Showcase of Student Research and Engagement 2025

May 2, 2025

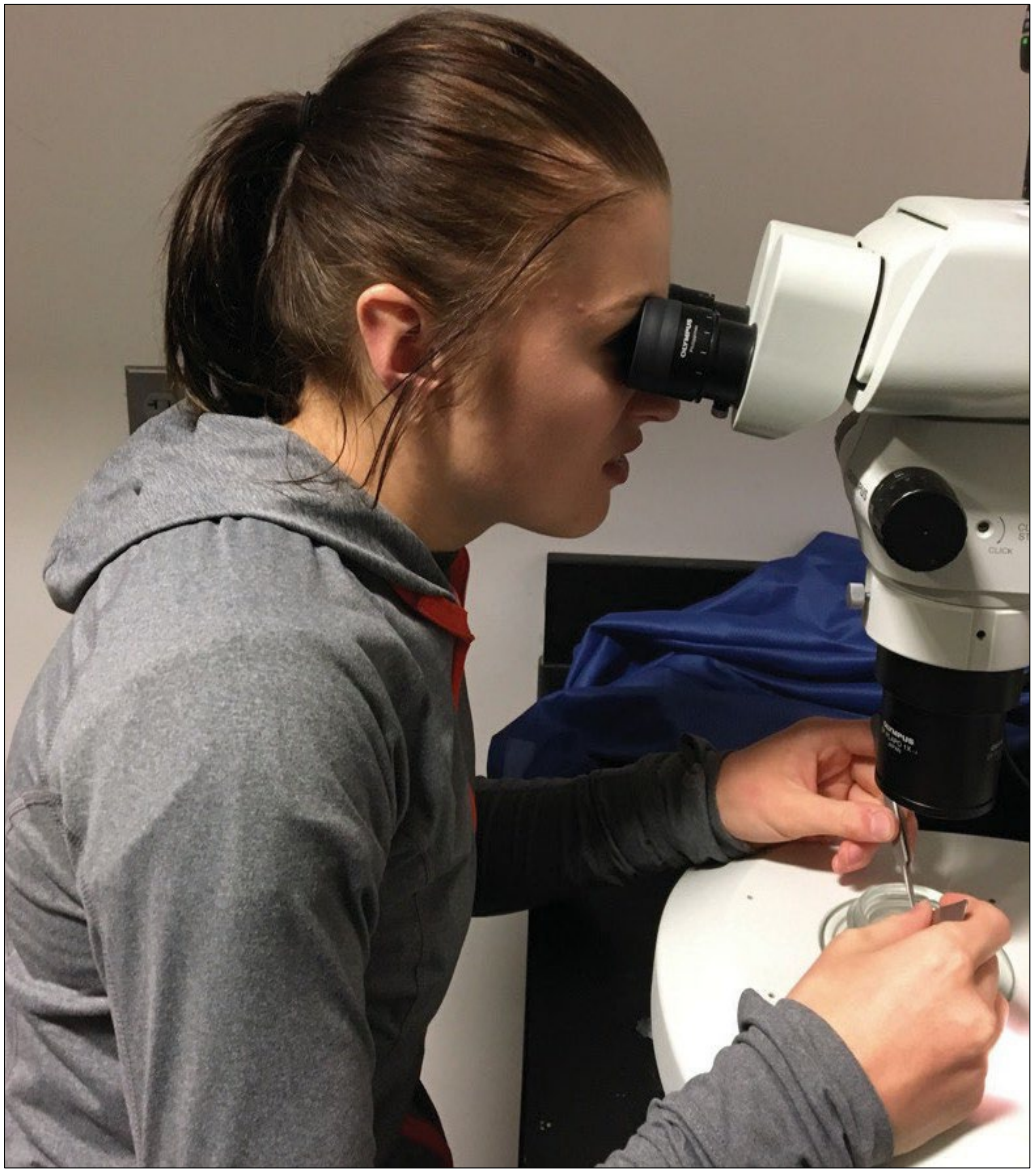
2:00 – 4:00 PM

HUB Courtroom

Museum of the White Mountains

Silver Center

Plymouth State University



- Welcome to the 14th annual Showcase of Student Excellence and Engagement! This symposium features student projects from a variety of disciplines including the sciences, arts, and humanities. This event is free & open to the public to come and interact with our students and discuss their projects, research, and scholarly achievements.

- Plymouth State is proud of its long legacy of engaged teaching and learning, and our new Integrated Cluster model is specifically designed to extend this by emphasizing reciprocal partnerships that benefit students and community. The projects, research, scholarship, and creative works on display demonstrate the power of these partnerships – to improve skills and preparation, to support the region, and give students a space in which to integrate information and skills across multiple disciplines.
- We hope that you will enjoy the wide variety of presentations on display today and we hope that you enjoy the interactions with our wonderful students!

Sincerely, *the 2025 Showcase Committee*

The Showcase Committee:

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Many thanks to the following, without whom this Symposium would not be possible:

- President Don Birx
- Provost Nate Bowditch
- The Showcase Committee
- Marsi Wisniewski
- PSU Bookstore, PSU Office of Student Life
- Special thanks to Pam Anneser, for the extra effort to print out posters and all signage for this Showcase!
- INBRE – IDeA Network for Biomedical Research Excellence (https://Geiselmed.dartmouth.edu/nhinbre/)
- The 35+ Faculty mentors for your dedication to our students:
- And lastly, to the 400+ students who are presenting today – thanks for your work and dedication!

Schedule of Events:

2:00 PM Opening Remarks

- Dr. Eric Hoffman - *Showcase Planning Committee*
- Dr. Nate Bowditch, *PSU Provost*
- Dr. Kimberly Livingstone, *2024 PSU Distinguished Scholar*

2:15 – 4:00 PM - Presentations

1. Poster, Activities, and Laptop – *Courtroom*

   Students at work – concurrent slideshow

   Light Refreshments Served

2. Pop-Up Play Event– *Alumni Green or Pawsway*
3. Exhibits –

   a. *Museum of the White Mountains*

   b. *The Silver Center*

List of Research and Engagement Presentations

Presentations are listed by presentation type, then alphabetical by subject area.

Academic Posters:

Applied Exercise Physiology and Human Performance

Effect of Lower Extremity Asymmetry on Athletic Performance

Author(s):
Madison Senecal
Kylee McGurn
Faculty Mentor: Vincenzo Nocera

Summary

Muscle asymmetries (MA) can be used to assess return to sport readiness. PURPOSE: To investigate the correlation and predictability between MA and athletic performance in power, speed and agility. METHODS: Division III athletes were recruited to participate in two sessions. Session 1 consisted of baseline measurements followed by vertical jump tests, and 5 repetition maximum split squat. During session 2, participants performed the T-agility test and the 40m sprint. RESULTS: In Division III athletes MA were infrequent. Muscular strength appeared to be associated with power (left: .837: $p < .001$; right: .809: $p < .001$). CONCLUSION: Most sports require unilateral movements. Data from this investigation reinforce the unilateral nature of collegiate athletics. Thus, practitioners may implement training programs that address MA through unilateral training.

