial growth. Then, a Minimum Inhibitory Concentration assay (MIC) is used to determine the sensitivity of the molecules to inhibit bacterial growth.

11. Antioxidant Properties of Thymol and Eugenol Derivatives

Chelsea Sarring
Biochemistry and
Faculty Sponsor(s): Dr. Daryle Fish
A.J. Palumbo Student Research Endowment

Oxidative stress is caused by an imbalance between the reactive oxygen species and antioxidants present. It can lead to various diseases including cancers, cardiovascular diseases, diabetes, and neurodegenerative diseases. Antioxidants can attenuate oxidative stress, and many phenols are able to act as antioxidants by reducing free radicals. These antioxidants have many possible applications such as the prevention and treatment of many oxidative stress-linked diseases. Eugenol and thymol are both phenolic compounds, extracted from cloves and thyme, respectively, that have been previously studied, along with their derivatives, for their antimicrobial abilities. In this study, derivatives of eugenol and thymol were synthesized before being analyzed for their antioxidant abilities using a 2,2'-diphenylpicrylhydrazyl (DPPH) assay to determine how changing the conjugation of the phenols would affect their antioxidant abilities.
12. Comparing Macromolecular Crowding's Effect on Protein Aggregation in Globular Proteins to Intrinsically Disordered Proteins

Samuel Whittaker  
Biochemistry  
Faculty Sponsor(s): Dr. Matthew Fisher  
A.J. Palumbo Student Research Endowment  

The focus of this study centers on furthering the understanding of macromolecular crowding and its effect on protein folding. The phenomenon of macromolecular crowding shows that the 3D space in which a macromolecule occupies is impenetrable by other macromolecules. When a protein comes into the space of another molecule, the macromolecular crowder, which can be another protein or a polysaccharide, the two compete for the volume of space occupied by the crowder and this can cause the protein to follow a different folding pathway from its native one due to the more confined volume of space. This shift in a protein's normal folding pathway has been known to result in misfolding and protein aggregation. This research sought to determine how macromolecular crowding might affect aggregation formation in different types of proteins, as well as determining what effect the type and concentration of the crowders might have on aggregate formation.

13. Modeling and Docking Fatty Acid and Retinol Binding Protein Found in Nematodes

Locke Lewandosky  
Bioinformatics  
Faculty Sponsor(s): Dr. Michael Sierk  

Nematodes are parasitic organisms that cause major damage to crops around the world; in 2015 they were responsible for the loss of $157 billion worth of crops. To combat nematode infection farmers use nematicides which can be highly toxic; thus, new nematicides are needed. Nematodes require retinol produced by the host plant to survive, and have proteins, called FAR proteins, that bind to retinol. This study focused on a FAR protein, called Mi-FAR-1, found in the Meloidogyne incognita nematode. We first built a computational structural model of the protein by using the experimentally determined structure of a related protein, Gp-FAR, as a template. We then performed computational docking experiments to compare the binding of retinol with various other compounds to see if we could identify compounds that would serve as retinol antagonists. We identified multiple compounds that have docking scores better than that of retinol.
14. The Conformational Protein Changes Responsible for the Onset of Juvenile Pilocytic Astrocytoma

Madison Mehlferber
Bioinformatics
Faculty Sponsor(s): Dr. Michael Sierk

Juvenile Pilocytic Astrocytoma (JPA) tumors are considered the most prevalent type of tumor found in children and account for about 30 percent of the tumors within the central nervous system of children. (Sivert et al 2008). JPA tumors are benign in nature and with the proper treatment exhibit over a 90 percent survival rate; however, these tumors can pose a major threat to diagnosed patients depending upon the location in the brain that the tumor manifests itself. There is still much that is not known about the genetic factors that lead to the progression and development of the tumor mass. The Neurofibromatosis Type I (NF1) protein has been linked to JPA development due to its role within the MAPK signaling pathway and its interaction with Ras proteins. We set out to investigate how known mutations in NF1 affect the NF1-Ras interaction using computational molecular docking.

15. The SVC World Series of Birding Teams: The Bearcat Bird Nerds

Jared Ackerman, Alyssa Baker, Rachel Dudek, Michael Kardos, Devon Long, Rachael Sarnowski, Anthony Schaefer
Biology
Faculty Sponsor(s): Dr. James Kellam
A.J. Palumbo Student Research Endowment

The annual World Series of Birding is held in early May at Cape May, New Jersey. More than 70 teams compete to find the most species of birds in a single 24-hour period, from 12:00 a.m. to 11:59 p.m. Saturday. Saint Vincent College began sending teams in 2017. We observed 96 species in 2017 and 111 species in 2018. All competing teams raise funds for conservation programs around the world. To date, the Bird Nerds have raised $860. There is also a scientific value to the competition. The bird lists that are compiled provide a snapshot of which birds are at Cape May on a certain day, and which birds are not. By comparing these lists year after year, scientists can determine how migratory patterns are changing as well as how changes in habitat affect species populations and distributions.
16. The Effects of Environmental Enrichment and Wall Climbing on Anxiety and Depression-like Behaviors in the Female Swiss Webster Mouse

Madeleine Bartrug
Biology
Faculty Sponsor(s): Rev. Shawn Anderson, O.S.B.
A.J. Palumbo Student Research Endowment

Anxiety and depression disorders are prevalent in society, and substantial disparity exists between different socioeconomic classes. This project evaluated how anxiety-like and depression-like behaviors in female Swiss Webster mice with access to an enriched environment (EE-SED), wall climbing (SH-EX), or both factors (EE-EX) would differ from controls (SH-SED). Three days per week for six weeks, EX mice underwent three x 10-minute sessions on a climbing wall. Wall-climbing mice or enriched mice explored the center region of an open field apparatus more than control mice, showing reduced anxiety-like behavior (P's < 0.05). In the elevated zero maze, wall-climbing mice showed increased exploration of the open sections, displaying reduced anxiety-like behavior (P's < 0.05). Enriched mice showed trends for increased depression-like behavior in the forced swim test. These data suggest that access to better housing conditions and exercising both work to reduce anxiety, but not depression.

17. The Effects of Oral Bacteria on an In Vitro Blood-Brain Barrier

Kylie Bible
Biology
Faculty Sponsor(s): Dr. Jennifer Koehl
A.J. Palumbo Student Research Endowment

Alzheimer’s Disease (AD), a neurodegenerative disease that results in loss of memory and cognitive ability, has recently been correlated with the oral pathogen Porphyromonas gingivalis, a facultative anaerobic bacterium associated with periodontitis (Poole et.al., 2013). Aggregatibacter actinomycetemcomitans, Streptococcus oralis, and Streptococcus mitis were utilized in this study; these are facultative anaerobic bacteria found in the oral cavity. An in vitro blood-brain-barrier (BBB) model was constructed and the concentrations of bacteria that were capable of crossing the membrane were measured. It was hypothesized that A. actinomycetemcomitans would transmigrate across the in vitro BBB in higher concentrations when compared to S. oralis and S. mitis. Our results confirmed this hypothesis, possibly indicating a more virulent interaction between the bacteria A. actinomycetemcomitans and human brain endothelial cells. In conclusion, finding further evidence to support the relationship between oral bacteria and AD will provide greater understanding in hopes of discovering treatment for this disease.
18. The Hyaluronidase Inhibitor L-Ascorbic Acid 6-Hexadecanoate Prevents Large Tumorsphere Formation by B16-F10 Malignant Mouse Melanoma Cells

Michael Cooper
Biology
Faculty Sponsor(s): Dr. Bruce Bethke
A.J. Palumbo Student Research Endowment

The tumor microenvironment, including hyaluronic acid a component of the extra cellular matrix, plays a role in tumor growth and development. The enzyme hyaluronidase, which breaks down hyaluronic acid, alters this microenvironment. Inhibition of hyaluronidase with L-ascorbic acid 6-hexadecanoate was proposed as a method to suppress tumor growth. This was tested by performing in vitro aggregation and growth assays with cultured B16-F10 mouse melanoma cells, and an in vivo tumor challenge assay. Tumorsphere formation was inhibited by 80-100µM concentrations of the hyaluronidase inhibitor resulting in significantly smaller tumorspheres and dispersed cell growth relative to untreated cells. Subcutaneous injection of untreated B16=F10 cells in mice failed to develop into tumors, while 60 percent of the mice injected with inhibitor-treated cells developed soft fluid-filled masses at the site of injection. These results indicate the hyaluronidase inhibitor has capacity to influence malignant cell a

19. Synthesis of an Extended Matrix Metalloproteinase Inhibitor

Jordan Hungerford
Chemistry
Faculty Sponsor(s): Dr. Daryle Fish
A.J. Palumbo Student Research Endowment

Previous research shows that extending the structure of an inhibitor increases the potency, and that having a group on the inhibitor that binds zinc well will also increase the potency; these are the requirements that must be present in the structure. The amino acid cysteine binds zinc very well through its R group that contains a sulfur. Other structural recommendations are to have a hydrophobic group in the R3 position, and to have the stereochemistry opposite of each other. This specific research project aims to utilize many organic reactions to yield a final structure that will contain all these requirements and recommendations. After each reaction has occurred, the structure will be checked with structural instruments like the infrared (IR) spectrometer and the hydrogen nuclear magnetic resonance (H-NMR). This project consisted of four reactions, with three succeeding. Overall, the synthesis was unsuccessful.
20. Synthesis of Potential Drug Chalcones with Enhanced Solubility

Lindsey Kampas
Chemistry
Faculty Sponsor(s): Dr. Daryle Fish

A chalcone is a conjugated structure that is currently of interest in the pharmaceutical industry due to its variety of biological properties. Besides often being found naturally, chalcones are relatively easy to synthesize, but the problem with these compounds is their low solubility in water and organic solvents. This negative chemical property prohibits the chalcone from reaching its potential in the pharmaceutical industry. The goal of this research was to synthesize a potential chalcone with improved solubility that can be used for drug delivery and other pharmaceutical advancements.

21. Synthesis of Iridium and Palladium N-Heterocyclic Carbene Complexes

Kristin Marsh
Chemistry
Faculty Sponsor(s): Dr. Jason Vohs

The preparation and characterization of two air-stable complexes bearing either Ir or Pd metal centers and a cyclooctadiene ring: [trimethylenebis(N-n-butylimidazol-2-ylidene)](cyclooctadiene) iridium hexafluorophosphate and [trimethylenebis(N-n-butylimidazol-2-ylidene)](cyclooctadiene) palladium hexafluorophosphate. The syntheses involve the preparation of a Ag(I)-NHC complex and its use as carbene transfer agent to either an Ir or a Pd precursor. The products were characterized using $^1$H NMR.
22. An Assessment of the Influence of a Modified Ketogenic Diet on Mild Traumatic Brain Injury in Adolescent and Post-Adolescent Male Rats

Joshua Kucmeroski
Biology
Faculty Sponsor(s): Dr. Bruce Bethke
A.J. Palumbo Student Research Endowment

Mild traumatic brain injury (mTBI) and concussion are temporary impairments of brain function. Concussions are common among athletes and result in not only lost playing time, but also long-term effects. Studies on high-fat diets have indicated potential neuroprotective effects. In this study, adolescent and post-adolescent male rats were exposed to a modified ketogenic diet or a standard rodent diet and then subjected to mTBI. The impact and recovery from the injury were then monitored over a four-week period via arm entries in a Y-Maze assay and discovery latencies in a Morris water maze assay. A combination of limited group sizes along with interval variation in the collected data precluded a sound assessment of the effects of the modified ketogenic diet. Further studies with larger sample sizes are needed to fully characterize the neuroprotective effects of modified ketogenic diets relative to brain injury.

23. The Effects of Preconditioning and Exercise on Muscle Repair in Cryoinjured Zebrafish (Danio rerio)

Samantha Mears
Biology
Faculty Sponsor(s): Br. Albert Gahr, O.S.B.

Zebrafish are a common test model for mammalian species because of genomic structure and physiological similarities. In this experiment, zebrafish were used as models to study muscle regeneration and the effects of preconditioning and exercise on the regenerative capacity. Twenty zebrafish were divided into four experimental groups based on type of injury and presence of exercise. Prior to injury, all four groups were exercised for seven days. Two groups received a cryoinjury and the remaining groups received mock injury. For each injury protocol, one group was exercised four times over the course of seven days. After the exercise period, fish were euthanized, photographed for measurements, and muscle samples collected for real time PCR. MyoD was significantly increased in the cryoinjured groups and Pax3 was significantly increased in the exercised fish. These data with injury scaling indicate that preconditioning and exercise increase the regenerative capacity of the fish muscle.
Comparison of the Effects of Red Palm Oil (RPO) and Virgin Coconut Oil (VCO) on Growth and Metabolic Rates of Chicken Embryos

Jessica Rudolph
Biology
Faculty Sponsor(s): Br. Albert Gahr, O.S.B.
A.J. Palumbo Student Research Endowment

Red palm oil (RPO) and virgin coconut oil (VCO) are two tropical oils that contain many beneficial properties that could potentially enhance development and metabolism during embryonic gestation. RPO and VCO both contain lipid components such as saturated fats as well as vitamins and antioxidants. In the current experiment, RPO, VCO, and saline were applied to chicken embryos at the beginning of gestation to assess effects on development, metabolism, and cholesterol concentration. Application of RPO and VCO appeared to alter weight of the chick embryos, but did not alter appendage length. However, cholesterol concentration and enzyme activity showed a trend to have altered the following application. An increased rate of activity in the liver enhanced oxidation of the fatty acid source indicating improved metabolic processes. It may be concluded from this data that consumption of RPO and VCO by pregnant mothers may be beneficial for the postnatal metabolism of the embryo.

25. The Effects of Alendronate on Chicken Embryonic Bone Development

Christian Dimeo
Biology
Faculty Sponsor(s): Br. Albert Gahr, O.S.B.
A.J. Palumbo Student Research Endowment

One limitation in chicken meat production is the overgrowth of muscle without compensation for the increased bone strength needed to support the increase in weight. The current study considers the effects of alendronate, a common osteoporosis drug, on chicken embryonic bone development in order to identify a potential remedy to this limitation. At the sixth day of embryonic development, chicken embryos were treated with 0.006, 0.06 ug/kg alendronate or a saline control. Then, on the 18th day of development, the tibiotarsus bones were collected to test bone stress and osteogenic gene expression. BMP-2, RANKL, and Sox9 gene expression trends correlated to the increased length of the wing. However, no difference in bone stress was observed in the current study. These data indicate alendronate may have stimulated proliferation of osteocytes but did not affect the overall strength of the bone.
26. Manganese Chloride and its Effects on the Reproductive Health of Zebrafish

Peter Becker
Environmental Science
Faculty Sponsor(s): Dr. Caryl Fish, Br. Albert Gahr, O.S.B.

Abandoned Mine Drainage (AMD) affects many stream ecosystems in Southwestern Pennsylvania. The pollutants that are affiliated with AMD can cause havoc to the ecosystem by disturbing food chains and have negative effects on the organisms' health. In order to test the effects of the pollutants, I exposed two experimental groups of female zebrafish (Danio rerio) to a high and low concentration of manganese chloride (MnCl₂) for two weeks. After this two-week period, I bred the two experimental groups along with the control to see how many eggs were produced. The two experimental groups produced zero eggs while the control group produced 44 eggs in total in which two were dead. These results show that AMD negatively affects the reproductive health of the organisms in the stream. If nothing is done to clean the streams from the AMD pollutants, the stream ecosystems that we know may not be here in the future.