Comparison of Ultimate Frisbee Positions in Physical Performance

Author(s):
Noah Biron
Faculty Mentor: Vincenzo Nocera

Summary

Ultimate Frisbee is a rapidly growing sport that requires high levels of various components of physical fitness. The dichotomy of the physical characteristics of the two main positions, handler and cutter, has scant research. Purpose: To evaluate and compare the fitness parameters of the two offensive positions. Methods: Adult club ultimate frisbee players were recruited to complete one in person visit utilizing a battery of physical fitness tests. The physical fitness battery included tests of body composition (bioelectrical impedance analysis), power (vertical jump test), agility (T-agility test), and cardiorespiratory endurance (Yo-Yo intermittent

recovery test level 1). Results: Higher levels of physical fitness may be important for success in ultimate frisbee. Conclusion: Understanding the physical fitness requirements of each position may aid in tailoring training programs to address those components. Ultimately, improving on field performance.

Impact of Concentric Hamstring Strength on Sprint Performance

Author(s):
Eric Griffin
Gregory Walker
Faculty Mentor: Vincenzo Nocera

Summary

Literature suggests eccentric hamstring strength training may reduce the prevalence of lower limb injuries and improve performance. However, the impact of concentric hamstring training remains unclear. Purpose: To determine the correlation between relative concentric hamstring strength and sprint performance in Division III athletes. Methods: A correlational study was conducted with college aged athletes (18–25 years). Participants completed a single testing session involving anthropometric measurements, a standardized warmup, and assessments of 5-repetition maximum lying leg curl (5RM-LLC) strength and 40-meter sprint times. Results: A correlation between relative concentric hamstring strength and sprint performance was observed. Discussion: The findings indicate that stronger hamstrings contribute to faster sprint times in this population. These results support the inclusion of concentric hamstring training in athletic programs to enhance sprint performance, potentially reducing hamstring injury risk.

Sex Differences in Muscle Oxygenation During the Leg Extension Exercise Following Acute Nitrate Supplementation

Author(s):
Owen Cottrill
Faculty Mentor: Ryanne Carmichael

Summary

PURPOSE: To assess sex differences in muscle oxygenation during resistance training following acute nitrate (NO3-) supplementation. METHODS: Twelve resistance trained individuals (6 males, 6 females) participated a double blind, randomized, crossover study (age: 21.83 ± 1.03 years, height: 173.25 ± 11.89 cm, weight: 84.31 ± 23.12 kg, BF: 23.13 ± 7.23 %). Participants were tested over the course of three sessions separated by a minimum of 48 hr. During session one, participants performed a 10 repetition maximum (RM) leg extension test to estimate their 1 RM. During sessions two and three, participants were instructed to ingest a 400 mg NO3-

concentrated beetroot juice (BRJ) or a 0 mg NO3- beetroot juice (PLA), 2 hr prior to testing. Participants then completed three sets of repetitions to failure (RTF) using 65% of their predicted 1 RM. Skeletal muscle oxygenation (SmO2) and RTF were recorded. RESULTS: There was no difference in RTF regardless of sex or condition ($p > .05$). SmO2% change was greater in males immediately after each set when compared to females (Males: 80.57 ± 8.75, 82.01 ± 8.00, 79.71 ± 7.73; Females: 37.65 ± 8.75, 45.00 ± 8.00, 45.22 ± 7.73; $p < .05$), regardless of condition. There was no significant difference for sex or condition in peak SmO2 ($p > .05$). CONCLUSION: While there were sex differences in SmO2% change, there were no differences between conditions. Continued research is needed to understand the effectiveness of NO3- in females, while controlling for fluctuations in the menstrual cycle.

The Effects of Honey Versus Energy Gel Supplementation on 5 km Running Performance

Author(s):
Owen Henry
Nicholas Arenstam
Elisabeth Carter
Faculty Mentor: Ryanne Carmichael

Summary

PURPOSE: To determine the effectiveness of honey as a fuel source for improving 5 km performance time compared to energy gel. METHODS: This double-blind, randomized, crossover study included eight recreational runners (age: 20.65 ± 1.3 years; body fat: 13.68% ± 8.06; weight: 70.05 ± 7.51 kg; height: 171.93 ± 8.17 cm). Participants completed two 5 km time trials (TT) on a treadmill, separated by at least 1 week. Participants consumed 100 kcal of honey (35 g) or energy gel (27.5 g), diluted in 10 oz of water, 30 min prior to each TT. Blood Glucose (BG) and Blood Lactate (BLa-) were measured before and immediately after exercise. BLa- was measured again 5 min postexercise. HR and RPE were recorded at each km. RESULTS: There was no significant difference in performance time between honey and gel (1,420.5 s vs. 1,440.9 s; $p >.05$). There were also no significant differences between RPE, HR, BLa-, and BG between conditions. CONCLUSION: These results support the hypothesis that a natural source of carbohydrates such as honey is equally effective in fueling 5 km performance as energy gels.

Applied Meteorology

Radar Signatures of Sea Breeze Convection in Florida

Author(s):
Ethan Mousseau
Faculty Mentor: Dr. Samuel Miller

Summary

Sea Breezes are a common occurrence in Florida, since there are two coasts and prevalent moisture is available, particularly during the summer. Sea Breeze Fronts (SBFs) form when cool, stable ocean air moves inland and interacts with warm, unstable continental air. These fronts create a lifting mechanism, and thunderstorms can develop along them. Atkins (1994) found there are three flow regimes where convection can form, which are (1) onshore flow, (2) offshore flow, and (3) two SBF's colliding. The present work examined the signatures of sea breeze convection appearing on radar during each of these three flow regimes on the east coast of Florida. Onshore flow cases caused the weakest convection, offshore cases were intermediate in strength, and colliding SBFs caused the strongest thunderstorms.

Storm Evolution of Flash Flood Producing Thunderstorms in New Hampshire, July 2023

Author(s):
Hannah Butt
Faculty Mentor: Dr. Sam Miller

Summary

The summer of 2023 was the warmest, wettest summer on record in New Hampshire, since record keeping began in 1895. July 2023 received the highest number of flood warnings issued by the NWS in a single month, with 38 total. While flash flooding may result from many causes, this study focused on flooding due to rainfall. Of the 38 flash flood warnings issued in July 2023, 19 were verified. Yang (2016) investigated 15 storms over a watershed in New Jersey, focusing on 19 thunderstorms that produced flash floods in July 2023, and found that flash flooding was caused by storms that collapsed either before or during passage over the area. In the present study, the evolution of 19 thunderstorms was examined to determine if storms collapsed before, during, or after passage of the warned area.