27. The Effects of Solar Radiation Management on Terrestrial Plant Life

Gregory Bizup
Environmental Science
Faculty Sponsor(s): Dr. Caryl Fish

High emissions cause several problems that are well known to climate scientists, such as ocean acidification, global warming, and sea level rise. According to the NOAA, if action is not taken on climate change, temperatures could rise a catastrophic six degrees Celsius by 2100. Unfortunately, even if emissions are significantly cut, the carbon dioxide will linger in the atmosphere for decades. Thus, a new and effective method of reversing the effects of climate change is necessary. Solar geoengineering, commonly called Solar Radiation Management (SRM), is possibly the most drastic, but the most necessary option, and it needs to be studied. In this research, I explore the ways SRM will affect plant life.

Samantha Dull
Environmental Science
Faculty Sponsor(s): Dr. Peter Smyntek

Acid mine drainage (AMD) impacts water quality but may suppress other pollutants. This study examined how AMD pollutants and phosphorus, a key nutrient pollutant, varied within sediments of Crabtree Creek. Since phosphorus can adsorb to iron and aluminum precipitates in AMD, phosphorus in stream sediments may decrease with distance from an AMD input. Sampling took place in August and October at sites before and after AMD entered the stream. The relationships between phosphate, iron, and aluminum in sediment samples varied between sampling dates. Sediment concentrations of aluminum and phosphate showed similar patterns on the first sampling date. This suggests phosphorous adsorbs onto aluminum precipitates more efficiently than onto iron precipitates. The second sampling, which occurred after significant flooding in the stream, did not show this pattern. Flooding may have redistributed AMD precipitates in a way that obscured the earlier pattern.

29. The Effect of Limestone Containing Bedrock Formations on Stream Acidification and Recovery of Headwater Streams on Laurel Hill

Vincent Lessard
Environmental Science
Faculty Sponsor(s): Dr. Peter Smyntek

It has been documented that Laurel Hill receives acidic precipitation. Past research shows that streams along Laurel Hill are affected by this phenomenon. If acidification reduces the pH below what is considered neutral, aquatic life is negatively affected. The main cause of these negative effects is elevated aluminum concentration in the water. Aluminum is toxic to fish, benthic macroinvertebrates and other aquatic organisms. It was hypothesized that bedrock limestone influences stream acidification on Laurel Hill. To conduct this study, six streams were selected. Three streams were influenced by limestone bedrock, while the other three were not. Streams were tested for pH, alkalinity, aluminum concentration and macroinvertebrates. The data indicated a difference in water chemistry and macroinvertebrate communities between limestone and non-limestone influenced streams. The results may also suggest possible biological recovery from past acid rain impacts.
30. Flood Analysis of the Mississippi

Niah Wolfe
Environmental Science
Faculty Sponsor(s): Dr. Peter Smyntek

The purpose of this research project is to draw conclusions and analyze flood crest data and rainfall data from around the Mississippi River at Baton Rouge, Louisiana, to see if there are any connections between the levee construction in 1927 and flooding. I also researched articles on the Mississippi River and how the levees may or may not have caused even more flooding than what was already happening. I would like to see if these claims have any significance with what data I found from the National Weather Service. From the articles I found, it seems to be true that the levees built may help the surrounding area but may cause flooding in other parts of the river. This is important in order for us to know how to control flood waters from rivers without causing more damage to ecosystems and our populated areas.

31. Easing the Effects of Epilepsy Through the Use of Clinical Nutrition

Alexis Bellafiore
Integrated Science
Faculty Sponsor(s): Dr. Caryl Fish

Epilepsy is a disorder of the brain that is defined by the reoccurrence of seizures. Today it affects 1.2 percent of the United States population includes 470,000 children. Currently, epilepsy is treated mostly by anti-epileptic drugs called AEDs which work in various ways to attack the mechanism that causes the seizures to occur. Other treatment options are currently being explored; the most common is through clinical nutrition. The most common is a diet low in carbohydrates. It has proven to be most effective and shows that epileptic seizures could be better regulated with use of a different diet plan than the traditional American way of eating. Based on alternative treatment options, focusing on a low-carb diet could prove to reduce epileptic seizure frequency and improve overall homeostasis.
32. The Effects of Music Therapy, Aromatherapy, and Reminiscence Therapy on Dementia and Its Side Effects

Alison Boyer
Integrated Science
Faculty Sponsor(s): Dr. Caryl Fish

The prevalence of dementia is rapidly increasing worldwide. A large amount of people with dementia are on forms of medication that delay or lessen the symptoms of dementia. However, these medications can have negative adverse effects. So recently, many more patients are turning to forms of therapy. The purpose of this research paper is to look at three different types of therapies (music therapy, aromatherapy, and reminiscence therapy) to see the effects on dementia and its symptoms. Out of the three therapies, music therapy had the most overall benefits on reducing the effects of dementia for patients. Music therapy can reduce agitation of those with dementia, reduce the burden placed upon caregivers, and increase the overall quality of life of the dementia patients. When moving forward on research for dementia, the public needs to be educated more on the basics of dementia and its treatment options.

33. Effectiveness of Various Occupational Therapies on the Treatment of Autism Spectrum Disorder

Sarina Chase
Integrated Science
Faculty Sponsor(s): Dr. Caryl Fish

Autism spectrum disorders are increasingly diagnosed in modern society, and consequently, occupational therapy is increasingly used as an alternative treatment. One of the most notable symptoms of autism spectrum disorders is that of behavioral struggles, specifically difficulty in social interactions. Occupational therapy is divided into three different styles: early intervention, individual care, or group care. The purpose of this comprehensive paper is to study which of these three styles of occupational therapy is most effective when treating the behavioral symptoms of autism spectrum disorder. Most sources on this topic do not provide a specific "best" treatment for autism spectrum disorder because each patient (and his or her symptoms) is unique and in turn, their treatments are also unique. With this in consideration, the most significant information that should be taken from this comprehensive paper is that one style of therapy that does not work for one person may successfully work for another.
34. Safe Alternatives for Formalin When Preserving Specimens

Elizabeth Daniels
Integrated Science
Faculty Sponsor(s): Dr. Caryl Fish

Fixation is a very critical step in the practice of pathology and histology. This is linked to the chemical formalin, which is used as the main preservative in pathology. Formaldehyde and formalin are key roles in this process to be used as the fixative for the tissues. These chemicals are very toxic, which raises concern about the safety of the doctors. Formalin and formaldehyde are potential carcinogens and alternatives have been studied to determine a safer way to preserve the tissues. Formalin is one of the best preservatives and is used all over the world in pathology labs. This chemical preserves the tissues to keep them as lifelike as possible to determine a correct diagnosis for the patient. Several alternatives have been studied to determine which products could be the best substitute for formalin. Two products studied are jaggery and khandsari, which is mostly honey.

35. Increasing Survivability of Patients Suffering from Acute Myocardial Infarction

Ean Eshelman
Integrated Science
Faculty Sponsor(s): Dr. Caryl Fish

Twenty-five percent of deaths this year will be related to a cardiac issue commonly relating to an occlusion, or blockage, in the blood flow of the heart. When an occlusion develops, the heart muscle no longer receives oxygen enriched blood and begins to die (infarct). If left untreated the patient will go into cardiac arrest and eventually die. The research analyzes the various treatment options emergency departments use to treat patients suffering from acute myocardial infarction. Treatments have minor variations, but others utilize more time, different stents in cardiac catheterization, and different drug administrations. Treatments during reperfusion and rehabilitation after an event are also key for the survivability of the patient and is something that varies from case to case. The goal of every patient is to go home after a cardiac event with minimal changes in everyday life.
36. Dyad Dungeon Game

Zachary Kriley
Computer Science
Faculty Sponsor(s): Dr. Cynthia Martincic

A platformer is a genre of video games in which the player controls a character to run, jump, and climb through obstacles in order to reach the end goal. Puzzle platformers emphasize slowing down and thinking through the obstacle, rather timing jumps or blasting through enemies. Dyad Dungeon is a puzzle platformer that features two characters that the player must control in order to move from room to room and explore the dungeon. Both characters are equally fast and can jump the same height, they even share a health bar. However, each character wields a different set of abilities, which are unlocked as the player progresses through the game. One character may find a mallet to hit switches and smash spiked enemies, while the other uses a whip to exploit openings in an armored enemy's defenses. The only way to escape the dungeon is to make the most out of both characters abilities.

37. Bluetooth Security Application

Mitchell Marangoni
Computer Science
Faculty Sponsor(s): Dr. Cynthia Martincic

Bluetooth has long been considered an insecure method of device communication, with its main security being its limited range. This is not entirely true; Bluetooth does communicate with encryption, for example. On the other hand, pairing to another device is inherently risky; what if the device is hacked, and is using Bluetooth pairing to get into your phone? While updates have since improved security and range, no update can remove the inherent vulnerability to paired devices. There are a few applications that can help: for instance, Bluetooth Firewall by Fruitmobile, an app limited to Android OS, has various Bluetooth-related features such as viewing nearby visible Bluetooth devices. My application, the BlueTooth Security App, is designed to help the user manage and log the device’s Bluetooth functionality. Specifically, the application allows the user to change and view the device's name, toggle Bluetooth on and off, view a list of paired devices, and log device status changes.
38. Developing Three Concise Video Games across the 2D and 3D, Platformer and Shooter Genres

Matthew Wojtechko, John-Paul Depew, Jess Jaynes
Computer Science
Faculty Sponsor(s): Dr. William Birmingham

Three games were developed mindful of a specific audience, while endeavoring to provide entertainment for the general population as well. Avoiding glitches and offering evocative experiences were guiding goals. In-class development followed the agile software development approach for project management, which entails week-long “sprints” iterating playable products until the project deadline. Development begins with deciding overall theme, feel, and gameplay experience. Player movement, enemy AI, collision detection, and other code is scripted and level layout and user interface are designed. Animations and sprites are created and fitting music, sound effects, models, and other assets are found. Toward the latter part of development, gameplay-altering variable values are tuned in accordance to playtest results, and supplemental elements that ‘juice’ the experience, such as particle effects, are implemented. Throughout the project, communication, bug fixing, and playtesting are crucial.

39. iMTracker Mobile Application

Ryan Carcia
Computer Science
Faculty Sponsor(s): Dr. Cynthia Martincic

iMTracker is a mobile application for both Android and iOS that is specifically tailored toward the Intramural Sports Club at Saint Vincent College. With this application, players will be able to sign up for different intramural leagues, as well as view other players, teams, and leagues in the club, track the results of each game, and view the standings to keep track of where their team stands in the league. This application also allows the intramural commissioners to be able to more easily create and keep track of the teams in the league.
40. Golem - A 2D Side-Scrolling Platformer

John Paul Depew  
Computer Science  
Faculty Sponsor(s): Dr. Cynthia Martincic, Dr. William Birmingham

The 2D side-scrolling platformer is a game genre usually characterized by a player who can move right, move left, and jump on various platforms. Golem is an example of a 2D side-scrolling platformer but contains all common features for the genre, such as sound effects, original music, multiple levels, menu, and original artwork. I used the Unity game engine, C#, Gimp for graphics, and Audacity for sound mixing. During the implementation, I tried to use as many built-in Unity features as I could to improve the game while saving time, such as parallax, HDR, and collision detection. But for most features, I had to build custom scripts, such as a player controller using ray-casting, a lookahead camera, enemy AI, scene managers, and many more. The result was a game that did not break new ground but used both custom and built-in tools to create a smooth experience.

41. Dat File Converter

Mitchell Plute  
Computer Science  
Faculty Sponsor(s): Dr. Cynthia Martincic

Many companies create a file format unique to their devices and usage to set them apart from the competition. However, this becomes a problem once they want to use the data contained in that proprietary file with commercial software. Extrel CMS is a company that creates gas spectrometers and also writes all of the software for them. This software then outputs the company’s unique, proprietary, .dat file format. Both Extrel CMS and their customers wish to be able to use the data files produced by the software in other software applications that provide functionality and visualizations of the data. The Dat File Converter converts Extrel CMS’ unique file format into more commonly used file formats such as mzXML and netCDF. This allows users to use programs to better manipulate the data as well as giving them an easy way to store and view the data.
42. An Investigation into the History and Design Philosophy of the R-7 Launch Vehicle

Elias Anderson  
Engineering Science  
Faculty Sponsor(s): Dr. Derek Breid

To explore both the history and operation of the R-7 launch vehicle as used on Sputnik, Laika, Vostok, the Soyuz and more, I will explain how it is this 61-year-old Soviet design is still actively competing with the cutting edge of modern design in an attempt to provide avenues for new ideas and possible influences for future designs.

43. Performance of Ultra-High-Molecular-Weight Polyethylene Fibers vs. Aramid Fibers in Body Armor, and Projectile Penetration Upon Impact of UHMWPE Ballistic Vest

Daniel Baker  
Engineering Science  
Faculty Sponsor(s): Dr. Paul Follansbee

The focus of this study is to research the polymer material Ultra-High-Molecular-Weight Polyethylene (UHMWPE) and its applications in the field of ballistic protection, to physically test and observe how successful this material is against different types of ammunition, and to see how the performance and characteristics of this fibrous material compare to its top market competitor, Aramid Fibers (Kevlar), through literary research. A level IIIA bulletproof vest using this UHMWPE material was acquired and used for this project’s testing phase. The body armor is shot at from different distances and angles while the effects of each shot are recorded. Different areas of the penetrated polyethylene sheets within are then cut and carbon coated in order to display the material both pre- and post-shot using a Scanning Electron Microscope. Also, slugs the vest were able to absorb are retrieved, cut and molded in order to view the deformation on the bullet itself as well as the different phases of the ammunition.
44. Creating an Affordable Load Frame

Daniel J. Dunchack
Engineering Science
Faculty Sponsor(s): Dr. Derek Breid, Dr. David Grumbine

A load frame is a machine that is capable of performing tensile and compression tests on various materials. Knowing the stiffness of a material is important because it determines how much a material can extend or shorten depending on the load applied. Testing materials for their stiffness can be a costly matter, and will often require an outside facility that has the necessary machinery to complete the tests. This capstone project is an attempt to create a smaller, more affordable load frame that will grant Saint Vincent College students the ability to measure the Young's Modulus of a soft material sample. This smaller load frame will be capable of tensile tests and will be easy to transport. This will help the growth of the engineering department moving forward.

45. Updated Research on The Effects of Water Jet Machining on Material Properties

Ian Garay
Engineering Science
Faculty Sponsor(s): Dr. Paul Follansbee

Created in the 1930s, water jet machines were used by engineers to cut many materials with ease. Many industries of today use these machines for their cold-cutting process, smooth edges and high accuracy combined with the ability to cut any material. This research is a follow-up on a previous student's capstone project. The goal of this research is to determine the impact this "ultimate machining tool" could have on metals provided from Westmoreland Mechanical Testing and Research, including seeing these surfaces on a higher magnitude microscope as well as determining any fatigue that shows on these images. Water jet seems to be very popular according to the process and the quantity it provides. With enough evidence, these results will determine to see if any visual negative effects were created. The project will raise serious questions as to if a material that was cut using a water jet would be better off being cut with a normal disc blade cutter.
46. Deformation Twins in Silver

Sarah Malone
Engineering Science
Faculty Sponsor(s): Dr. Paul Follansbee

This capstone project is the extension of a research internship I held over the summer of 2017. In this internship the deformation of pure silver was analyzed according to a numerical model developed by Dr. Follansbee and coworkers. It is a state variable model in that strength is related to dislocation interactions with various defects. One observation that we made was that the behavior seemed to suggest that at low temperatures deformation twinning was becoming active. We did not see clear evidence in the literature that twinning was commonly observed in silver. In this project, pure silver in an initial soft condition has been deformed at liquid nitrogen temperature (77 K). The extremely low temperature and the rapid deformation we achieved through impact should favor deformation by twinning. The deformed metal was examined using optical metallography to search for twins. The metallography was assisted by associates at Product Evaluation Systems Inc.