Tornado Probability of Detection and Strength as a Function of Environmental Parameters

Author(s):
David Pessin
Faculty Mentor: Samuel Miller

Summary

This study was motivated by the need to improve the probability of detection of Tornadoes. The focus was on how Environmental Parameters such as Convective Available Potential Energy, Wind Shear, and Significant Tornado Parameter can be used to determine how the impact of these parameters affect Tornado Strength, Probability of Detection, and warning-lead time for Tornadoes that form in Right-Moving Discrete Supercells. Data from the SPC Storm Mode Database from 2003 to 2023 were used. After data filtering and cleaning, the analysis focused on EF-1 and EF-2 Tornadoes in Iowa, Missouri, Illinois, and the Northeast, from 2013-2022, resulting in 111 cases for analysis. WSR-88D data were analyzed for each case, focusing on Level II radial velocity. The results were inconclusive and failed to show statistically significant results that CAPE, STP, and wind shear differ between EF-1 and EF-2 Tornadoes.

Verification of the WSR-88D Hydrometeor Classification System for Mixed Precipitation Events in New England

Author(s):
George Mousmoules
Faculty Mentor: Sam Miller

Summary

This investigation focused on the hydrometeor classification algorithm (HCA) and melting layer algorithm used in the WSR-88D radar system. These algorithms were analyzed in the context of their effectiveness in identifying winter precipitation and distinguishing it from rainfall during winter storms in the Northeastern U.S. This ultimately helped identify how useful these algorithms are in depicting the rain/snow line during complex winter storms. This was compared to analyzing correlation coefficient and reflectivity data from these same radars utilizing the methodology outlined by Giangrande et al. (2008). Based off observational data, the two detection methods were compared to build an understanding of the performance level of the HCA. Identifying how the HCA compares to manual radar product analysis during mixed winter precipitation events in New England is critical in identifying future improvements to the national radar grid.

Art (BFA)

Art & Design Capstone

Subject Area:

Author(s):
Meghan Doherty
Sydney Budaj, Eddy Damis, Jr., Kevin DeMuth, Nicole Giarla, Timothy Girard, Shea Guimont, Bee Hollingworth-Richards, Mardi Horne, River Moon, Nicole Rogers, and Rose Speigel
Faculty Mentor: Nicholas Sevigney

Summary

The annual Art and Design Capstone exhibition features the work, passion, and educational journey of PSU senior students. On view at the Museum of the White Mountains and in the lobby of the Silver Center for the Arts.

Earth Jam

Author(s):
Rosella Rentas-Ubeda
Zachary Cross
Natalie Morris
Faculty Mentor: Nicholas Sevigney

Summary

Earth Jam is Student Art Collective's annual Spring music and arts festival. We had 4 live bands, 60+ vendors, food, and activities. We were able to secure 3 local businesses as sponsors and partnered with 3 other student clubs. Earth Jam took around 4 months to plan and we still could not predict that it would snow the day of. With very short notice we were able to move the event inside, and was still successful.

Biochemistry

Analysis of Wild Yeast Samples for Fermentation in Beer Production

Author(s):
Kylie Dolloff
Jennifer Limoges
Javier Gonzalez
Faculty Mentor: Alexandra Disney

Summary

The goal of this lab was to evaluate wild yeast samples for their potential in beer fermentation. Traditionally, fermentation has utilized natural yeasts from sources such as honey, fruits, and rice, while modern brewing often relies on well-characterized yeast strains. In this study, yeast samples were collected from Common Lowbush Blueberry and Oriental Bittersweet plants in New Hampshire. Cultures were grown and DNA was extracted, followed by PCR amplification of the 18S rRNA gene. A ferulic acid assay was conducted to evaluate the risk of phenolic off-flavors, and beer metrics including IBU, SRM, and ABV were measured. Sanger sequencing identified a 44% match for the Blueberry sample to less-characterized yeast, while the Bittersweet sample had a 76% match to Papiliotrema strains. Although both samples exhibited weak fermentation at 0.3% ABV, there is increasing interest in wild and unconventional yeasts for their potential to introduce unique flavors and characteristics to beer.

Bioprospecting Beer from Wild Yeast

Author(s):
Stanley Jozokos
Patrick Smith
Leif Charbonneau
Faculty Mentor: Alexandra Disney

Summary

To explore the idea of brewing with wild yeast sources we collected sources from an eastern white pine cone, and berries from a Japanese barberry. After a few weeks of fermentation, both of our products had 0% alcohol. The yeast from the Japanese Barberry yielded a SRM value of 20.19 (brown), while the yeast from the eastern pine yielded a SRM value of 19.79 (amber-brown). The IBU for the Japanese barberry brew was 13.75, while the pine cone yeast had an IBU of 7.55. Both beers tested negative for phenolic off flavors. Due to a calculation error prior to PCR, Sanger sequencing could not be performed to identify the species of yeast for both samples. Our results indicate that the conditions could have been unfavorable for the yeast to produce alcohol and future studies could test varying environmental conditions under fermentation.

Bioprospecting Yeast For Brewing

Author(s):
Ty Rivera
Ryan Boucher
James Tiller McDonald
Faculty Mentor: Alexandra Disney

Summary

Bioprospecting wild yeast strains for beer fermentation offers an opportunity to enhance flavor diversity and brewing innovation. By isolating and characterizing native yeasts, brewers discover novel fermentative properties that differ from conventional Saccharomyces cerevisiae. We sampled yeast from wild plants commonly found in the New England region. We inoculated our samples and cultured to isolate a single yeast colony, using biochemical assays to detect the 18S rRNA gene necessary for fermentation. In this study, we isolated a wild yeast species, Aureobasidium pullulans, from the bark of river birch, while the white birch tree's yeast species was inconclusive. After fermentation, we received 0.0% ABV. The beer had an IBU of 10.15 and 16.25, and SRMs of 19.25 and 23.64. Bioprospecting offers an insight into everyday practices for beer making and fermentation. In future experiments, we would attempt the process again to achieve a higher ABV.

To Beer or Not To Beer: Fermentation with Bioprospected Wild Yeast

Author(s):
Gabrielle Gardiner
Elizabeth Hanson
Becket White
Faculty Mentor: Alexandra Disney

Summary

Yeasts are a widespread group of unicellular fungi that can be found in a variety of locations. They play a significant role in the development of fermented goods, and their characteristic flavors through by-products created during fermentation. In this experiment, we sought to compare a species of wild yeast to a commercially available brewer's yeast to assess its potential for beer brewing. Identification of the yeast species by Sanger sequencing was unsuccessful. The fermented products were tested for alcohol content, color, and bitterness. While our commercial yeast produced a satisfactory beer, the wild yeast species did not produce a product that was safe for consumption due to low levels of alcohol. Our results suggest that further testing and sampling are required for the production of a safe beverage.