47. Artificial Neural Network for Numeric Character Recognition

Justin Newman
Engineering Science and Computer Science
Faculty Sponsor(s): Dr. Cynthia Martincic

Image recognition by computers is a problem which is often solved using techniques from Artificial Intelligence. Among these techniques, Artificial Neural Networks (ANN) are considered to be one of the best solutions. Inspired by the neurons in the human brain, ANNs take many input signals and translate them into output signals. In image recognition the input is made up of pixel data from the image and each output signal is associated with a category in which the image could fall. Before the ANN is able to correctly classify the data, however, it must be trained for the specific problem it will be used to solve. The image recognition problem solved by this project is classifying handwritten numbers (0-9). This was achieved by implementing an ANN in C++ based on existing Python code. The C++ ANN reached 97% accuracy on a test set of 10,000 images which is comparable to the existing Python network.
48. Ideal Gas Law

Kyle Pope
Engineering Science
Faculty Sponsor(s): Br. David Carlson, O.S.B.

49. Forces Operating on a Balloon

Amanda Michel
Engineering Science
Faculty Sponsor(s): Br. David Carlson, O.S.B.

50. Escape Velocities

Zachary Kuzel
Engineering Science
Faculty Sponsor(s): Br. David Carlson, O.S.B.

51. Implicit and Explicit Ideas about Christianity and Humanism

Paige Dawson, Kyle Upchurch
Psychological Science
Faculty Sponsor(s): Dr. Mark Rivardo

Implicit beliefs are thought to originate during childhood, while explicit beliefs are developed with maturity. Explicit ideas may be the result of the social desirability effect, in which people respond to ideas in a way that is socially acceptable. The Implicit Association Test (IAT) measures implicit biases toward a number of different subjects. In the present study, we wanted to examine individuals' defensiveness when told their explicit religious beliefs did not match their implicit religious beliefs. We had 132 individuals complete scales gauging explicit bias. We had them take the IAT, and randomly assigned the participants to false IAT scores. Finally, participants responded to scales which assessed feedback derogation, mood, and defensiveness. Reactive affect and feedback derogation varied by explicit bias and IAT score. There was also a main effect of explicit bias on feedback derogation.
52. The Effects of Misleading Information on Eyewitness Memory

Kaylee Gojkovich, Jenna Matijevic, Victoria Monstrola, Jessica Radicic, Caleigh Williams
Psychological Science
Faculty Sponsor(s): Dr. Mark Rivardo
A.J. Palumbo Student Research Endowment

We investigated the influence of central and peripheral details of misinformation on eyewitness memory. Sixty-three participants watched a video of a theft and then answered questions about it. In one condition, the questions contained misinformation about central and peripheral details. Then, participants answered questions pertaining to the misinformation. Participants who received the misleading questionnaire reported more misinformation and answered more of the questions incorrectly. Participants also reported more peripheral details of misinformation than central details.

53. The Relationship Between Social Media Use and Mental Health in U.S. Adults

Jenna Matijevic
Psychological Science
Faculty Sponsor(s): Dr. Mark Rivardo
A.J. Palumbo Student Research Endowment

We analyzed the relationships between addictive social media use and symptoms of anxiety, depression, and alexithymia. Five hundred twenty-eight participants recruited from college classes, Amazon Turk, and social media answered questions about their mobile phone and social media usage, and then responded to three questionnaires that assessed alexithymia, depression, and anxiety. Moderately high positive correlations were found between all study variables. Alexithymia and anxiety were significant predictors of addictive social media use.
54. Mental Health Knowledge among College Students

Mary (Kay) Hurey
Psychological Science
Faculty Sponsor(s): Dr. Mark Rivardo

I examined how the prevalence of psychological myths and misconceptions surrounding mental health varied depending on psychology courses taken among Saint Vincent College students. One hundred seventy-four participants rated their degree of belief in 20 myths surrounding mental health on a 5-point scale, which allowed the researcher to measure degree of belief or disbelief. Results revealed that participants accepted 11 of the myths and rejected the other nine myths though the effect sizes for many of the accepted myths were small. When I compared differences between ability to debunk the myths based on number of psychology courses taken, only two of the 20 myths were found to have significant differences. Participants who took no psychology courses or Introduction to Psychological Science only were able to debunk myths focused on agoraphobia and multiple personality disorder, more than participants who took two or more psychology courses.

55. A Correlational Study of Social Media, Self-Esteem, and Social Comparison

Kelly Ingram, Zachary Budde, Makenzie Clark
Psychological Science
Faculty Sponsor(s): Dr. Mark Rivardo

The relationships between social media addiction, social comparison, and self-esteem were examined in the context of a survey utilizing three scales: the Bergen Social Media Scale, the Rosenberg Self Esteem Scale, and the Social Comparison Scale. Participants’ level of social media addiction predicted their self-esteem. However, we did not find a significant correlation between participants' social comparison to others and their overall levels of self-esteem. Participants’ levels of social comparison to others and their levels of social media addiction also resulted in a nonsignificant correlation. These findings suggest that social media addiction is correlated with college students' overall self-esteem.
56. Empathy and Helping Behavior Toward Animals Ranked by Phylogenetic Similarity

Nicholas Lange  
Psychological Science  
Faculty Sponsor(s): Dr. Kristine Slank

*Research suggests that empathy is innate in humans and can be observed to different degrees based on phylogenetic similarity. Previous research demonstrates that the closer humans are related to a species of animal, more empathy is felt toward the animal. Participants were assigned to a target animal (human, chimpanzee, dog, pig, or turtle) that differed in phylogenetic rank and needed help; then they completed the Toronto Empathy Questionnaire (TEQ) and answered questions based on five levels of helping. It was hypothesized that participants would report more helping behavior toward animals that are more phylogenetically similar to humans and that helping would decrease as phylogenetic rank decreased. Results demonstrated that participants reported being more likely to help the dog across most helping behaviors relative to other targets. This finding contradicts the theory that humans experience empathy toward animals based solely on phylogenetic rank.*

57. A Study on Internet Usage among United States Adults

Rachel Seamans, Jessica Brinker  
Psychological Science  
Faculty Sponsor(s): Dr. Mark Rivardo  
A.J. Palumbo Student Research Endowment

*Over the last decade, the internet has become a prominent part of daily life. We investigated the correlation between internet addiction and potential mental health issues (depression, anxiety, stress) among adults in the United States. Participants completed the Internet Addiction Test (IAT; Young, 1998) followed by the Depression Anxiety Stress Scale-21 (DASS-21; Henry & Crawford, 2005). Participants also answered questions regarding which medium they use most frequently to access the internet (smartphone, tablet, laptop, desktop, other) and how they spend the majority of their internet time (streaming, shopping, social media, online gaming, browsing, school work, other work, and other). We previously conducted this study with Saint Vincent College students. We used the data from the previous study to improve this one and investigate a wider, more diverse sample. We hope our study can add to the existing literature in the argument on the prevalence and validity of internet addiction.*
58. Racial Attitudes at Saint Vincent College

Adam Ferguson
Sociology
Faculty Sponsor(s): Dr. Thad Coreno

This study explores the sociological factors that might shape a person's attitudes about minority groups. Through the use of a survey-based method of data collection, the following variables will be measured: attitude/level of intimacy, gender, race, a person's political party affiliation, parent's social class, college major, class standing, external events (the current political debate concerning the construction of a border wall on the U.S.-Mexican border) and community size. Measuring each participant's social distance score will provide information that will shed light on how different racial groups feel toward one another at Saint Vincent College.

59. Self-Esteem, Social Comparison, and Instagram: Creating a Better Future Online Through Understanding

Annamarie Cardo, Cleona Helton
Communication
Faculty Sponsor(s): Dr. Jessica Harvey
A.J. Palumbo Student Research Endowment

Social media has become a staple in the media diet of young adults. While it certainly has positive effects, research has shown that social media, when used for social comparison, can negatively affect users by decreasing their self-esteem. This study sought to understand if the type of follower (e.g., friends, celebrities) on Instagram that a user compared oneself with mattered. With this in mind, we investigated the relationship between young adults' Instagram usage, to whom they socially compare themselves with on this social medium, and how these actions affect their levels of self-esteem. A total of 64 undergraduate students participated in a self-report survey (M age = 19; 75% female, 25% male; 89% white). Preliminary results indicated that increased social comparison with friends on Instagram, but not celebrities, was correlated with decreased self-esteem, possibly revealing the type of follower that might have the largest effect on young adults' feelings about themselves.
1. Transcriptional Profiling of Perinatal Spiral Ganglion Neurons Using Single Cell RNA-Seq

Madison Mehlfiber
Bioinformatics – Internship Showcase
Faculty Sponsor(s): Dr. Michael Sierk

The incoming (afferent) nerve innervation to the cochlea in the inner ear is composed of spiral ganglion neurons (SGNs). Despite its importance, relatively little is known about the degree of cellular diversity within the spiral ganglion (SG). Two populations of SGNs can be distinguished in the mammalian cochlea based on their morphology. They are the Type 1 SGNs which constitute 90-95 percent of the total population, and synapse with inner hair cells (IHCs). The Type 2 SGNs constitute the remaining 5-10% of the total population and synapse with outer hair cells (OHCs). During the early postnatal period, synapses are formed, and circuitry is refined. We still have little idea when any of the SGN subtypes are specified or what is specifying this diversity. This study aimed to transcriptionally profile the spiral ganglion neurons across the prenatal and early postnatal periods in mice.

2. Incorporating Psychotherapeutic Techniques For Positive Group Development

Nicholas Lentz
Psychological Science – Internship Showcase
Faculty Sponsor(s): Dr. Chris Oldenburg

I conducted my internship at Camp Walt Whitman (CWW). CWW is a co-ed summer camp that focuses on raising kids who value community, giving back to others, and being a good person. The camp offers internships to students who want to pursue careers in a variety of fields. The staff come from all over the world, and have a wide range of educational backgrounds. I was assigned to a cabin with one other counselor in which we supervised 12 teenage boys. During this time, I was able to use my education to incorporate different psychotherapeutic techniques into my work. Along with the application of theory, I was also able to observe the dynamics of a group develop over a seven-week period. This internship was an opportunity for me to both grow as an individual and change the lives of a few kids.
3. Exploring the Validity of a Flat Dipole, "Thin Sat", for Measuring Plasma Impedance

Nicholas Amatucci
Physics/Physics Education – Internship Showcase
Faculty Sponsor(s): Dr. Daniel Vanden Berk

Traditionally, measurement of plasma density in space has been done by analysis of the electrical current collected by a voltage-swept Langmuir probe inserted into the plasma away from the spacecraft body on a deployable boom. While effective, the necessity of mechanically operated parts to deploy the probe is a glaring drawback. By utilizing a frequency-swept electric dipole instead of the traditional Langmuir probe, there are possible ways to mitigate mechanically operated parts. In this investigation, a planar dipole flush-mounted on the surface of a model microsatellite was tested in a laboratory plasma and found to be an effective way to measure plasma density. By adjusting the range of frequencies applied to the dipole, plasmas could be characterized at higher densities. This sensor will be tested in space on a series of U.S. Coast Guard Academy microsatellites to be launched in 2020.

4. Mutual Aid Ambulance Service Internship

Ean Eshelman
Integrated Science – Internship Showcase
Faculty Sponsor(s): Dr. Caryl Fish

During the summers of 2016, 2017, and 2018, I worked at Mutual Aid EMS as part of my internship. I became a certified Emergency Medical Technician in July 2015 after attending the University of Pittsburgh’s Center for Emergency Medicine. Mutual Aid provides emergency medical services as well as emergency and non-emergency transports to many communities in Westmoreland County, Pennsylvania. With 12 stations in different areas, Mutual Aid serves Saint Vincent and the communities surrounding. Emergency Medical Services answers calls made to 911. If someone is experiencing a medical emergency, a trained and staffed ambulance responds to the call to initiate treatment and transport to an appropriate hospital. These medical emergencies can range from a person feeling generally ill to a high-mechanism motor vehicle accident with severe trauma. Working at Mutual Aid provides a lot of opportunities to experience different types of calls and patients due to diverse service areas.
5. Saint Vincent's SAP Business One Program

Jill Cline
Management – Internship Showcase
Faculty Sponsor(s): Mr. Robert Markley Jr.

I will present a poster that details Saint Vincent’s SAP Business One Program. It will contain sections about:
1. What SAP Business One Is
2. The SAP Business One Workshop
3. ASUG and Biz. One Conferences
4. My internship with Pioneer B1 last summer.
I will be presenting on behalf of the career center!

6. Personality Traits and Facial Expression Recognition

Arianne Winkleblech, Kate Luetkemeyer, Carly Grove
Psychological Science
Faculty Sponsor(s): Dr. Mark Rivardo

Facial expression recognition is a necessity for many daily social interactions. In this study, we examined the relationship between personality traits, specifically the participants’ level of extroversion and the accuracy of facial expression recognition. After completing a questionnaire to determine his or her level of extroversion, each participant was presented a series of images showing facial expressions and asked to determine which emotion was shown from a list below. There were no significant differences in emotion identification accuracy between the levels of extroversion. However, there were results indicating significant effects of the emotion shown and the intensity that it was depicted in on the accuracy of facial expression recognition, which could be expanded on in further research.
7. The Effect of Brief Mindfulness Practice on Racial Bias

Kyle Ward
Psychological Science
Faculty Sponsor(s): Dr. Kristine Slank

Previous research has established that mindfulness practice results in nonjudgmental acceptance and reduced automaticity. Forty-three undergraduate students practiced either a cognitive task or mindfulness for approximately one week. Participants then completed the IAT, a mindfulness scale, and several explicit racial attitude measures. IAT scores were not effectively recorded. No main effects of mindfulness on explicit racial attitudes were found. These findings challenge the existing literature and suggest mindfulness does not affect racial bias.

8. The Relationships Between Video Game Playing, Sleep Quality, and Mental Health

Kayla Vantassel, Hailey Strauss
Psychological Science
Faculty Sponsor(s): Dr. Mark Rivardo

In this study we aimed to investigate the relationships between anxiety, depression, sleep quality, and video game addiction. Participants were 122 undergraduate students (85 women, 36 men, 1 other) who completed the following questionnaires in a randomized order: a) Game Addiction Inventory for Adults, b) Hospital Anxiety and Depression Scale, and c) The Pittsburgh Sleep Quality Index. A multiple step-wise linear regression indicated an overall model of three variables (sleep quality, anxiety, depression) that significantly predicted video game addiction, $F(3, 121) = 2.87, p = .04$, with an $R^2$ of .07. To date, studies have focused on the relationships between each variable separately (e.g., anxiety and depression, video game addiction and sleep quality), but few have concentrated on them all together.
9. Pluralistic Ignorance Within Social Groups and of Risk-Seeking Behaviors

Brent Sweigert
Psychological Science
Faculty Sponsor(s): Dr. Mark Rivardo

Pluralistic ignorance occurs when an individual rejects a certain social norm, while falsely believing that the group they are associated with is accepting of the same norm. Despite past research on the matter, there have been few studies conducted specifically for pluralistic ignorance in the different social groups that a college student may be a part of such as athletics, extracurricular clubs, and their major. In this study, participants completed a survey that asked them what their individual thoughts are about their college major, club, sport team, alcohol usage, sexual behavior, and drug usage. They were then asked how they believe an average student of Saint Vincent College would respond to each of the same social groups and behaviors. It was hypothesized that an individual's perceived notions in a certain social group/behavior would be rated higher than the individual's perceived notions about other members of the same social group/behavior.

10. Guitar Hero and Sound Relevance: Effects on Inattentional Deafness

Megan Miller, Caitlin Jacobs, Aliyah Rhodes, Caroline Nelson
Psychological Science
Faculty Sponsor(s): Dr. Mark Rivardo

Inattentional deafness occurs when an individual focusing on a particular task fails to hear an unexpected auditory stimulus. Relevance of the sound to their current task and the amount of cognitive load an individual is experiencing can affect inattentional deafness rates. We manipulated both cognitive load (using the video game Guitar Hero) and sound relevance to determine inattentional deafness rates in college students. No significant main effects or an interaction were found. However, we hope our study can add to the growing body of literature on inattentional deafness.
11. College Students' Desire for Social Distance with Individuals with Mental Illness

Norina Haefelin  
Psychological Science  
Faculty Sponsor(s): Dr. Mark Rivardo  
A.J. Palumbo Student Research Endowment

Mental illness stigma can be very detrimental to a person who is experiencing mental illness, affecting self-esteem, willingness to seek help, and treatment outcome. The present study is examining if mental illness stigma exists in college students, specifically in participants' willingness to interact with a person with mental illness. I hypothesized that participants would be less willing to interact with a target with a psychological disorder than a target with a physical disability or no disorder/disability, thus showing a greater desire for social distance. I also hypothesized that individuals with bipolar disorder and alcoholism would be rated lower than individuals with depression and anxiety. Results indicated that participants would be less likely to interact with an individual with mental illness, especially bipolar disorder and alcoholism. Participant would be least likely to room with an individual with a physical disability or an individual with no disorder or disability.

12. Reflection and Interference of Specific Light Wavelengths in a Thin Film

Anthony Vecchio  
Physics/Physics Education  
Faculty Sponsor(s): Dr. David Grumbine

Reducing laser attacks toward aircraft can be accomplished by first using the ratio of transmitted radiance over incident radiance of a monochromatic light source through a thin film surface. Consequently, the finesse coefficient can be worked out mathematically and leads to the fact that each thin film can be represented via a characteristic matrix, which defines how light will reflect and interfere in the thin film. For each thin film layer, the unique characteristic matrices are multiplied together to find one specific matrix. That specific matrix defines the finesse coefficient, and ultimately affects light interference and reflection in the thin film. A program calculates the matrices for a specific thin film system and computes the corresponding reflectance for specific wavelengths. While many thin film systems can be designed to block specific wavelengths of light, it is found that most frequencies of green and red monochromatic light sources, which are common lasers used again.
13. Drag Coefficients of Cylinders in Parallel Flow at Small Reynolds Number

Mitchell Bredice  
Physics/Physics Education  
Faculty Sponsor(s): Dr. David Grumbine

The relationship between the drag coefficient ($\gamma$) and Reynolds number (Re) is investigated for cylinders moving through a viscous fluid, where the fluid's flow is parallel to the axis of the cylinder, in the regime of $0.25 < Re < 2.5$. Drag force measurements were conducted on aluminum cylinders traveling through glycerol. Determination of glycerol's viscosity was done using Stokes' drag law for spheres. We found that the drag coefficient is inversely proportional to the Reynolds number in this regime. Furthermore, we found that the model's coefficient is dependent on the diameter of the cylinder.

14. Toward Studying 3D Topological Structures in Optical Frequencies

Lauren Bittner  
Physics/Physics Education  
Faculty Sponsor(s): Dr. Mohamed Maize

We present progress toward the automation of an optical system that allows the band structure for a wide variety of structures, including three-dimensional materials and BICs, to be determined. BIC stands for bound states in the continuum. The automated system is suitable to study the response for any sample and provides convenience and flexibility regarding the incident wavelengths and angles of light. To study the dependence of the focal length and beam waist on the wavelength of light, we vary the infrared light from the laser, adjust the position of the focusing lens, and measure the beam waist. These relationships are found experimentally, and the resulting curves are used to automate the system in the infrared range.
15. Ultrasound LOGIQ E10 Quality Control Test

Teresa Yuhas  
Physics/Physics Education  
Faculty Sponsor(s): Dr. Mohamed Maize

The purpose of this test is to determine the quality of the ultrasound machine LOGIQ E10, used frequently to diagnose and assess patients with various medical conditions at Children's Mercy Hospital in Kansas City, Missouri. We perform quality-control tests listed in the AAPM Ultrasound Task Group No. 1 Report to ensure the reliability of the machine. Comparison of the results to the required FDA measurements are made to determine if the machine and its corresponding equipment are operating correctly.

16. Simple Interactions: Our Experience

Kyle Ward, Michaela Yonto, Sydney Schoff  
Fred M. Rogers Center for Early Learning and Children's Media  
Faculty Sponsor(s): Dr. Dana Winters, Dr. Junlei Li

Simple Interactions (SI) is a practice-based, strengths-focused, and community-driven approach to support helpers who serve children, youth, and families. SI aims to identify and capture developmental adult-child interactions in everyday practice, build and facilitate communities to learn and grow from what they already do well, communicate the science and practice of human interactions across systems, and advocate for practices, programs, and policies that empower human interactions. Our involvement in the research team was made possible through our work-study positions in the Fred Rogers Center. Our experiences have taken place throughout the last three years and have shaped our perspectives on early education, interpersonal communication, and research.
17. When Someone Your Child Loves Dies

Jessica Rudolph, Jenna Matijevic, Journie Crutchman, Megan Morrone
Fred M. Rogers Center for Early Learning and Children's Media
Faculty Sponsor(s): Dr. Dana Winters

Members of Incubator 143 at the Fred Rogers Center have collaborated with Excela Health to develop a children’s bereavement program to be used by mental health professionals that serve grieving children and their families. The team of students and faculty researched key principles of child development, coupled with the reading of materials from the Fred Rogers Archive, to gather an in-depth understanding of what bereavement looks like during childhood. By analyzing the archival materials such as articles, pamphlets, and Family Communications' materials, members of Incubator 143 were able to immerse themselves in what Fred taught about death. In the fall of 2018, the team members published an informative brochure that we hope will help children and families that are experiencing a loss. Finally, the group of student researchers worked together to build a guide for Excela Health professionals to use in group therapy sessions for grieving children of all ages.

18. What is the Best Way to Hydrate?

Tyler Strasser
Integrated Science
Faculty Sponsor(s): Dr. Caryl Fish

There is only one substance that controls the livelihood of our entire human race. Even with our sophisticated technology and advanced hospital and emergency services, there is only one material that rules over all. It's water. Water is the basis of life for almost all species on planet Earth. It fuels our bodies and helps us maintain and regulate things like body temperature, and digestion, as well as many other areas of necessity. How, though, do we hydrate, and furthermore, how should we be hydrating?

Well to be honest, it depends on what you need and how quickly you need it. Hydrating for the Winter Olympics should be different than hydrating for a baseball game in mid-August. There are several ways for humans to control their hydration, and all people in the world should be paying attention to the way they do so.
19. Helping Treat Duchenne Muscular Dystrophy through Therapy and Medicine

Dustin Sinclair
Integrated Science
Faculty Sponsor(s): Dr. Caryl Fish

Muscular dystrophy is a rare incurable genetic disorder that kills everyone who has the genetic mutation with one of the most common types being Duchenne muscular dystrophy. Treating Duchenne muscular dystrophy can be done either through therapeutic options or medicinal treatment and surgery. Duchenne muscular dystrophy is caused by a lack of dystrophin, which is a protein that keeps muscle cells intact. Without it the muscles become progressively weaker over time. To check the person for this protein the doctors can run many different tests. They can even test the baby if the person is pregnant. Once confirmed, therapy and medicinal treatments begin. Therapy treatments struggle because there can only be so much stretching and strengthening of the muscles while they continue to weaken. Medical treatments and surgery are better because they give a better quality of life and help strengthen the muscles. Therapeutic treatments need to start improving.

20. Treatments of the Effects of Rheumatoid Arthritis

Leah Scott
Integrated Science
Faculty Sponsor(s): Dr. Caryl Fish

The purpose of this research paper is to determine the best way to treat and decrease the effects of rheumatoid arthritis, to see which form of treatment is best for everyone, and how to stop the progression of the disease. The findings in many of the primary sources say that early treatment and diagnosis, physical therapy, methotrexate, and adalimumab are the current best routes for treatment. Another discovery is that in the primary and secondary sources, genetics may be able to determine how likely one is to develop the disease if another person in the family also has the disease, as well as how the disease will progress. The most substantial information that comes from these studies is that drug therapy is highly recommended to treat rheumatoid arthritis, and that physical therapy is an add-on therapy that will also be beneficial to patients.
21. Enhancing Therapeutic Efficiency of Chemotherapy for Cancer Patients

Elizabeth Hoffer
Integrated Science
Faculty Sponsor(s): Dr. Caryl Fish, Dr. Michael Rhodes

Developing pharmacological advancements in oncological care may help researchers and physicians to enhance the effectiveness chemotherapy has on pancreatic and lung cancer patients by using cannabinoids (CBD). This study demonstrated how cannabinoids have the potential to be used as a dual pharmaceutical treatment to aid in minimizing the effects of chemotherapy. The results showed that there was a significant increase in survival rate for the mice with CBD-loaded SRBs relative to the other cohorts including control cohort. Yasmin-Karim’s study also demonstrated substantially enhanced tumor cell killing when using CBD’s with Radiation Therapy. Cannabinoids (CBD) could help provide patients with the strength they need to take chemotherapy as a combination medication with cannabinoids (CBD). Chemotherapy along with cannabinoids could decrease tumor growth, while restricting the severity of chemotherapy symptoms.

22. Alternative Medicinal Uses to Treat Pain in Cancer Patients

Kelly Flaherty
Integrated Science
Faculty Sponsor(s): Dr. Caryl Fish

In 2017, The United States Department of Health and Human Services (HHS) declared a state of emergency in regard to an opioid crisis. Prescription drugs, such as opioids, have become so easily accessible in today's society and have found their way to the streets because patients are not taking their medication properly and/or not using them at all. As a result of patient and care provider negligence, the prescription opioids find their way into the black market because of the monetary value associated with the drug. Opioids are used in cancer patients to alleviate the pain from the cancer itself, such as spinal cord compression, and pain from the cancer treatments, such as side effects from chemotherapy. An analysis was conducted utilizing scientific research in regard to how opioids, medicinal marijuana, and non-steroidal anti-inflammatories are alternative medicinal treatments to those facing pain that is inflicted from cancer itself or the treatments, such as chemotherapy.
23. Improving Quality of Life in Lung Cancer Patients with the Aid of Occupational Therapy

Alexus Fearer  
Integrated Science  
Faculty Sponsor(s): Dr. Caryl Fish

Lung cancer is high on the list for taking lives in the United States. This specific type of cancer is caused when abnormal cells grow rapidly and out of control in either one or both lungs. Therefore, the patient's quality of life is decreased. Occupational therapists focus on restoring an individual's functional status, which ultimately increases their quality of life by performing cognitive and physical activities. The purpose of this research paper is to determine if occupational therapy can increase lung cancer patients' quality of life. The findings in many of the primary and secondary articles provide information that occupational therapy is still being introduced to oncology patients, therefore, the research is limited. However, the studies that were done discovered that occupational therapy decreases fatigue and improves strength in cancer patients to prevent falls, which could overall set them back from improving their quality of life.

24. Decreasing the Severity of Symptoms Associated with Autism

Noah Emerick  
Integrated Science  
Faculty Sponsor(s): Dr. Caryl Fish

Autism spectrum disorder is on the rise throughout the world, but the biggest problem is early detection and intervention methods. The intervention techniques we investigated were pivotal response treatment, facilitated communication, and relationship development intervention. These three treatment methods try to decrease different aspects of the severity of autism. The purpose of this research is to see if one of these techniques is the best technique to assist in decreasing the severity of autism spectrum disorder. The most important part of this research paper that should be taken away is that all these treatments can assist in decreasing the severity of autism and the younger the individual seeks the treatment, the better. Generally, the information gathered throughout this research paper is useful for parents who have or suspect their child of having some form of autism spectrum disorder and the effects that early intervention can have on their child.
25. Climate Change and Its Effects on the Growth Rate and Gender of the Monarch Butterfly: Danaus Plexippus (2019)

Ashley Zolocsik
Environmental Science
Faculty Sponsor(s): Ms. Angela Belli

Climate determines the gender of many reptile species and the gender of some parasites. With a decline in monarch butterfly populations and an increase in temperature, there is thought to be a correlation between the two. It was hypothesized that with warmer temperatures, more male monarch butterflies would be produced. Monarch butterfly eggs were collected and raised in the Saint Vincent College Greenhouse and directly outside the greenhouse. Temperature and humidity readers were placed in both locations. The greenhouse temperature was altered between both trials. Since the gender of the butterfly is not clear until emersion, the temperature in which they are exposed to throughout metamorphosis is hypothesized to determine the gender. This research experiment indicated that there was no significant correlation between ambient air temperature and the gender of the adult monarch butterfly.

26. Agricultural Runoff and Its Effects on Red-Eared Slider Health

Michael Yeropoli
Environmental Science
Faculty Sponsor(s): Dr. Caryl Fish, Dr. James Kellam

Chemicals used in agricultural management often get mixed in rainwater and other fluids and then wash through fields, ending up in nearby rivers or ponds, where the chemicals can drastically affect the aquatic environment. Phosphates and nitrates are common chemicals found in agricultural runoff because they are essential for plant growth, but this becomes detrimental when the chemicals also cause harmful algae blooms when present in high amounts. The direct effects of elevated phosphates and nitrates on animal life were measured via stress-level and behavioral changes. Red-eared sliders (Trachemys scripta elegans) were exposed to various combinations of the chemicals. Limited conclusions could be made due to outside variables, but overall, stress levels did increase. However, it is not clear if these changes are due to the phosphates and nitrates. The hope would be that future experiments could run similar analyses, but with different organisms under more controlled circumstances.
27. The Aerosolization of Metal Particulates in Electronic Cigarettes

Mason Wheeler
Environmental Science
Faculty Sponsor(s): Dr. Peter Smyntek

Electronic cigarette usage has steadily increased in recent years, while research investigating the produced aerosol has been lacking. This research aimed to quantify the concentration of metal particulates expelled from a rebuildable electronic cigarette atomizer under common user conditions. A common rebuildable heating element is typically built using kanthal wire (FeCrAl) and can be built to any size and resistance specification. For this experiment, a 0.12-ohm atomizer was fired at 100 and 150 watts in varying successions, collecting 20 mL of e-liquid onto a filter cassette for individual metal concentration analysis. It was expected that as the coil was further stressed, metals would be ejected and collected on the filter. However, metal concentrations were found to be low, to the point where all the metals examined (Al, Cu, Ni, and Pb) were below daily average intake from the environment. (Al: <1mg, Ni: 0.05mg, Cu: 2mg, Pb: 0.05)

28. The Effect of Habitat Fragmentation on the Bat Populations of Saint Vincent College's Campus

Anthony Schaefer
Environmental Science
Faculty Sponsor(s): Dr. Caryl Fish

The purpose of this research was to analyze the effect of habitat fragmentation on bats in western Pennsylvania. This study focused on native bats such as the little brown bat and three degrees of habitat fragmentation. Habitat fragmentation degree was determined by percentage of human structures and surfaces in a given area. The sites that samples were taken from were Winnie Palmer Nature Reserve, Saint Vincent College Cemetery, and a wooded/field area called Cemetery Woods® on the Saint Vincent College campus. Data was collected using ultrasonic receivers which receive and record bat echolocation calls. The data was then run through SPECTR’III BAT software to determine calls per file. After analyzing the data, it was found that, on average, there were significantly more bats found in the higher-fragmented area than the medium- and lower-fragmented areas. The data collected is useful for continuing bat population records in the SVC area.
29. Impact of Flooding Susceptibility on Water Chemistry and Macro-invertebrate Populations of Two Urban Streams

Nicholas Nyman
Environmental Science
Faculty Sponsor(s): Dr. Peter Smyntek

Urban streams are affected by many anthropogenic stressors. These can be enhanced by natural events like flooding. Impermeable surfaces in urban areas increase runoff and non-point source pollution in streams. This problem was investigated at two urban streams in Pittsburgh, Jack's Run and Girty's Run. Girty's Run is a larger, faster-moving stream with a history of frequent flooding, while Jack's Run is smaller and does not flood as frequently. Parameters including heavy metal concentrations (Fe, Cd, Pb, Cu and Zn), conductivity, pH, macroinvertebrate abundance and flow rates were examined at low-flow periods and at times following a rain storm. Results showed that neither stream had high heavy metal concentrations. However, Girty's Run had a higher conductivity, less macroinvertebrates and greater variation in its flow rate. The increased conductivity, which might be due to various sources possibly including sewage overflow, may impact the macroinvertebrate population in Girty's Run.