Biology

Circadian Enzymes and Cryptochrome (CRY) Regulate Circatidal Rhythms in the American Horseshoe Crab, Limulus polyphemus

Author(s):
Fletcher Hall
Sara Mercier
Faculty Mentor: Christopher Chabot

Summary

While the animal circadian clock is composed of 4-5 core genes and several accessory enzymes, the mechanisms that control other biological clocks are poorly understood. Recent evidence suggests at least one circadian clock gene (bmal1) and enzyme (casein kinase-Iε/CKIε) also regulate circatidal rhythms. The goal of these experiments was to identify other shared mechanisms between these two clocks. Juvenile American horseshoe crabs, Limulus polyphemus, were exposed to circadian gene and enzyme modulators and their activity was recorded. The results demonstrate that CKIε, CKII, GSK-3, cryptochrome, and neuropeptide Factor, a circadian output hormone, all appear to be conserved between these clocks while CKIα/δ and AMPK appear to be involved in only the circadian clock. While these results demonstrate many shared mechanisms between the two clocks, their dissimilarities show that they are distinct, and therefore there are likely other genes and enzymes controlling circatidal rhythms that remain to be discovered.

Detection of temperature changes using bradycardia in Carcinus maenas

Author(s):
Ryan Boucher
Madison Vazquez
Sara Mercier
Brenna Smith
Faculty Mentor: Christopher Chabot

Summary

While temperature often determines the worldwide distribution of crustaceans, their ability to detect temperature has not been well studied, and virtually nothing is known about the detection abilities of green crabs (Carcinus maenas), an invasive crustacean that is limited in its range by temperature. In this study, heart rate bradycardia responses were used to indicate a nervous system response to temperature to determine whether green crabs can detect acute temperature changes. The results indicate that green crabs exhibit bradycardia in response to both increasing and decreasing temperatures ($\bar{x}$=1.95±0.42°C; $\bar{x}$=-1.38±0.28°C, respectively). Additionally, smaller individuals appeared to be more sensitive to increasing temperature changes. These results are similar to those found in lobsters, although lobsters appear to have

a lower detection threshold. These results broaden our understanding of crustacean sensory physiology and may indicate a potential role of temperature sensitivity in shaping the distribution and invasive success of Carcinus maenas.

Impact of Environmental Conditions on Activity Patterns of Eastern Red-Backed Salamanders (Plethodon cinereus)

Author(s):
Elizabeth Hanson
Faculty Mentor: Kerry Yurewicz

Summary

Eastern Red-backed Salamanders (Plethodon cinereus) are abundant and widespread vertebrates in eastern U.S. forests. Their sensitivity to environmental conditions may make them vulnerable to the changing climate. We collected data on surface activity of salamanders during repeated visits to six plots in the Hubbard Brook Experimental Forest from 2017 to 2024. We report on their annual pattern of activity across seasons (from April to December). We also test for relationships between their activity and variation in air and soil temperature, humidity, and precipitation.

Larval American Horseshoe Crabs (Limulus polyphemus) Exhibit Circalunidian Rhythms of Vertical Migration

Author(s):
Jacob Santos
Fletcher Hall
Faculty Mentor: Christopher Chabot

Summary

The American horseshoe crab, Limulus polyphemus, is a medically, economically, and ecologically important animal. This foundational species lays its eggs in the spring in intertidal zone sediment and most larvae hatch and exit the sediment shortly after a summer high tide inundation, although overwintering in the nest has been documented. Previous work has shown that large groups of horseshoe crab larvae exhibit circatidal rhythms (τ=12.4) of vertical swimming that can be entrained by agitation in the lab. However, the individual patterns of activity and the effects of other early environmental factors on the activity patterns of larvae are unknown. In the present study, most individual larvae housed in vertical migration chambers in constant conditions exhibited circalunidian (τ=24.8) rhythms of vertical swimming, although some exhibited circatidal rhythms. Freshly hatched, field collected larvae generally exhibited higher percentages of rhythms than lab-raised animals and appeared to synchronize their activity to dusk and ebb tide of the photoperiod and tidal cycles they developed in. These

results suggest that horseshoe crabs are sensitive to both photoperiodic and tidal influences while still in the egg case and further indicate a clear preference for nighttime ebb-tide activity. Lastly, lab-hatched larvae that were artificially overwintered in the lab at 4oC for nine months exhibited only circalunidian rhythms with significantly shorter periods compared to other groups. Overall, the results indicate that horseshoe crab larvae exhibit primarily nocturnal, ebbtide circalunidian rhythms, perhaps to help them to avoid both stranding on intertidal substrate and diurnal predators. In addition, the presence of these circalunidian rhythms is more strongly expressed in overwintered animals and provide particularly strong support for the hypothesis that circatidal rhythms are controlled by dual circalunidian clocks in horseshoe crabs.

Temperature cycles and Egg Density Affect Early Development and Behavior of the American Horseshoe Crab, Limulus polyphemus

Author(s):
Sara Mercier
Fletcher Hall
Faculty Mentor: Christopher Chabot

Summary

Early development of marine organisms is affected by a variety of factors such as temperature cycles, egg densities, and chemical cues but the impact of these factors have been relatively unexplored in the American horseshoe crab, Limulus polyphemus, an important keystone species in estuarine environments. In this study, eggs exposed to constant temperature cycles developed faster than those exposed to tidal conditions while larvae and juveniles exposed to tidal temperature cycles primarily synchronized to low temperature or high temperatures respectively. In the absence of concurrent temperature cycles, animals primarily synchronized to LD. Both density and conspecific chemical cues affected development with higher densities slowing development and increased mortality in eggs exposed to water from juveniles. Overall, the results indicate that animals develop best at constant temperatures with light dark cycles at moderate densities and isolated from juveniles and adults and indicate an ontogenetic shift in behavioral preferences for water temperature.

The Effects of Commonly Used Insecticides on Growth and Development on the American Horseshoe Crab, Limulus polyphemus

Author(s):
Kaitlyn Sullivan
Jasper Bates
Christopher Chabot
Faculty Mentor: Christopher Chabot

Summary

The increasing world-wide use of pesticides over the past few decades has led to increasing concentrations of these toxins in marine estuarine systems, known as the main “nursery of the ocean”. Nearly 90% of all pesticides used are the organophosphates, neonicotinoids, or carbamates and these all target the ubiquitous acetylcholinergic synapse: organophosphates and carbamates inhibit the enzyme acetylcholinesterase while the neonicotinoids target the nicotinic acetylcholine receptor directly. While these substances are known to be toxic in a few marine species, their effects have not been assessed in the important keystone estuarine species, the horseshoe crab, Limulus polyphemus. Results show that chronic exposure to environmental levels of the organophosphates Diazinon and Chlorpyrifos suppressed metamorphosis at environmentally relevant concentrations but had no significant effects on activity or circatidal rhythms. Conversely, neither a neonicotinoid (Imidacloprid) nor a carbamate (methomyl) pesticide affected hatching or metamorphosis. Overall, the results suggest that neonicotinoids and carbamates may be less toxic when compared to organophosphates in marine species such as horseshoe crabs, but this hypothesis needs to be tested in other marine species.

The effects of overwintering and below freezing temperatures on larval survival in the American horseshoe crab, Limulus polyphemus

Author(s):
Cassidy R. Margerison
Jennifer L. Livingstone
Kyle C. Franks
Faculty Mentor: Christopher Chabot

Summary

The American horseshoe crab, Limulus polyphemus, is an ecologically and biomedically important species. Horseshoe crabs lay their eggs in marine intertidal sediment and while most individuals develop into juveniles and leave the nest the summer they are laid, some larvae are known to overwinter in the sediment. Here, these overwintering larvae may be exposed to freezing temperatures that could induce mortality. When larvae were exposed to temperatures below -2°C for longer than an hour, there was a significant increase in mortality. In addition, sediment samples that were collected from known nesting sites in late winter contained larvae (18 ±4 per sample), none of which were alive. Overall, although larvae have been reported to survive overwintering in some populations, our results suggest that populations further north, which endure colder temperatures, are likely to experience higher mortality rate.

Cell and Molecular Biology

Determining glucocorticoid receptor mediated cell stress pathway activation in triple negative breast cancer

Author(s):
Gabrielle Gardiner
Kara Geoffrion
Faculty Mentor: Dr. Sarah Tarullo

Summary

Despite new targeted therapies and improved screening methods, breast cancer remains the second leading cause of cancer-related deaths among women in the US. This is especially true in triple negative breast cancers (TNBCs), which are associated with poor prognoses primarily due to the lack of effective targeted therapies. While TNBCs do not express female sex hormone receptors, which have effective targeted therapies, ~40% of TNBCs do express the glucocorticoid receptor (GR) a member of the steroid hormone receptor superfamily. In TNBC, GR is associated with resistance to chemotherapy and metastatic recurrence. These studies aim to confirm GR signaling may drive Stimulator of Interferon Genes (STING) pathway expression and downstream signaling and regulate cell cycle progression. Further understanding of these mechanisms could provide rationale for novel treatment options for TNBC patients.

Climate Studies

Flooding and Wildfire: The Risks For Plymouth, NH In A Changing Climate

Subject Area:

Author(s):
Ben Hays
Samuel Taksar
Samuel Scoville
Faculty Mentor: Ricardo Nogueira

Summary

Our project focuses on the threat that Plymouth, New Hampshire faces in terms of flooding and wildfires. We discuss past events that have occurred in and around the town of Plymouth, as well as reference studies that help with our findings. Moreover, we will talk about the threat that climate change poses in exacerbating those hazards, and what our town can expect for the

future. We will also be sure to discuss mitigation efforts that can be used to prevent loss of life and damage to infrastructure.

Florida's Flooding Plan Proposal

Author(s):
Armani Moretti
Nick Ciaccio
Jameson LaBrecque
Torran Bosworth
Faculty Mentor: Ricardo Nogueira

Summary

Florida has experienced serious flooding issues with the issue increasing due to rising sea levels and hurricanes. We plan to take inspiration from New York's Flood plan to develop a plan that will help prevent flooding in high risk areas. This will increase public safety and decreasing spending on property damages.

How does climate change effect the grape industry

Author(s):
Andre Bailin
Eli Roth
Gavin Rollison
Cory Boisselle
Faculty Mentor: Ricardo Nobueira

Summary

In our project we explored how climate change affects the grape industry. We chose this because it is not often that people think about how climate change will affect the plants we grow and eat. We chose grapes because you need almost perfect grape growing weather in order for these grapes to grow correctly. Grapes need a dry environment but also need lots of water at the stand by to help combat frosts and extreme droughts. Grapes widely consumed across the world as a food but also as wine which is used in religious ceremonies or just to drink for fun.

Nuclear Power: A Key Player in the Future of Energy

Author(s):
Samantha Mallet
Roy Rusk
Mia Xiang
Tindra Bergstrand
Faculty Mentor: Ricardo Nogueira

Summary

Our Project is about informing the PSU student community about nuclear power and benefits of it. A seminar will be held to help introduce and inform students to nuclear power. Those who attend will be asked a few questions at the end and their answers will be recorded and presented at the showcase. The presentation will include a brief history, how nuclear is implemented, some benefits and challenges and the future of nuclear.

Overconsumption on Campus

Author(s):
Emma Marini
Ryan Winschel
Baillie Mako
Nahomy Palma
Faculty Mentor: Ricardo Nogueira

Summary

The idea of overconsumption will be focused on Plymouth State University. Utilizing local farms, instead of importing all goods, would help lessen our overall carbon footprint. Localizing our food supply will allow the university to only buy what is needed, instead of over buying goods. Waste will become significantly less if we localize our food goods. Buying in large quantities leads to more waste, which is why changing this mindset would help counter the total food waste on campus. This can be done through speaking with dining on campus with our recommendations. Some recommendations include maintaining and implementing gardens, importing goods from local farms, and composting waste. Furthermore, we will also be looking to create an aid to help students, faculty, and staff curve overconsumption tendencies, as they can expand further than food. This can include local stores that focus on sustainability such as Plymouth Soap Works, Ladders, etc.

Environmental Science and Policy

2025 Newfound Lake Tributary Water Quality Monitoring Protocol

Author(s):
Emma Marini
Brayden White
Luca Cardenas
Faculty Mentor: Amy Villamagna

Summary

The health of Newfound Lake reflects the quality of its watershed. An issue of concern is how tributaries are being impacted both naturally, and unnaturally, through land use changes over time. We aimed to develop and implement a comprehensive monitoring program that would track these changes within the tributaries. We gained insights into the current water quality monitoring parameters by reviewing the current tributary monitoring protocol. By researching protocols from other tributary monitoring programs, we brainstormed ideas of possible methods to further track change over time in tributary water quality. The revised protocol integrates additional chemical, physical, and biological parameters, as well as the inclusion of automated monitoring sensors to accurately monitor water quality in streams. In depth monitoring of tributaries allows us to see how conservation within the watershed can further preserve the pristine water quality of Newfound Lake.

Biomarker Reconstruction of Climate following LGM Deglaciation in the White Mountains, New Hampshire, USA

Author(s):
Jennifer Limoges
Faculty Mentor: Simon Pendleton

Summary

The retreat of the Laurentide Ice Sheet (LIS) in the northeastern U.S. after the Last Glacial Maximum (LGM) is well constrained, but high-resolution climate records from the deglaciation period are limited. Without this data, it is challenging to 1) understand the climatic evolution from deglaciation to present, and 2) evaluate the relationship between local climate and LIS behavior immediately following deglaciation. To address this, we analyzed lipid biomarkers from a ~12.6 ka lake sediment core from Cone Pond in Thornton, NH. Temperature was reconstructed using branched glycerol dialkyl glycerol tetraethers (brGDGTs), while hydroclimate was assessed using hydrogen isotopes (δ^2H) of plant waxes. Our results show a warming trend in temperature from brGDGTs, while δ^2H values suggest stable precipitation patterns similar to those from the deglaciation period. Our record has begun to fill the gaps in understanding the impact of terrestrial climate on the LIS behavior in New England.