30. Does the Size of the Drainage Area Affect the Rate of Change of Flow Following Major Storm Events?

Vincent Lessard
Environmental Science
Faculty Sponsor(s): Dr. Peter Smyntek

Flooding is something that is reported in the news often, particularly since it is something that causes damage to property and landscapes. To come up with ways to mitigate this, further understanding of how and why these streams flood must be obtained. One aspect of these flooding events that can be studied is the timing of peak flows following a significant rain event. This research examined the differences in the time required to reach peak flow in streams of different drainage areas. To do this, four streams were selected based on drainage areas, and two different storm events were chosen based on size and significance for those four streams. The results showed that the streams that had smaller drainage areas took less time to reach peak flow. This means that larger rivers will see large delays in peak flow.
31. A Meta-Analysis of the Effectiveness of Physical Stream Restoration in the Loyalhanna Watershed

Nicholas Iacaruso
Environmental Science
Faculty Sponsor(s): Dr. Peter Smyntek
A.J. Palumbo Student Research Endowment

More than $1 billion each year is spent on restoration projects aimed at improving the habitat and biological diversity of streams. Despite the vast amount of resources being invested into these projects, little scientific data exists on how effective stream restoration projects actually are. This study analyzed the level of biological recovery in five restoration projects in the Loyalhanna Watershed using a variety of physical, chemical, and biological parameters. Each of the sites was tested for the quality of their physical health, water quality, and the amount of biological recovery. There was no clear observed biological recovery of macroinvertebrate and fish species at all five of the restoration sites. More extensive testing needs to be done to draw larger conclusions, but it appears that often times physical restoration projects do not provide the benefits to stream biota they are thought to have.

32. The Effect of Abandoned Mines and Natural Gas Pipelines on Radon Gas Concentrations in the Soil

Nevana Duzyk
Environmental Science
Faculty Sponsor(s): Dr. Caryl Fish

The purpose of my experiment is to compare levels of radon gas concentrations in the soil within three areas. The first area will contain abandoned mines and a natural gas pipeline below the soil. The second area will contain abandoned mines, but no natural gas pipelines. Lastly, the final area will not have abandoned mines or natural gas pipelines. Radon gas poisoning is relevant all over the United States. The results of my experiment conclude that the areas where abandoned mines and natural gas pipelines were present did have elevated levels of radon compared to the area without these parameters which is what was hypothesized. This experiment is important to residents living in areas with abandoned mines, or natural gas pipelines below the soil because they could be exposed to increased radon gas exposure which may cause lung cancer.
33. Effects of Brewing Methods on Levels of Antioxidants in Coffee

Kelly Wieczorkowski
Chemistry
Faculty Sponsor(s): Dr. Jason Vohs
A.J. Palumbo Student Research Endowment

This coffee-consumer-driven research was primarily focused on helping the average consumer get the most antioxidants from their cup of coffee. Antioxidants help to keep cells from being damaged by oxidation which helps to prevent various cancers and other diseases. The goal of this research was to look into the different methods of brewing coffee and determine the effect on the resulting antioxidants in a cup of coffee. The methods of brewing include the French press and Keurig with grind size as a brewing variable. Samples from these coffees were submitted to the HPLC for levels of caffeine and chlorogenic acids. The results are predicted to be that overextraction due to finer grinded coffee beans and the French press will lead to higher levels of antioxidants. With this information, consumers can reap the benefits of antioxidants just by drinking their daily cup of coffee.

34. Improving an Organic Potassium-Ion Battery

Patrick Walsh
Chemistry
Faculty Sponsor(s): Dr. Steven Gravelle
A.J. Palumbo Student Research Endowment

Polytriphenylamine (PTPAn) is a conductive polymer synthesized to be utilized as a cathode material for a potassium-ion battery. In combination with a graphite anode, it has been observed to exhibit unique anionic interactions with the electrolyte, allowing for a cation and anions to form. Potassium hexafluorophosphate forms these two ions each interacting with the anode or cathode material displaying this dual-ion interaction. The emphasis on using organic-based materials provides a sustainable and accessible form of energy while maintaining low cost. This experiment focuses on changing the anode material to improve the electric properties of the battery while maintaining the dual-ion interaction. Hard carbon is synthesized from sucrose and offers improvements in cycling stability and soft carbon, in comparison, exhibits increases in rate capabilities.
35. Recovery of Lithium from Multiple Metal Ion Solution Using Crown Ether

Joseph Simsic
Chemistry
Faculty Sponsor(s): Dr. Daryle Fish
A.J. Palumbo Student Research Endowment

Research for the recovery or recycling of lithium ions from batteries has recently become an important environmental impact study due to the world we live in today. Simply start by looking around you. How many items do you see are powered by lithium ion batteries? Cell phones, laptops, and wireless headphones, just to name a few. Without the lithium batteries, these devices would suffer in quality. What happens to all the batteries when they lose their ability to charge? As of right now, a landfill is the only destination. The proper disposal of batteries is essential to keeping our ecosystem free of metal ions interacting with the environment. A relatively new disposal method is to extract the lithium ions from solution. A particular crown ether has been examined to selectively choose lithium ions from solution. Further exploration into this extraction process could help solve a global issue we face today.

36. Inhibition of Polyphenol Oxidase by phenolic related compounds

Albert McGrath
Chemistry
Faculty Sponsor(s): Dr. Matthew Hillwig
A.J. Palumbo Student Research Endowment

The purpose of this study was to look at the inhibition of an enzymatic reaction that leads to the browning of fruits and vegetables. Even with modern refrigeration the consumer and producer both lose large amounts of profits due to spoilage of the produce. The enzyme responsible for the reaction is polyphenol oxidase (PPO). Therefore, inhibition of the PPO enzyme could potentially prevent pigment production. This study used the commercially available PPO from the fungal species, Agaricus bisporus. Six structurally related phenolic compounds were applied to PPO enzyme assays, containing L-3,4-dihydroxyphenylalanine as substrate, to determine if they were effective inhibitors. Salicylic acid, gallic acid, pyrogallate, and propyl gallate are effective inhibitors compared to control assays lacking the inhibitors.
37. BiNbO4: A Photocatalyst for Hydrogen Evolution

Christine Kovac
Chemistry
Faculty Sponsor(s): Dr. Steven Gravelle
A.J. Palumbo Student Research Endowment, Other

The BiNbO4 water-splitting photocatalyst is an improvement on BiVO4, a compound that has been found to have increased photocatalytic activity with the advantage of not needing a redox mediator to prevent the reformation of water. The BiNbO4’s smaller band gap makes it a more ideal photocatalyst, as it requires less energy for energy level transitions, and therefore less energy to induce a reaction. In this study, I look at recreating the method used by Song Sun et al. to test the efficiency of BiVO4 as a water-splitting cocatalyst under visible light, but I replaced the BiVO4 with my own BiNbO4.

38. Calculating Elliptical Orbits

Austin Bertok
Engineering Science
Faculty Sponsor(s): Br. David Carlson, O.S.B.

39. Desalination Unit Balances

Sydney Green
Engineering Science
Faculty Sponsor(s): Br. David Carlson, O.S.B.
40. Structural Analysis using Finite Element Method (FEM)

Jeremy Kennedy
Engineering Science
Faculty Sponsor(s): Dr. Paul Follansbee

In this study a structural analysis of a simple building structure was performed using the open-source program SeismoStruct®. SeismoStruct® is Finite Element Method (FEM) computer code that is capable of predicting stresses, strains, and displacements of frames at any location in the structure under both static and dynamic loadings. It takes into account both geometric nonlinearities and material inelasticity, which produces stress and strain experienced by elements in a structure. The structure will be analyzed in a static pushover analysis with various loadings on one side of the structure, which represents, for instance, a wind force. The focus will be on how the stress and strain experienced by elements of the structure change with the load variation, and to see where elements fail by exceeding the yield strength and target displacement.

41. The Flexural Strength of Plastic Containing Concrete

Hector Koch
Engineering Science
Faculty Sponsor(s): Dr. Derek Breid

Concrete is one of the most widely used building materials in the world. Its simplicity, strength, and cost make it the perfect building material. However, as the usable sand for concrete is dwindling, paired with a rise in environmental consciousness and a need to dispose of our waste, we must find innovative ways to make our building materials more sustainable. The project looks at the effect of the flexural strength of concrete as ground-waste plastic is added to the specimen. The research was done experimentally by varying the amount of waste plastic in the concrete and comparing the data to a specimen which contained no ground waste plastic. From previous research, compression tests have shown a decrease in strength, but the flexural strength is often overlooked. A decrease in strength is likely to be found in the flexural strength of plastic-laden concrete, too. However, a small percentage of plastic in large applications might be feasible in strength and increase sustainability.
42. The Effect of Different Machining Techniques on the Impact Energies of V-Notch Samples

Autumn Miller
Engineering Science
Faculty Sponsor(s): Dr. Paul Follansbee

This experimental and analytical project studied the effect of different types of notch-machining methods on the impact energy of Charpy V-Notch Test samples. The material used in this experiment was AISI 4140 steel which is commonly used as a standard when qualifying the test method. Each of the 112 samples was split into three groups of 28 at differing material hardness and differing machining technique, then subdivided into smaller groups of seven. The three different machining techniques used to prepare the V-notch included standard milling, grinding, and electrical discharge machining, or EDM. The subsets consisted of the different temperatures the samples were heated or cooled to before being tested to capture the lower shelf, transition zone, and upper shelf regions of the response. Statistical analysis and microscopic characterization are used to assess the effect of the machining method at each hardness level.

43. Quantifying Plastic Microparticle Contamination in Bottled Water Using Nile Red

Caitlynd Pietrusza
Engineering Science
Faculty Sponsor(s): Dr. Stacy Birmingham

The goal of this research is to quantify the amount of plastic microparticles found in water in disposable and reusable plastic bottles. A solution of Nile Red in acetone is added to the water for 30 minutes; the Nile Red binds to any plastic microparticles present in the water. Through a vacuum filtration process, the microparticles are collected onto a glass fiber filter. The plastic microparticles bound with the Nile Red solution emit fluorescence when excited with a blue light, which are viewed through an orange filter and orange filter goggles. The number of particles larger than 100 µm is quantified using the naked eye and fluorescence microscopy. Based on the total amount of plastic microparticles found in the various types of bottled water, the more expensive brands seem to contain less particles and, therefore, are the healthiest kind to use to limit the intake of plastic microparticles.
44. Hardware Inventory System

Zachary Spate  
Computer Science  
Faculty Sponsor(s): Dr. Cynthia Martincic

The Hardware Inventory System aims to give the Saint Vincent College Computer and Information Systems Department an easy way to manage devices that students may use for assignments and projects. With this application, students will be able to check out equipment, like checking out books from a library. The application consists of two parts, a front-end service and a back-end service. The front-end component was developed in Angular utilizing Angular Material. The front end aims to give an easy interface to users to manage the devices. The back-end component was developed in Java utilizing the Spring Boot framework. The back end extends APIs that allow the front-end to manipulate data. The front end calls these APIs passing in data from the user, the back end takes this data, processes it and then performs the action on the database. These two components allow the user to seamlessly add, delete, and update data from a simple interaction with the application.

45. GardenKeep

Michael Marinchak  
Engineering Science  
Faculty Sponsor(s): Mr. Nathan Hoffer, Dr. William Birmingham

GardenKeep is a mobile phone application built to aid gardeners and landscapers. This easy-to-use phone app gives gardeners a quick way to keep track of which plants they have growing in which gardens. GardenKeep showcases three main features: a garden organizer listing tool, a plant listing tool, and plant information pages. Initial design and ideation were completed by Michael Marinchak in conjunction with Fr. Fred Byrne, who is the head of the gardening scene on campus. This project was built using Xamarin Forms, a program that allows developers to create C#-based cross platform apps. GardenKeep was designed and built by Michael, utilizing classroom experience and resources found online through research. Development took place over the course of several months starting with a basic page framework and continued through dynamic layout functionality. Field testing was completed by Fr. Fred who gave important feedback and suggestions for future development.
45. Parallel Programming Using NVIDIA GPU

L. Lee Stern
Computer Science
Faculty Sponsor(s): Dr. Cynthia Martincic

This project uses an NVIDIA GPU and NVIDIA’s CUDA development platform to complete mathematical operations in parallel. The purpose of this project is to increase the speed of computation -- a proper parallel program should, depending on the size of the task, finish faster than a standard "sequential" program. In order to run this sort of code, I installed an NVIDIA GeForce GTX 560 Ti GPU into a standard desktop computer. The GPU contains hundreds of cores that can be used to run code in parallel. The test program, referred to in documentation as P2NG, is written in C++ and will test the capabilities and limitations of the system and CUDA itself. Eventually, this system could be used to create a parallel program that computes the largest eigenvalue of a matrix, a function that physics professor Dr. David Grumbine has expressed an interest in.

46. Dread Hunters Game

Josiah Stickles
Computer Science
Faculty Sponsor(s): Dr. Cynthia Martincic

The video game Dread Hunters draws inspiration from the souls-like games. Souls-like games are third-person games that normally have a high difficulty that came to prominence with the Dark Souls series of games. As is typical of souls-like games, Dread Hunters has the inability to regain health over time and a dynamic combat system. It uses a third-person camera with camera-independent movement. This game was created using Unity3D and C#. It makes heavy use of Unity’s script event system along with a messenger script for event and gameplay interactions. Custom scripts were created for camera movement, player movement and combat animations, enemy movement and combat animations, and level progression.
47. Dungeon Delver

Dylan Tkach
Computer Science
Faculty Sponsor(s): Dr. Cynthia Martincic

Dungeon Delver is an interactive fiction game, where the player assumes the role of an adventurer entering and exploring a newly discovered dungeon with only a sword, a torch, and his or her wits. The players must solve puzzles and overcome dangers as they uncover the mysteries of the dungeon and its even more mysterious owners. Gameplay, in true interactive fiction fashion, comes in the form of entering keyword commands to interact with the environment and navigate the dungeon. Each of the game's scenes is described in detail to the player, but it is up to the player to decide what to do. Puzzles, some simple, others far more complex, are what primarily stands in the player's way, and it is up to the player to figure out the solution in order to progress further into the dungeon and reach the game's conclusion.

48. Deep-Security

Christian Estok
Computer Science
Faculty Sponsor(s): Dr. Cynthia Martincic

The goal of the Deep-Security project was to build upon a typical home-security system by employing state-of-the-art deep-learning technology. The idea was conceived after watching my father repeatedly check his home security camera, only to find nothing of interest. Deep-Security aims to solve this problem by letting you know exactly what it is seeing without your interaction. The power behind this project is the Amazon DeepLens. Its built-in deep-learning technology is implemented and expanded upon to let its users know who is at their door and when. Faces within the camera's view are compared with familiar faces to match a face with a name. Text notifications are implemented to ensure that you are always informed as to who is at your front door and an online web service makes sure that you can always review exactly what the camera has analyzed and when.
49. CIS Departmental Kiosk

David Osborn
Computer Science
Faculty Sponsor(s): Dr. Cynthia Martincic

The Computing & Information Systems Departmental Kiosk is a one stop hub with information for current students and people wishing to learn more about what we do and what we have to offer. The physical part of the kiosk is made up of a touchscreen and an Intel Compute Stick. It will connect to a website via WiFi that will be hosted by the department on the ESXi server. The Compute Stick will also have a Chrome shortcut that will put it into kiosk mode. Kiosk mode will lock down the entire computer and make the rest of it inaccessible to any tampering. The webserver is an Ubuntu Webserver with Node.js installed to add some functionality. The website will also have a refresh functionality were if it is left on a random page, it will refresh everything and bring it back to the home screen.