Exploring Topographic Control of Rock Glacier Formation in the Rocky Mountains of Colorado

Author(s):
Brayden White
Faculty Mentor: Simon Pendleton

Summary

As climate change continues to drive retreat of the world's bare ice glaciers, alpine hydrologic systems are likely to change dramatically, with significant environmental and water resource consequences. Formations of rock and ice known as rock glaciers are ubiquitous across alpine regions and are projected to become hydrologically important as bare ice glacier water resources diminish. However, the factors and mechanisms controlling rock glacier formation and evolution remain poorly constrained. Understanding how rock glaciers form and the variables that impact their behavior can help geologists better understand how the changing climate is impacting these glacier systems. Using geospatial data and analyses of rock glaciers in the Colorado Rockies, my project explores various rock glacier topographic characteristics to better understand potential controls on formation and persistence.

Feathers and Flakes: Bird Activity in a Landscape of Snow

Author(s):
Christine Aery
Faculty Mentor: Amy Villamagna

Summary

Daily and seasonal weather shifts influence bird activity and migration. To evaluate potential influence of snow on activity, we observed birds at two backyard bird feeders during ten, 15-minute intervals between February and April. We associated each observation with time, snow depth, temperature, prior precipitation, and site disturbance. At most, 10 species (13 individuals) were present in any observation period. Throughout the study period, snow depth varied from zero to 26 cm, temperature from 22° to 49°, with site disturbance ever present. Observed species richness was best explained by an inverse relationship with snow depth (R^2 = 0.445; n=10) and, on average, more species were observed in the morning (5.3 species; n=3) and daytime (5.2; n=5) than the evening (0.5; n=2). About 20% of species richness variation was explained by a positive relationship with daily high temperature (R^2 = 0.193; n=10). Generally, observations coincided with warmer temperatures and less snowpack.

How did we get the National Park System?

Author(s):
Norah Conley
Faculty Mentor: Rachelle Lyons

Summary

My academic poster distills complex legislative language into an accessible piece on environmental policy, specifically the Organic Act of 1916, which established the National Park Service (NPS). Its purpose is to advance the audience's understanding of the Act and the socio-political context it arose from. It covers the history behind the Organic Act, its enactment, and following amendments. My piece also addresses the shortcomings of the NPS: The disfranchisement of Indigenous communities and commodification of our beloved parks. It is important for Americans to understand foundational U.S. laws that set a precedent for the way our nation perceives and protects its natural resources. My poster conveys this compellingly and eloquently.

Paleo-river Discharge of the Baker River, Hampshire

Author(s):
Christopher Shoals
Faculty Mentor: Simon Pendleton

Summary

Projected climate change in New England will have uncertain impacts on the hydrologic cycle and flooding. Paleo-river discharge (beyond the historical record) under differing climates provides important context for future flood management. The goal of this project is to map paleo-river features of the Baker River, determine their relative age, and use those features to estimate paleo river discharge. ArcGIS Pro and the RiverREM python package were used to create a relative elevation model and map past river channels, meanders, and oxbows from LiDAR elevation data. The relative ages of landforms were determined via elevation classification. Dimensions of past and present channel features were used to estimate discharge and compared to historical streamflow. Mapping paleochannels and identification of oxbows will guide future investigations of paleo floods from oxbow lake sediments. These results are an important step in understanding the past, present, and future behavior of the Baker River.

Reconstructing 4,500 years of Wildfire and Climate Interactions in the Cone Pond Watershed, New Hampshire

Author(s):
Elizabeth Hastings
Virginia Moore
Faculty Mentor: Lisa Doner

Summary

Wildfires play an important role in forest ecosystems, but they also pose growing risks to communities as development expands into wildland areas. In New England, human activity is the major cause of modern wildfires. Lake sediment records reveal the long history of fire over thousands of years, but the causes of these early fires are less clear. This study examines wildfire history in the Cone Pond watershed of New Hampshire, using sediment records and paleoecology data. We analyze shifts in forest composition, charcoal abundance, and grain size to explore the synchrony of climate, specifically drought, and wildfire events over the past 4500 years. This project involves partnership with the US Forest Service and correlating our data with new tree ring chronologies in the White Mountains. Our research improves understanding of forest responses to wildfire as climates change, crucial to information for strategic fire and forest management.

Snow Camera? Snow Problem! Fixed-site monitoring in Langdon Woods.

Author(s):
Gabrielle Gladu
Christopher Shoals
Faculty Mentor: Amy Villamagna

Summary

Studies in New England have documented changes in snowfall accumulation over recent decades attributed to climate change. The purpose of this study is to develop a fixed monitoring station in Plymouth for long-term snow depth monitoring. The objectives were to document daily changes in snow depth using cameras and compare: 1) patterns between sites under tree canopy and no canopy, 2) winter 2025 to winter 2023, and 3) the Langdon Woods site to other fixed stations at different elevations and latitudes. The maximum snow depth recorded under open canopy (between January and April) 2025 was 56.4 cm. There were 9 days of snow accumulation over 5 cm and 10 days where snowmelt surpassed 3 cm. We describe the challenges and benefits with fixed camera monitoring of snow depth and discuss potential modifications for next year's study (e.g., increased site visit frequency and revised camera distances to enhance photo clarity).

The Depth of Winter: Mapping Snowpack in the White Mountains

Author(s):
Zan Alberici
Faculty Mentor: Amy Villamagna

Summary

Snow depth is a critical parameter in environmental monitoring. Understanding seasonal snowpack dynamics offers valuable insight into climate science, hydrology, watershed resource management, and avalanche risk assessment. The objectives of our work were to contribute as many snow depth measures as possible to the international Community Snow Observation Network and to analyze snow patterns from three distinct periods in February and March within the White Mountains National Forest. We collected measurements of snow depth using manual snow probes on all aspects of slope and a broad scope of varying elevations, ranging from 186m – 1910m, during the months of November to April; 230 individual measurements were recorded, ranging from 0 to 315cm in depth. This data contributes to a growing body of knowledge supporting regional climate modeling and hydrologic forecasting. The continuation of long-term monitoring will be essential for detecting trends in the regions lacking fixed station monitoring sites.

USFS Watershed Mapping

Author(s):
Lucas Robdau
Chris Shoals
Faculty Mentor: Simon Pendleton

Summary

This project is part of a long-term stream monitoring program within the White Mountain National Forest. Our role is to assist Forest Service hydrologists and aquatic ecologists in mapping and characterizing selected stream study locations using a variety of GIS techniques to aid in the larger study of monitoring changes in stream habitats (e.g. wood loading, flooding). This study helps understand and identify potential risks to infrastructure. Using high-resolution LiDAR DEM data, we mapped and delineated watersheds and survey sites, and documented elevation, slope, drainage density, among other parameters. We drafted detailed methods, including accurate metadata for each piece of data. In addition, we mapped and characterized all 11 of the planned Forest Service study sites for 2025 and most of the 11 2026 sites. This research provides the foundation for continuing research, and the data supplied will be used to inform future studies.

Exercise and Sport Physiology

Physical Fitness Levels of College Students

Author(s):
Ethan Provost
Leah Maheux
Megan Rouvalis
Natasha Wales
Faculty Mentor: Vincenzo Nocera

Summary

Despite the known benefits of physical activity (PA), research suggests a decline in this behavior. Low physical fitness (PF) levels are believed to negatively impact PA participation. However, the PF level of college-aged students remains unclear. Purpose: To determine the PF levels of college-aged students. Methods: Participants were assessed during one in-person visit using a battery of PF assessments. The PF battery included tests of body composition (bioelectrical impedance analysis), muscular power (vertical jump), muscular strength (handgrip strength), cardiorespiratory endurance (Queens College Step Test), and muscular endurance (push-up test). Results: PF levels varied among college-aged students. Conclusion: High levels of PF are believed to increase the likelihood of lifelong PA participation, which can reduce the risk of chronic conditions. Acutely, improved PF during college years can enhance academic performance, reduce psychological distress, and increase vitality. Targeted interventions may be needed to assist in improving the PF level of college-aged students.

The Effects of Acute Beetroot Juice Supplementation on Muscle Oxygenation and Resistance Training Performance.

Author(s):
Jacob DesRoches
Chase Anestis
Faculty Mentor: Ryanne Carmichael

Summary

INTRODUCTION: Beetroot juice (BRJ) is a natural ergogenic aid which increases nitrate levels in the body. Nitrate supplementation has been found to increase performance in resistance training (RT). PURPOSE: To investigate the effects of acute supplementation of BRJ on muscle oxygenation and RT performance. METHODS: Healthy, college-aged individuals were recruited for this double-blind, randomized, crossover study (Height: 173.8 ± 11.3 cm, Weight: 84.9 ± 22.5 kg, Age: 21.7 ± .9 years, BF: 22.2 ± 7.7%). Participants were asked to come in for three visits. Visit 1 consisted of familiarization of the protocol and maximal leg extension test, where a one repetition maximal (RM) was estimated. During visits 2 and 3, participants were given 70 mL of

BRJ or a nitrate depleted placebo. After 2 hr, participants completed three sets of repetitions until failure (RTF) on the leg extension machine at 65% 1RM. Muscle oxygenation variables (SmO2 peak and SmO2 percent change) and completed repetitions were recorded. RESULTS: There was no significant difference in SmO2 peak (BRJ: 79.0 ± 9.1, 78.6 ± 9.9; PLA: 79.7 ± 6.7, 80.1 ± 7.9) or SmO2 percent change (BRJ: 57.8 ± 31.0, 63.0 ± 28.1, 60.6 ± 26.1; PLA: 60.3 ± 33.4, 63.9 ± 32.0, 64.2 ± 29.9; $p > .05$) between conditions. No significant difference was found in RTF between conditions ($p > .05$). CONCLUSION: Nitrate supplementation was not found to be ergogenic in this study. If a chronic versus acute supplementation was administered, a difference in muscle oxygenation peak and percent change may be seen.

The use of Extrinsic Strategies to Improve the Exercise Experience

Author(s):
Dan McHugh
Imalay Rodriguez
Faculty Mentor: Vincenzo Nocera

Summary

Physical activity (PA) participation rates remain epidemically low. Limited data suggest that extrinsic strategies may enhance exercise experiences thus improving PA adherence. Yet, the impact of extrinsic strategies remains unclear. Purpose: To evaluate the motivation of college age students to utilize extrinsic strategies to enhance their PA experience. Methods: Participants completed a Qualtrics survey. Following the completion of demographic information, attitude towards exercise (Affective Exercise Experiences) and PA behaviors (International Physical Activity Questionnaire) were evaluated. Finally, participants were asked to rank their willingness to implement extrinsic strategies from a predetermined list. Results: Various factors influenced PA behaviors, attitude towards exercise, and willingness to implement extrinsic strategies. Conclusion: A better understanding of an individual's willingness to implement extrinsic strategies may enhance the exercise experience. Data from this investigation highlights unique motivators to make exercise more pleasurable. This information may help to develop tailored PA programs.

Sex Differences and the Impact of Beetroot Juice on Resistance Training Performance

Author(s):
Rylan Canabano
Patrick D'Entremont
Logan Brierley
Faculty Mentor: Ryanne Carmichael

Summary

Beetroot juice (BRJ) is a supplement high in nitrate (NO3-). NO3- is converted into nitric oxide (NO) in the bloodstream which can positively affect exercise performance. PURPOSE: To investigate the sex differences of acute BRJ supplementation on resistance training. METHODS: Healthy individuals with at least one year of resistance training experience were recruited for this randomized, crossover, double-blind study (Males, age: 21.83 ± 1.16 year, height: 181.3 ± 10.4 cm, weight: 99.4 ± 23.9 kg, BF: 17.7 ± 4.4%; Females, age: 21.66 ± 0.81 year, height: 166.5 ± 6.8 cm, weight: 70.5 ± 6.6 kg, BF: 26.8 ± 7.9%). Participants completed three visits. Visit 1 consisted of baseline measurements and a 10-repetition maximum (RM) leg extension test. The 10 RM test was used to predict 1 RM. During visits 2 and 3, participants were given a 70 ml dose of BRJ (400 mg nitrate) or a nitrate depleted drink (PLA). After a 2 hr waiting period, participants completed 3 sets of repetitions to failure (RTF) at 65% of predicted 1 RM. RESULTS: There was no significant difference between males (Set 1: 12 ± 2, Set 2: 9 ± 1, Set 3: 6 ± 2) and females (Set 1: 12 ± 2, Set 2: 9 ± 1, Set 3: 6 ± 2) in RTF when comparing BRJ and PLA ($p > .05$). CONCLUSION: In this study, males and females responded similarly to nitrate supplementation. Given that estrogen levels fluctuate in females and that estrogen upregulates the production of NO, future research should control for the menstrual cycle.

Finance

PSU student Finance Club: Investment Policy Statement and Portfolio Construction- Spring 2025

Author(s):
Christina Bradbury (Faculty Advisor - see answers that follow for students please. Thx!)
Ronja Dahlin
Michael Toronto
Vincent Fosser
Faculty Mentor: Christina Bradury

Summary

PSU's student finance club manages approx. $22,500 in assets under management. Integrating a spirit of enthusiasm and energy toward hands-on learning in the field of finance, this Club introduce students to the basics of the investment process.

Geology

Signal coherence in sediment deposits at Juggernaut Pond, Hancock, NH

Author(s):
Elijah Pinette
Samuel O'Hara
Faculty Mentor: Lisa Doner

Summary

The frequency and occurrence of Cyanobacteria blooms are a general indicator of aquatic health. In 2024, Plymouth State researchers collected cores from Juggernaut Pond, Hancock, NH to assess the risk of Cyanobacteria blooms in that water supply lake. In 2025, we subsampled and analyzed Juggernaut Core 3, to compare productivity, using loss-on-ignition (LOI), and watershed erosion, using magnetic susceptibility (MS), across the suite of cores. Lead-210 and radiocarbon dating provide core bottom ages for Cores 1, 2 and 4, against which we compare Core 3. All the cores are similar in their LOI and MS results, and this provides insight into the depositional history of Juggernaut Pond over the past 2000 years. Results of this study allow users of Juggernaut Pond's water resources, including residents of Hancock, to better understand the site's geological history and the lake's response to changes in climate, land disturbance, and conditions that create Cyanobacteria blooms.