50. Railguns: An Application of Electromagnetic Fields

Jarrod Young
Physics/Physics Education
Faculty Sponsor(s): Dr. David Grumbine

Rail guns use electromagnetic forces to propel a projectile. To achieve this force metal rails are run parallel to each other through a uniform magnetic field. By running current into the rails in a burst provided by a capacitor or battery, the system creates an electromagnetic force that pushes the projectile forward with a higher speed than the projectile initially starts with. This can be done with non-magnetic metal rails such as aluminum and magnetic strips along with a power source to create a small rail gun. Using a 12-volt power supply and aluminum rails, a projectile is propelled down the rails at reasonable speed.
51. The Effects of Traffic Noise on Passerine Birds’ Foraging Behavior and Stress Levels

Henry Duran
Biology
Faculty Sponsor(s): Dr. James Kellam
A.J. Palumbo Student Research Endowment

Noise pollution is shown to increase the corticosterone levels in birds, which may indicate they are under stress. The experiment is to observe bird behavior and measure their hormone levels at two sites with varying levels of traffic noise to determine how chronic stress affects blood corticosterone levels and their behavior when they visit bird feeders to observe their numbers, the duration of visit, and distraction levels at the feeders with noise pollution being a factor. The site by the busier road is predicted to increase corticosterone levels, decrease the number of birds that visit, and increase the chances of birds leaving the sites. Those that remain will show increased, distracted behavior by consuming less food and watching their surroundings as vehicles pass by compared to the quieter road. Birds captured for blood sample collection will be banded to determine if they remain near the study sites by being recaptured.

52. The Herbicide Glyphosate Suppresses Ghrelin Expression but Does Not Induce Intestinal Enteropathy in Neonatal Rats

Alexandria Dvorchak
Biology
Faculty Sponsor(s): Dr. Bruce Bethke
A.J. Palumbo Student Research Endowment

Glyphosate, the active ingredient in the herbicide Roundup, has been suggested as an agent that may contribute to the increasing incidence of gluten sensitivity disorders. Residues of Glyphosate have been found on produce consumed by humans. To investigate the potential link between glyphosate consumption and gluten sensitivity, a model in which neonatal rats are fed gliadin, the major protein component of gluten, was employed. Independent litters of neonatal rats were administered gliadin alone, glyphosate alone, or a mixture of both for two weeks. Subsequent histological evaluation of the pups jejunal microvilli and analysis of gene expression changes for the hormone ghrelin, which is induced in response to intestinal damage, were performed. No statistically significant differences were observed for microvillus length or intestinal crypt depth between treatment groups; however, ghrelin expression levels were repressed in animals fed glyphosate, in the presence or absence of gliadin.
53. The Impact of Splenda on Development and Acetylcholinesterase activity in the Chicken Embryo

Eric Earl
Biology
Faculty Sponsor(s): Br. Albert Gahr, O.S.B.
A.J. Palumbo Student Research Endowment

This experiment acts as a simulation of a pregnant mother consuming sucralose and the possible effects it would have on the baby, specifically, the effects of sucralose on morphological development and acetylcholinesterase activity in embryonic chickens. Two breeds of chickens were used in this study to observe differences among organisms with different genetic backgrounds that belong to the same species. The two breeds used were broiler chickens and layer chickens. The broiler chicken is bred for an increase in size and muscle mass, and the layer chicken is bred for its ability to lay eggs at a higher rate. The treatment of sucralose was administered to the chicken embryo at the beginning of incubation. The results indicate that sucralose treatment may have altered growth of the broiler chicks; however, no change in acetylcholinesterase activity was observed in either group. It may be concluded that sucralose consumption will not impact embryonic development.

54. The Effects of Lavender and Bergamot Essential Oil Aromatherapy on Anxiety-Like Behaviors and Stress Response in the Female Swiss Webster Mouse

Taylor Easter
Biology
Faculty Sponsor(s): Rev. Shawn Anderson, O.S.B.
A.J. Palumbo Student Research Endowment

Worldwide, stress and anxiety are seen at high rates (Lv et al., 2013. Prescription drugs are not always 100 percent effective, leaving 43 percent of people requiring further relief of their symptoms (Sousa et al., 2015). Previous studies show essential oils to be an effective complementary treatment, and it was hypothesized that lavender and bergamot aromatherapy would reduce the effects of chronic restraint stress in female Swiss Webster mice. The experimental groups, no restraint and chronic restraint, were each exposed to their corresponding aromatherapy treatment for a one-hour period. The chronic group received 15-minutes of restraint in a Decapicone device. Concluding each week, behavioral tests were performed, and mice were euthanized for colon, adrenal gland and blood collection. Significant results occurred for restraint stress on Elevated Zero Maze, colon weight:length ratio, novel cage exposure on cortisol levels, and aromatherapy treatment on animal weight change and colon length.
55. Long Term Preservation of Brewing Yeast in Dried Rice Cakes: A Cost-Effective Option for Small Breweries

Luke Egan
Biology
Faculty Sponsor(s): Dr. Bruce Bethke

Small breweries often lack the specialized equipment needed for the long-term preservation of brewing yeast. Consequently, they have to purchase yeast each time they brew. This project tested a low-tech, cost-effective preservation method. We compared the preservation of an ale and a lager yeast strain in dried rice cakes against conventional preservation methods of lyophilization and cryopreservation, utilizing sucrose and glycerol as cryoprotectants. Percent viabilities of the yeast cultures were measured pre- and post-preservation and storage-induced genetic shift was assessed by RAPD-PCR. Poor recovery was observed for lyophilized and cryopreserved cultures of both strains, and genetic analysis revealed greater alteration in banding patterns among cultures preserved by these methods compared to storage in rice cakes. Overall, rice cake storage proved the most robust and is a viable option for small breweries to store their strains between batches with minimal investment in equipment.

56. Kombucha Tea: More Than Just a Health Fad

Katherine Guevara
Biology
Faculty Sponsor(s): Dr. Jennifer Koehl
A.J. Palumbo Student Research Endowment

The fermentation process of the kombucha tea SCOBY into tea releases organic acids, vitamins, polyphenols, and flavonoids that may benefit health and inhibit microbial growth. The first part of this study investigated optimum brewing conditions. The second part investigated antimicrobial properties of the tea. Kombucha fermented for 5, 7, and 10 days was sampled by volunteers and judged based on acidity, sweetness, and willingness to drink it again. Results showed the majority of volunteers favored the 5-day fermented tea. Kirby Bauer tested the tea for growth inhibition of two bacteria and one yeast. Results were minimal. The conclusion is that 7 days is not a long enough fermentation period to bring out kombucha tea's antimicrobial properties but 5 days is the most palatable from my volunteers.
1. Cookie Dough Data: Task Analytic Instruction for Job Fluency

Allie Richter
Education and Education/Early Childhood PreK-4/Middle Grades 4-8
Faculty Sponsor(s): Ms. Leann Downs

Acting as job coaches for the Bearcat B.E.S.T Transition Program, two students created a task analysis with each step for preparing a tray of cookie dough for a student working in the college bakery. Each step that was performed without prompting or assistance was recorded, and the number of steps completed independently can be shown in percentage form. In this way, the job coaches were able to see Tommy's progress over the course of several weeks. As time went by, Tommy was able to meet his objective in placing cookie dough. The job coaches also recorded the number of trays completed during each session. This information was helpful in understanding the fluency with which Tommy completed his job tasks.

2. A Reading Intervention in Making Inferences and Increasing Comprehension of Text

Ashley Brady, Marisa Maicke, Rebekah Reist
Education
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

This reading intervention project was implemented with a 19-year-old student who has been diagnosed with autism. The goal of this reading intervention was to enhance the student’s comprehension and inferencing skills. Over the course of nine weeks, the student was assessed and evaluated on a novel text provided by his reading teacher. The interventionists met with the student four days a week, implementing their repeated reading intervention. The student was expected to increase his proficiency when answering in text comprehension questions, and inferring when reading.
3. Implementing Task Analysis to Promote Independence When Tying Shoes

Ashley Brady, Sarah Kalp
Education
Faculty Sponsor(s): Ms. Leann Downs

Learning to tie shoe laces has been identified as a critical goal for a student who is 18 years old, has been diagnosed with autism and is enrolled in the Bearcat B.E.S.T. program. In order to develop this desired skill, the student spent 10 minutes over 10 consecutive sessions working toward her goal, under the guidance of job coaches. This instructional development time was guided by the instructional method of a task analysis checklist to collect data. The overall goal was for the student to gain independence by being able to tie her own and other shoes when administered with the skill.

4. Success in the Workplace: Task Analytic Instruction in Facilities Management

Mackenna Bressler, Jessica Hartner
Education
Faculty Sponsor(s): Ms. Leann Downs

Over an approximate four-week time period, support through job coaching was given to a 20-year-old male student in the Bearcat B.E.S.T. program with a dual diagnosis of an Intellectual disability and other health impairments. The task analytic instruction strategy was used to improve performance on sweeping the staircases in the Carey Student Center. This checklist of 12 steps was given to support the student through repeated exposure. The Bearcat B.E.S.T. student worked with two interventionists during three sessions each week. Data was collected during each session. The goal of this task analysis was to increase the student's ability to correctly sweep the staircases to a proficient level. Over the approximate four-week time period, the Bearcat B.E.S.T. student displayed an increase in improvement on the task.
5. Cleaning with Confidence: Using Task Analytica Instruction in Vocational Training

Claudia Clemens, Brandon Lucas
Education
Faculty Sponsor(s): Ms. Leann Downs

Over a time period of ten weeks, vocational training was given to a 19-year-old male student in the Bearcat B.E.S.T. program with a diagnosis of intellectual disability, Down syndrome, speech and language impairment, and hearing impairment. The student worked for FMO in Leander Hall under the guidance of a job coach. Task analytic instruction, coupled with positive reinforcement contingencies, was used to help the student learn multi-step skills and to gain confidence in the workplace. The student learned to complete tasks systematically while cleaning a bedroom and bathroom. Learning cleaning tasks/skills is a critical component for maximizing future independence. The goal for the student is to use the knowledge and skills learned from his vocational training and generalize them to other environments relevant to his own life.

6. Reading Remediation: CLOZE and Repeated Reading to Enhance Student’s Fluency and Comprehension

Claudia Clemens, Mackenna Bressler, Sarah O'Callaghan
Education
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

Over a time period of nine weeks, reading remediation was given to an 18-year-old female student in the Bearcat B.E.S.T. program with dual diagnosis of intellectual disability and speech and language impairment. The reading remediation used CLOZE assessment and a repeated reading strategy. This presentation outlines the procedures utilized, the data collected, and the conclusion drawn from the reading remediation. The goals of this reading remediation were to increase reading fluency and comprehension. To achieve these goals, the Bearcat B.E.S.T. student worked with three interventionists during four sessions each week. Data was collected during each session using words read correctly per minute in provided DIBELS passages and percentage of CLOZE assessment answers correct in familiar passages. Throughout the nine-week period, the Bearcat B.E.S.T. student displayed an increase in performance regarding reading fluency and comprehension.
7. Hoarding Disorder in Children

Abbey Conrad
Education
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

This case study involves a 12-year-old boy who shows behaviors consistent with hoarding disorder (HD). In this examination of the case, I will examine the possibility of using cognitive behavior therapy (CBT), focusing specifically on his problematic beliefs and behaviors related to hoarding. There will be an evident emphasis on the three major manifestations of HD, including disorganization, difficulty discarding items, and excessive acquisition, to help the client live a full-functioning life. As therapy proceeds, I would attempt to practice family-based approaches, knowing the success children have in treatment with the support and help from their family.

8. Curriculum-Based Measurement Intervention: Reading Comprehension Strategies in Practice

Journie Crutchman, Lauren Czerwien, Dylan Paduano
Education
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

Over the course of nine weeks, three instructors have been implementing a systematic curriculum-based measurement reading intervention with a 20-year-old Bearcat B.E.S.T. student. The student had an initial third grade reading comprehension level. In an attempt to raise his reading comprehension, the instructors devised a three-part intervention plan emphasizing key reading comprehension strategies. These three parts were broken into pre-reading, reading, and post-reading. Strategies in all three sections include inference making, activating background knowledge, checking for understanding, and answering questions. After instructors met with the student four times a week, 20- to 30-minute sessions, there was a host of data that has provided the instructors with telling information about the student's reading comprehension progress.
9. Addressing Anxiety Using Applied Behavior Analysis and Associated Approaches

Alaina D’Aloiso
Education
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

Maria H. is a high-achieving high school student who is well-liked by her peers and supportive of her family’s business. What no one knows is that Maria is experiencing many symptoms commonly seen in individuals with generalized anxiety disorders. Due to her family’s beliefs and culture, Maria has not received help in managing her anxiety. This case study outlines the needed services and interventions that may assist Maria in overcoming her difficulties and regaining control of her life.

10. A Case Report: Navigating Symptomatic, Cultural, and Social Factors When Examining Potential Mental Disorders

Hannah Earhart
Education
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

The subject of this study, an 11-year-old male in fifth grade at a prestigious private school, experiences difficulties in both the school and home environments. The subject demonstrates a variety of behaviors that impede his learning but he is consistently recommended for advanced academic placement by his parents. This case is further complicated by the family’s social and financial connections with the school. Upon observation across multiple settings, the symptoms of the subject in question partially align with two separate mental disorders: Autism Spectrum Disorder (ASD) and Attention Deficit Hyperactivity Disorder (ADHD). After further examination of symptoms, family and cultural backgrounds, and the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) criteria, it is concluded that ADHD is the most viable of the two potential disorders for the subject. Suggestions for future communication, referral, evaluation, and treatment are provided.
11. Effects of Abuse on Social and Emotional Growth: A Case Study

Marissa Falkosky
Education
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

The case study presented depicts a 16-year-old girl who was abused at a young age. The abuse impacted her physical health through binge eating, resulting in excessive weight gain and numerous health complications. Her mental health suffered, as well, through symptoms associated with PostTraumatic Stress Disorder, anxiety and depression. Elements of an effective treatment package for this young girl may include cognitive behavioral therapy and psychotherapy.

12. Using Graphic Organizers to Enhance Literal Comprehension

Leah Fertal, Brandon Lucas, Molly Massimo
Education
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

Literal comprehension had been identified as the critical goal for the student. A graphic organizer was implemented as the intervention strategy for this occasion. A 19-year-old student, enrolled in the Bearcat B.E.S.T. transition program at Saint Vincent College, used a graphic organizer to organize key information within the text that was being read. This tool was utilized in order to provide the student with a cognitive structure and framework to relate prior knowledge to new information introduced through a text. This plan was supported by the need expressed by parents and other support staff as indicated in the IEP. After meeting with the student over a course of nine weeks, four times a week, the overarching goal was to have the student answer the "right there" questions quickly, efficiently, and correctly.
13. Becoming a Self-Determined, Contributing Member within the Community

Leah Fertal, Maria Loftis
Education
Faculty Sponsor(s): Ms. Leann Downs

Over the course of 10 weeks, we have been working with a 19-year-old student who is diagnosed with Down syndrome and is a part of the Bearcat B.E.S.T. transition program at Saint Vincent College. We were able to see the student complete the step-by-step tasks with teacher prompting and a visual checklist. The student exceeded our expectations and did not need the checklist after all; fading verbal prompts were occasionally needed in the weeks that followed. The overall goal was to have the student perform the task completely independently with little verbal prompting. Learning to be a contributing member within the community had been identified as a critical goal for the student identified by her parents. This skill of making a sandwich promotes independence when hunger occurs as a normalized life opportunity and also expands her task skills within the workplace.

14. Using Graphic Organizers to Assist in Reading Comprehension

Jessica Hartner, Brie Prodanovich, Livia Wentworth
Education
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

Over a nine-week period, the intervention team worked with a 19-year-old student from the Bearcat B.E.S.T program. The goal for the student was comprehension of reading-based knowledge. This intervention plan focused on using graphic organizers to recognize key vocabulary words. In doing this, the student was able to understand the material and answer three comprehension questions. The strategy of using a graphic organizer will aid in future comprehension challenges. The reading material was based on the college course Adolescent Development which the student was auditing. Members of the intervention team met with the student four days a week for 30 minutes.
15. A Family Systems look on the diagnosis of Borderline Personality Disorder: A Case Study

Douglas Hough
Education
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

*Lacy Davis-Woodrow is a seventeen year old biracial American who lives with both her mother and stepfather in the borough of Queens, New York. At the age of six years old, Lacy’s prominent black socialist father was killed in a car accident. Her mother remarried, entering into a marriage whose foundation was built on emotional outbursts and loud arguments over financial issues. For nearly ten years, Lacy’s mental health remained stable amid these environmental concerns. However, upon entering her junior year of high school, her life began to spiral. Lacy became involved with cannabis, cutting and suicidal behaviors, lying, and manipulation of others. She became emotionally and socially erratic. Lacy and her parents were scheduled for an intake appointment by Child Protective Services after Lacy told her camp counselors that she was physically abused at home.*

16. Mass Customized Learning at LVMS

Gina Johnston
Education
Faculty Sponsor(s): Dr. Tracy McNelly

*This spring, I had the pleasure of student-teaching at Ligonier Valley Middle School. They do things A LITTLE differently there. The learners are given much more freedom than those of a traditional classroom setting. LVMS conducts what is known as Mass-Customized Learning. The learners are given choice in almost everything that they do from learning to assessment. Instead of the traditional test, a learner may show his or her knowledge of a subject in the form of a project, poem, or anything else that is deemed appropriate. This type of learning is the center of much controversy in the educational world. I will be discussing my research and observations of Mass-Customized Learning and how Ligonier Valley School District conducts this innovative practice.*
17. Increasing Reading Comprehension and Vocabulary Through CLOZE Assessment, Warm and Cold Reads, and QAR

Sarah Kalp, Maria Loftis, Khalil Sanders
Education
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

This project was geared toward a 19-year-old student who was diagnosed with autism in order to enhance his skills in both reading comprehension and vocabulary. Some of the strategies used were warm and cold reads, CLOZE assessments, as well as the strategy of QAR. Over the course of nine weeks, the student was given a reading text related to a sociology course. To improve the student’s reading comprehension, the use of cold reads was implemented as well as the QAR strategy in order to assess the student’s knowledge of the subject with regard to the cold reads. To improve the student’s vocabulary, warm reads, and CLOZE assessments were implemented.

18. Effect of Task Analysis on Building Independent Housekeeping Skills

Marisa Maicke
Education
Faculty Sponsor(s): Ms. Leann Downs

Housekeeping is an important vocational skill that provides cleanliness to the work environment. While working with a 21-year-old student who has Down syndrome, the job coach utilized a task analysis intervention plan complete with multiple detailed steps to complete the task. This vocational intervention plan was implemented over the course of three weeks, with three days of intervention per week. The student, responsible for cleaning residents’ personal living spaces inside a local nursing home, successfully applied the appropriate procedures for cleaning and sanitizing guest and patient rooms inside the nursing home.
19. Using Task Analysis for Problematic Behavior During After School STEM Program

John Malone
Education
Faculty Sponsor(s): Ms. Leann Downs

My project is a task analysis that I developed for a student with autism who attends my after-school STEM program at Laurel Valley Elementary School. The after-school program is for students K-5 and focuses on STEM education. The student highlighted in the task analysis/case study is a fourth-grade student with high-functioning autism, named Conner. He is a very bright and happy young man who enjoys skill. The task analysis focuses on transitioning from a preferred activity to a less desirable activity. In this case, transitioning from "play time" to "snack time." The task analysis shows the growth that Conner showed from the start to the end of the study. The after-school program teachers continue to use the applied interventions on a daily basis, which has helped Conner become a more well-rounded student.

20. How Can Differential Reinforcement of Low Rates of Behavior Decrease Questioning?

Christina Morgan, Laurel Prengaman, Taylor Reese, Bridget Sigg
Education
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

A student in the Bearcat B.E.S.T. program at Saint Vincent College exhibited a need to decrease the amount of irrelevant and off-topic questions asked in academic and social settings. A group of interventionists conducted a functional behavior assessment and used the information gained to implement a positive behavior support plan in an attempt to modify the student’s undesirable behavior. This plan utilized a differential reinforcement of low rates of behavior intervention approach to reduce behavior as opposed to eliminating the behavior. The student remained consistent in asking relevant, on-task questions and the behavior was not fully removed but rather replaced with a relevant behavior.
21. Implementing Operant Conditioning to Train Two Chickens to Match to Sample

Christina Morgan, Laurel Prengaman, Taylor Reese, Bridget Sigg
Education
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

Utilizing a female chicken from the Saint Vincent College Applied Animal Behavior Lab, a group of researchers expressed interest in experimenting with the learning process of operant conditioning. Using a system of rewards, the students tested whether the chicken would make an association between the desired behavior and the consequence in the form of a specified match to sample task. In the middle of the experiment, the original fowl died of unknown causes. As a result, the students implemented a second chicken into the lab using the same execution of phases which presented them the opportunity to compare the progress of both chickens.

22. Task Analytic Instruction in Shoe Tying

Taylor Remaley
Education
Faculty Sponsor(s): Ms. Leann Downs

In agreement with his IEP goals, a student of the Mt. Pleasant Area Junior High School Life Skills classroom has expressed the desire to master shoe tying. Daily, the student and I practiced shoe tying in order for the student to master dexterity involved with the target goal. This project used consistent instructional methods and data collection to track the student's progress. Our goal was for the student to gain independence and generalize the skill across multiple settings.

23. Using QAR to Improve Reading Comprehension

Caroline Rooney
Education
Faculty Sponsor(s): Rev. Philip Kanfush, O.S.B.

This project used Question and Answer Relationship to monitor students' reading comprehension. QAR is a strategy to help students find answers in text. For a period of eight weeks, 13 students in fourth and fifth grade read a novel and took a quiz on each type of QAR question. At the beginning of the course, each student took a pretest to monitor their original reading comprehension. At the end of the course, the students took the same test again to show their improvement.

Courtney Watt
Education
Faculty Sponsor(s): Ms. Leann Downs

A student at Baggaley Elementary School was identified with having difficulty transitioning at the end of the day. Transitioning steps consist of organizing needed materials to take home, putting materials in his or her backpack and getting appropriate outer clothing on depending on weather. The student has autism and these transitional skills are important for teaching independence and functional task awareness. To provide for success, a checklist was created for the student with the needed steps to follow at the end of the day. The student was observed, and data was collected weekly to track progress.

25. The Effect of Divalent Cations on Biofilm Formation

Kaitlin Sherry
Biology
Faculty Sponsor(s): Dr. Jennifer Koehl
A.J. Palumbo Student Research Endowment

Microbes can form a biofilm; and this collection of microbes and matrices is difficult for most antimicrobial agents to penetrate. Pseudomonas aeruginosa bacteria opportunistically causes skin and urinary tract infections and is multi-drug resistant. The functions of bacteriophages, viruses that target specific bacteria, can sometimes be enhanced when divalent cations, ions with two positive charges. This research explores combined divalent cations and bacteriophages to prevent P. aeruginosa biofilms. Bacteriophages were quantified using a soft-agar overlay method. Two P. aeruginosa and bacteriophage combinations were studied without (control) and with divalent (experimental) cations via a minimal inhibitory concentration (MIC) test. The first combination showed no inhibition of the bacterium with the bacteriophage regardless of cation presence; the second combination did show inhibition with and without cations. Cloudiness indicated bacterial growth and was measured visually and with a spectrophotometer. Enhancement of bacteriophage function should be pursued as a treatment for antibiotic-resistant bacteria.
26. Transnasal Delivery of Nav1.7 Sodium Channel-Blocking Peptides Does Not Induce Analgesia in Adult Female Mice

Erik White
Biology
Faculty Sponsor(s): Dr. Bruce Bethke
A.J. Palumbo Student Research Endowment

Congenital Insensitivity to Pain (CIP), due to mutations in the NaV1.7 voltage-gated sodium channel, is characterized by a lack of both pain sensation and olfaction (smell). Certain non-opioid peptides are reported to induce analgesia by blocking Nav1.7 channels, two such peptides being ProTX-II (from Peruvian Green Velvet Tarantula venom) and a minor derivative named JNJ63955918. This study tested whether transnasal delivery of these peptides would be an efficacious method of inducing global pain inhibition in mice. Transnasally dosed mice were evaluated at set intervals for pain sensitivity via hotplate and tail-flick assays, and anosmia (inability to smell) using a scent aversion assay. Results clearly indicate that neither peptide effectively blocked Nav1.7 channels in either the olfactory neurons or other brain centers. In the case of JNJ63955918 this was likely due to a lack of tertiary structure in the delivered peptide, but was surprising for ProTX-II in its native form.

27. The Effect of Chronic Stress on IBS Symptoms When Treated with Aromatherapy

Zachary Wood
Biology
Faculty Sponsor(s): Rev. Shawn Anderson, O.S.B.
A.J. Palumbo Student Research Endowment

Twenty-four female adolescent Swiss Webster mice were separated into four groups to undergo acute and chronic stress scenarios. Using an elevated zero maze, light/dark box, and fecal analysis, the effects of aromatherapy exposure were tested to see if it would lower or reduce anxiety-like behavior and the severity of IBS-like symptoms. The use of the elevated zero maze and light/dark box were used to quantitatively analyze stress-prone behavior. Fecal samples were collected from each subject during each test to determine consistency and abundance to see if there was any correlation between stress and fecal production. Upon euthanization of the subjects, blood and colon samples were taken and the colon length for each subject was measured to test for IL-6, cortisol, and whether the colon was distended. This experiment aimed to show correlation between stress and IBS-like symptoms and a reduction in IL-6 and cortisol due to aromatherapy.
28. Bioengineered Yeast Cells Expressing Archaebacterial Phospholipids Exhibit Enhanced Stress Resistance

Alexander Kollar
Biology
Faculty Sponsor(s): Dr. Bruce Bethke
A.J. Palumbo Student Research Endowment

Archaebacteria demonstrate well-documented resilience to environmental extremes such as salt, heat, acid, and pressure. This is due in large part to unique membrane structures, specifically isoprenated phospholipids, joined by ether rather than ester linkages, and chirally reversed glycerol molecules. It was hypothesized that the introduction of a genetic pathway for isoprene synthesis into Saccharomyces cerevisiae cells would confer higher resistance to stressors such as salt, acid, and ethanol. Consistent with hypotheses, results indicate that expression of the pathway caused no ill effects in the yeast cells but enhanced their resistance to acidic environments, salinity, and ethanol concentration. This proof of concept study suggests that yeast engineered to produce isoprenated membrane structures would be of significant utility in industrial applications, particularly biofuel production.

29. The Effects of Acute and Chronic Stress and Environmental Enrichment on NZBWF1/J Mice with Systemic Lupus Erythematosus and Their Dentition

Jennifer Larnino, Arianna Martino
Biology
Faculty Sponsor(s): Dr. Michael Rhodes
A.J. Palumbo Student Research Endowment

Systemic lupus erythematosus (SLE) is an autoimmune disease that affects most organ systems within the body. Mouse models of lupus show similar symptoms to humans. Stress has a detrimental effect on lupus symptomatology, mental health and dental health. This research studied the physiological, behavioral, and dental effects of acute and chronic stress and environmental enrichment in a mouse model of lupus. The results indicate statistically significant differences in urine protein concentration, adrenal gland and spleen weights, corticosterone concentrations, number of fully buried marbles and foot licks between the SW and L groups, as well as the EE and NE groups. Additionally, the results indicate differences between SW and L teeth. Teeth extracted from L mice were more brittle, discolored, and fewer in the number of intact, measurable teeth than SW mice. Collectively, these results support the hypothesis that enrichment mitigates adverse effects of stress on mouse models of SLE.
**30. Identifying and Quantifying Microbes in Different Sour Beer**

Eamon McDonough  
Biology  
Faculty Sponsor(s): Dr. Jennifer Koehl  
A.J. Palumbo Student Research Endowment

*Beer-spoiling bacteria such as Lactobacillus and Pediococcus are unwanted in most alcoholic beverages. Sour beer, however, needs these bacteria to create lactic acid to become sour. Brewourij De Brabandere's Petrus Oud Bruin, Brewourij Verhaeghe's Vichtenaar Flemish Red and Four Season Brewing Company Barrel #15 and #16 sour beers were plated on MRS, and TSA media to determine bacteria types and quantity. MRS media only grows Lactobacillus and Pediococcus while TSA grows other common bacteria. Yogurt was used as a control to determine Lactobacillus and Pediococcus growth on the MRS media and not TSA. No growth was seen on either the MSA or TSA from the either beer; genetic (PCR and ELISA) testing was inconclusive. The lack of bacteria detected in each beer could have been a technique issue or could mean that before distribution, each bottle may be flash pasteurized, or filtered to not allow culturing of bacteria left in the bottles after bottle conditioning.*

**31. Antibacterial Capabilities of Lavender and Cinnamon Essential Oils against Staphylococcus Epidermidis and Escherichia Coli**

Maggie Saunders  
Biology  
Faculty Sponsor(s): Dr. Jennifer Koehl  
A.J. Palumbo Student Research Endowment

*Staphylococcus epidermidis and Escherichia coli bacteria are commonly found in hospital settings and can be resistant to antibiotics (Brusco et al., 2017; Johnson and Russo 2003). Therefore, essential oils may be alternatives for treatment. Lavender and cinnamon essential oils contain desired antibacterial components such as phenols, aldehydes, and terpenes that can disrupt gram-negative and gram-positive bacteria growth. It is hypothesized that the oils with the greatest concentrations of these components will result in the most antibacterial capabilities. By utilizing a Kirby Bauer technique and Minimum Inhibitory Concentration procedure, this study tested the essential oil activity against S. epidermidis and E. coli. Oils purchased on Amazon inhibited bacterial growth with a larger zone of inhibition than oils purchased from WalMart. Overall, cinnamon and lavender essential oils are an alternative to chemotherapeutic antibacterial agents.*
2. The Effect of Social Environment in Stress Levels of Dogs

Natasha Serena
Biology
Faculty Sponsor(s): Dr. James Kellam
A.J. Palumbo Student Research Endowment

Stress is an organism’s response to environmental demands and pressures. Stressed organisms release the hormone cortisol. I looked at dogs in three different environments; an animal shelter, a single dog household, and a household that had multiple dogs. These environments were studied to see which dogs have the most stress. I hypothesized a dog in an animal shelter will have a higher level of cortisol than a dog in a household. Each dog studied was a pit bull breed to limit variation. I collected saliva from each dog by placing a gauze pad on the inside of the dog’s cheek and moving it around. Saliva samples were analyzed using an ELIZA kit. I found my hypothesis refuted. The shelter dogs showed less cortisol than the dogs in the households, indicating shelter dogs have less stress. This was significant in understanding the welfare of dogs in different environments.

33. Implementing a Multi-Agent System Utilizing SARSA Machine Learning Algorithm

Nicholas Winter, John Depew
Computer Science
Faculty Sponsor(s): Dr. William Birmingham, Dr. Sarah Dumnich

We hypothesize that AI agents can learn tactics in competitive multiplayer video games. To test this hypothesis, we created two agents in a simple multiplayer ‘death match’ game. The agents use the state-action-reward-state-action (SARSA) reinforcement-learning algorithm. SARSA assigns values to state-action pairs based on how an agent is rewarded. Higher values encourage an agent to take an action in a given state, and lower values discourage an agent from taking an action. We allowed the agents to play against each other varying only the agent reward, i.e., they use the same code. Each agent was given a reward for achieving victory in the game. One agent received a negative reward for losing, while the second agent received no reward for losing. By biasing the rewards given, we observed different learned behaviors in each agent.
34. Mobile Ordering For The Shack

Shane Tierney
Information Technology
Faculty Sponsor(s): Dr. Cynthia Martincic

The idea behind My Mobile Ordering for the Shack proof-of-concept project was to create a way for on-the-go students to be able to order a meal from The Shack in a way that they would not have to wait around for their food. Another reason for this project is to help the shack become more environmentally conscious in their outdated, all paper ordering system currently in place. This project allowed me to finely tune my skills in HTML, along with learning more about CSS, JavaScript and PHP. This project allowed for me to learn these tools and combine them to create a mobile website that looks good and functions properly. The project will take the order input by the student and display the orders on another screen so that would be available to Shack employees so they could view and complete the order.

35. Cryptocurrency Mining

Nathan Pieszak
Information Technology
Faculty Sponsor(s): Dr. Cynthia Martincic

The purpose of this project was to build two cryptocurrency miners. Cryptocurrency is a form of independent, decentralized digital cash that uses encryption to verify transactions. Cryptocurrency can be mined by things such as central processing units (CPU), graphic processing units (GPU), and application-specific integrated circuit chips (ASIC). The miners are used to solve intense computational processes with hash functions that connect to a block of data containing transactions. The first cryptocurrency miner I worked on was an ASIC A2 Terminator rig. For this rig, I used a Raspberry Pi to build a controller that would allow the rig’s circuit boards to properly function and mine cryptocurrency. The second miner I worked on was a GPU rig. I constructed this rig using various GPUs and a CPU attached to a motherboard. After both rigs were fully functional, I compared the efficiency and economic viability of the mining rigs.
36. Shack Kiosk Ordering

Nicholas Rossi
Information Technology
Faculty Sponsor(s): Dr. Cynthia Martincic

In an attempt to modernize ordering at the Shack on campus, my project is a proof of concept which implements an electronic ordering system that could be integrated into normal operation if deemed effective. The idea was to create a touch-screen ordering system similar to those seen popping up at restaurants and fast food joints. Working in Microsoft Visual Studio, the program is coded in Visual Basic .NET and interacts with a back-end Microsoft Azure cloud database. My goal is to have a system more efficient than the paper-and-pencil ordering approach which is currently in use. Forms are created to be user friendly, but still allow for customization to menu items as is done with the current paper-based system. Through Azure, customer authentication and unique IDs for individual orders are made possible to keep the entire process on both ends “inside and outside of the kitchen” running smoothly.

37. Fansmitter: Gleaning Data from an Airgapped Computer

Zack Spangler
Cybersecurity
Faculty Sponsor(s): Dr. Cynthia Martincic

Given all the cybersecurity threats circulating on the internet, one might think that data on an air-gapped computer (one that is not connected to a network) is completely safe. However, my project demonstrates that data can be gleaned from an air-gapped computer. My project has two main components: a compromised air-gapped computer infected with malware and an Android application. The malware alters the speed of the CPU fan which changes the frequency of the CPU fan. Then, using the app on an Android device, the user can glean a binary 1 or 0 based on the frequency heard by the device. This method has been used by a team in Israel to exfiltrate RSA encryption keys and passwords. The transmission rate is slow, averaging at a bit every three seconds. However, this project displays that there are vulnerabilities with computers that are not connected to a network.
38. Campus ID Security

Daniel Kissel
Cybersecurity
Faculty Sponsor(s): Dr. Cynthia Martincic

Campus ID Security delves into the technology of the ID cards utilized by both student and faculty members across Saint Vincent College's campus. The technology behind these IDs is examined and various security vulnerabilities are demonstrated. The ID security vulnerabilities found throughout the course of the project indicate the importance of not only physical security, but also cybersecurity on campus. Concerns include: the ability for someone to gain unauthorized keycard access to certain locations on campus and the ability for someone to access any student's meal plan's funds and drain the account. As a result of finding these vulnerabilities, the project suggests possible solutions for Saint Vincent College to mitigate the issues found. These include changing the way the IDs are used on campus, and how to better inform faculty and students about the importance of cybersecurity.

39. The Raspberry Plant

Ross Labuskes
Information Technology
Faculty Sponsor(s): Dr. Cynthia Martincic

House plants are a very common item in most households, and with most, they require water frequently. This task can become very bothersome, especially when you leave for a trip and need to make plans for them to be watered. Luckily, that is not an issue with The Raspberry Plant. The Raspberry Plant is a device that recognizes when your plant's soil is dry and will send a signal to a water pump to release water through a tube into the soil. This process is all possible due to a Raspberry Pi, a moisture sensor, and a water pump. The only thing the plant's owner will have to do is fill the tank with water. When the tank is empty, the owner will receive an email telling him or her to refill the tank. With The Raspberry Plant you can have plants without the burden of having plants!
40. Courier: Mobile File Encryption for Android Devices

Andrew Valecko
Cybersecurity
Faculty Sponsor(s): Dr. Cynthia Martincic

Android application marketplaces such as the Google Play store are flooded with software designed to protect users’ files behind various forms of encryption. Most of these applications are free (or have a functioning free version), and have remained popular over time due to their stability and ongoing support. While the applications available to Android users via primary distribution channels are typically well-designed, they tend to present at least one of several common drawbacks including limitation of functionality by paywall, always-on cloud storage connectivity, or lack of design transparency. Courier, a mobile application for Android devices that gives users access to secure password generation and AES file encryption capabilities, has been designed with the elimination of such drawbacks as a primary design focus. Free, reliable, and local, the Courier application’s operational sphere exists explicitly within an active session and requires no internet connectivity to function.

41. Autonomous Security Patrol Robot (ASPR)

Lionel Whitcombe
Cybersecurity
Faculty Sponsor(s): Dr. Cynthia Martincic

This project addresses the desire to own and implement a cost-effective solution to home security and active monitoring. Currently, home security systems are either costly or created by companies that use and sell your data/footage. This project seeks to replace these options with no expensive monthly payments and provide confidence to users that their data and the information gathered won’t be used or sold. Security around one’s home is monitored and controlled by the security robot. The user may log into a web application where he/she can view the security feed as well as control the movement of the security robot. When the robot identifies an individual within its field of view, it will send a screenshot of the individual with their face outlined to the user’s email. With the combination of existing software libraries, hardware, and a wireless network, this project acts as a working security guard for one’s home.
42. Multi-Player Touch Screen Game

Dylan Reyna
Engineering Science
Faculty Sponsor(s): Dr. Anthony Serapiglia

Have you ever visited a restaurant and played on their interactive game or food ordering touch-screen device? This project is expanding from that idea and uses two touch screens to provide a two-player experience. The game, Connect Four, was made using Python on two Raspberry Pis. These are inexpensive credit card-sized computers which were used along with two 5-inch touch screen monitors. Each 5-inch touch screen monitor is connected to its own Raspberry Pi and the Pis are connected to each other with an ethernet cable. The two computers communicate through sockets in a Python script to allow simultaneous player versus player functionality. The entire device is assembled and organized within a 3D-printed case.

43. The Evolution of the Golf Putter and Moment of Inertia

Richard Rossi, Zachary Fox
Engineering Science and Engineering Science
Faculty Sponsor(s): Dr. Paul Follansbee

The game of golf and its equipment has greatly changed since the game’s inception in the mid-15th century and putters are no exception. Putters come in all shapes and sizes, but the one thing that they all have in common is that their design processes are all centered around the idea of the Moment of Inertia. Basically, this is how forgiving the putter is and how well it resists turning when hits are struck off center. The design process for most all companies revolves around how different designs and head shapes will affect the Moment of Inertia. This project not only takes a trip through time to discuss the evolution of putters, but also presents experimental data on the performance of different putter face materials to see how they stack up against one another.
44. Designing a Charpy Impact Tester

Ryan Schwartz
Engineering Science
Faculty Sponsor(s): Dr. Paul Follansbee

Destructive impact testing has and continues to play a major role in the field of materials engineering. As batches of materials are produced to be used in various products, structures, and systems, their properties must be verified to ensure the end product meets several design criteria. One of these properties that is often measured is a material’s relative impact resistance. A material’s relative impact resistance is measured by determining how much energy is absorbed from a sudden impact by a standardized specimen of material before it fractures. For my capstone project, I am designing and building a rough Charpy impact tester to test polymeric materials. Using wood for the frame and machined metal for the pendulum arm, I will build a structure rigid enough to get reliable and consistent results when testing various polymeric materials. I will also conduct impact tests using my tester on several specimens of PLA plastic specimens.

46. Analyzing Underdeveloped Countries Water Filtration Methods in Western PA

Tyler Simsic
Engineering Science
Faculty Sponsor(s): Dr. Stacy Birmingham

This project is a research and analysis of testing the process of water filtration using activated carbon. The type of activated carbon used in this experiment is coconut shell-activated carbon. This type is used in underdeveloped countries due to the availability and how cost-efficient it is. The type of water being tested in this experiment is lake water here in western Pennsylvania. The purpose of this experiment is to see how efficient this method is and if there would be any benefits in using this method here. In order to see if it is cost effective, a cost analysis is done to make sure it is actually worth the cost to use coconut shell-activated carbon. The results of this experiment are a variety of tests done showing the components before and after filtration. With those results, we can obtain knowledge of how effective this type of activated carbon truly is.
47. Shear Displacement of a Soft Actuator

John Singer
Engineering Science
Faculty Sponsor(s): Dr. Derek Breid

This project is a research-and-experimental-based designing and testing of a silicone soft actuator capable of shear displacement by measuring the change in angles when a vacuum is applied. Soft actuators mimic the way living organisms move, and they can expand or contract like a muscle would behave. They are used in the medical field because of their shape-changing properties that assist with certain kinds of surgery. Soft actuators can be used to create flexible exosuits to increase the user's strength, mainly for rehabilitation purposes. The vertical beams will start at zero degrees and increase by 15 degrees up to 75 degrees. Once the actuator is made, a vacuum is applied to cause the actuator to compress. The change in the angle will be measured using an image-measuring application by taking before and after pictures. The results of the angle change will determine the amount of shear displacement of the vertical beams caused by the vacuum.

48. Solving Electrical Circuits

Reese Capo
Engineering Science
Faculty Sponsor(s): Br. David Carlson, O.S.B.

49. Gravitational Forces

Michael Moresea
Engineering Science
Faculty Sponsor(s): Br. David Carlson, O.S.B.

50. Power Calculations

Nico Molnar
Engineering Science
Faculty Sponsor(s): Br. David Carlson, O.S.B.
51. An Unexpected Artist: The Illustrative Talents of J.R.R. Tolkien

Melissa Koshute
English
Faculty Sponsor(s): Rev. Wulfstan Clough, O.S.B.

The Lord of The Rings trilogy, written by J.R.R. Tolkien, has been widely read and studied for generations, placing Tolkien among the most acclaimed fiction writers of the 20th century. In addition to his affinity for language and mythology, Tolkien had a love for painting and drawing which led him to produce more than 800 pieces of visual art. His use of mediums such as watercolor, pencil, and colored ink reveals Tolkien's rich artistry even as it reflects his theology of sub-creation. For this report, I studied drawings and paintings by Tolkien as well as scholarly analysis of the artwork. My goal was to share how Tolkien's illustrative talents, which remain unfamiliar to many readers, impacted his identity as a writer and expanded the already wide scope of his creative genius.

52. (Poster 52 has been moved to Session 1, Poster 59)
53. Reiki Therapy in Adults Undergoing General Anesthesia

Ira Kosta
Nurse Anesthesia
Faculty Sponsor(s): Dr. Beth Grabiak

The purpose of this proposed QI project is to evaluate the effectiveness of Reiki therapy in decreasing postoperative pain, anxiety, time in recovery room, and increasing patient satisfaction in adult general surgery (n=60). The design is a randomized controlled trial. The setting is a community hospital in Athens, Greece, with 13 operating rooms and 20 recovery rooms. Measures include The Universal Pain Scale and The Health Intake Questionnaire. Data will be entered into statistical analysis software. T-test analysis will assess the differences in means between the groups based on the outcomes of total pain medication given both intraoperatively and post-operatively, vital signs, pain scores, anxiety levels, total time to meet discharge requirements. Chi-square analysis will be used to assess the number of pain medications given and the incidence of pain. Demographic characteristics, clinical characteristics, and postoperative outcomes will be reported.

54. Tranexamic Acid for Treatment of Postpartum Hemorrhage

Trevor Swedeen
Nurse Anesthesia
Faculty Sponsor(s): Dr. Beth Grabiak

In the past five years the use of tranexamic acid has spread to obstetrics and gynecological surgery, primarily for the treatment of postpartum hemorrhage. The purpose of this proposed quality improvement project is to evaluate the effectiveness of tranexamic acid in decreasing postpartum hemorrhage in women giving birth via cesarean section (n=100). The design is a randomized controlled trial. The setting is a community hospital in southwestern Pennsylvania with 10 operating rooms, two OB operating rooms, 10 labor and delivery suites, 40 CRNAs and 10 anesthesiologists. Volume of blood loss will be used to evaluate the effectiveness of tranexamic acid intraoperatively and in the immediate 12 hours following surgery. Data will be entered into statistical analysis software for analysis. An independent sample t-test will be used to compare mean blood loss between the two groups. Demographic characteristics, clinical characteristics, intraoperative and postoperative outcomes will be reported.
55. Reaching Adulthood in College Through Transitional Events

Jennifer Hogan
Sociology
Faculty Sponsor(s): Dr. Thad Coreno

The purpose of this study is to explore expectations about transitions into adulthood. These expectations about reaching adulthood in college-aged students refer to transitional events such as marriage, first child, first job, and completion of schooling. I am focusing on how social roles shape people's expectations about the process into adulthood through transitional events. I administered a survey to Saint Vincent College students during the spring semester. The participants in the study answered questions about when transitional events should be completed and if they have reached adulthood in life. Another question asked participants if they were pressured by anyone to reach a particular transitional event. The independent variables are social class, race and ethnicity, gender, age, and class rank.

56. College Student's Perceptions of Poverty

Maribella Spino
Sociology
Faculty Sponsor(s): Dr. Thad Coreno

The purpose of my study is to examine the different perceptions of poverty that Saint Vincent College students have. I will be looking closely at gender, parental socioeconomic status (SES), and political affiliation of the students as the independent variables. The dependent variable in my study will be a list of possible causes of poverty: structuralist attributions and individualistic attributions. The first hypothesis for my study is the higher the parental SES, the more likely a student will blame the individual as the cause of poverty. The second is that students' political affiliation will impact their perceptions of poverty: Democrats will blame structuralist attributions and Republicans will make individualistic attributions for poverty. Lastly, females will more likely blame the social structural factors as the cause of poverty, whereas males will more likely blame the individual factors as the cause of poverty.