INCP - Integrated Capstone

Campus Nourishment: A Student-led Initiative to Combat Food Insecurity

Elizabeth Hastings
Cassidy Margerison
Jett Lucas
Faculty Mentor: Abby Goode

Summary

Campus Nourishment is dedicated to ensuring no student goes hungry. Our goal is to reduce food insecurity by providing accessible, nutritious meals and resources to students in need while fostering a culture of community on campus. Currently our dining hall closes at 8 pm, leaving a large portion of students (student athletes, students with late classes, or those with jobs) without accessible meals. To combat this hunger, Campus Nourishment will partner with Prospect Dining Hall, the Student Support Foundation, and the Office of Community Impact to create ready-to-go low-cost meals. These meals will then be distributed through our Community Cupboard, located on the second floor of the Hartman Union Building (HUB). Ensuring students can access meals during an extended timeframe (6:30 am – 12 am). By

working closely with dining services, we can foster a community where no student must choose between their education/work and a meal.

Digging Into Sustainability: A Student-driven Composting Initiative

Author(s):
Meghan Hall
Sierra Claudio
Natasha Wales
Jackie Gaigals
Faculty Mentor: Abby Goode

Summary

Plymouth State University is often seen as co-existing—perhaps in near-perfect harmony—with nature. Yet, the amount of food waste produced by our community, particularly in the student apartments, says otherwise. Food waste is one of the biggest sustainability issues pressing the United States, as food waste contributes to one-third of all greenhouse emissions. In response to the student food waste, composting would improve Plymouth State's connection to environmentalism while also supporting PSU gardens and individual gardens in the greater Plymouth area. To get students involved in our composting initiative, we will enroll them in a program to receive a small composting bin to keep in their living space. The compost system will be managed by the University Honors Program and the Office of Environmental Sustainability, with support from Residential and Student Life.

From Farm to All Tables: A Community-First Food Equity Initiative

Author(s):
Dennis Winders
Liam Leavitt
Joseph Znoj
Justin Bailey
Faculty Mentor: Abby Goode

Summary

The high cost of local produce is a significant barrier to lower-income households and excludes many marginalized groups from access to fresh, local foods. Federal programs like SNAP and state programs like Granite State Market Match (GSMM) have historically served to bridge this gap. However, recent budgetary cuts—with further reductions looming—continue to threaten these crucial resources. In response to recent governmental decisions to gut essential social support programs designed to uplift our most vulnerable populations, our project outlines a Food Equity Fund in partnership with Local Foods Plymouth that will either subsidize or replace

the support previously provided by SNAP and GSMM. This Fund will support our local producers and nurture a culture of mutual aid in our community. In the face of growing wealth disparities and an increasingly challenging environment for small farmers, it's more important than ever for communities like Plymouth to care for their own.

Striving for Transparency in Campus Dining: A Real-World Study

Author(s):
Tabitha Lopes
Kyla Napolitano
Logan Teixeira
Gabe Tyson
Faculty Mentor: Abby Goode

Summary

This project examines the theme of transparency within the campus dining system at PSU. We draw inspiration from Wendell Berry, who states that "eating is an agricultural act" and that "our kitchens and other eating places more and more resemble filling stations" (228-229). We aim to reconnect students with the roots of their food and promote critical thinking about the systems that influence their meals. Centering our investigation on PSU's primary food provider, Chartwells, we address issues like food quality, freshness, and pricing, while questioning the extent of student awareness regarding their food choices. Our approach includes a thorough examination of PSU's food network, research into student opinions, and broader food system problems, culminating in a proposal on how to enhance transparency on campus. We encourage students to view themselves as active participants, rather than passive consumers, in the evolution of a healthier and more transparent food system at PSU.

Taste of Culture

Author(s):
Mihalis Sourgiadakis
Brendan Lee
Dan Godomsky
Riley Anderson
Faculty Mentor: Abby Goode

Summary

In collaboration with the IDEA center and Dining Services, we are cultivating a more culturally diverse food culture on campus. By creating one-pagers that have information about the food our diverse students are eating and positioning them where students are inclined to read them,

we are bringing more food diversity to PSU. One of our biggest goals is to host events that promote culturally diverse food, like the one portrayed through our showcase poster. Getting students to be involved in their food, learn about their food, and interested in food is crucial to our project's success.

Meteorology

Atmospheric River Orientation and Resulting Precipitation Accumulations in the White Mountains of New Hampshire

Author(s):
Cameron Wessel
Faculty Mentor: Eric Hoffman

Summary

Roughly 100 Atmospheric Rivers (ARs) impact the eastern United States every year. Recent studies have shown the significance of upslope precipitation impacts during AR events along the U.S. west coast, but none have provided an in-depth analysis for upslope impacts during AR events along the east coast. A majority of ARs affecting the east coast are oriented southwest to northeast, coinciding with the orientation of the White Mountains, while a minority of AR events are oriented southerly and southeasterly, flowing orthogonal to the White Mountains. Although a minority, this direction would cause more favorable upslope flow in the White Mountains, which can lead to higher precipitation amounts and bigger impacts. This study examines multiple case studies of ARs oriented southeasterly, southerly, and southwesterly and compares the resultant precipitation accumulations for each AR event to determine the effects of upslope flow.

Meterology and Mathematics

Intensity Estimation of Tornadoes in Populated Areas

Author(s):
Angelo DeLuca
Faculty Mentor: Jennifer Nelson

Summary

Tornadoes are destructive forces of nature, especially when they enter populated areas. For my Mathematical Expositions class I researched tornadoes that have struck populated areas. I created an equation that estimates the wind speeds of tornadoes using velocity data from weather radars. I took windspeed estimations from tornado damage surveys performed by the NWS and compared them to weather radar velocity information for that tornado. The goal of this

project is to improve real time estimation of tornado intensity using weather radar information for tornadoes that strike populated areas such as metroplexes. This improvement would give response services, and the public a better understanding of the severity of the storm. I used numerous meteorological websites to gather data and create an equation. I then created a guide to tornado estimation based on the equation, to make intensity estimation more efficient.

Nursing

Alternative Therapies for Mental Health Treatment

Author(s):
Gwen Carranza
Cameron Derrig
Silas Weeden
Faculty Mentor: Julie Fagan

Summary

This poster examines the literature on alternative therapies such as exercise, lifestyle changes, and psychedelics versus traditional pharmacologic treatments for psychiatric disorders such as anxiety and depression. Existing evidence indicates that drugs such as psilocybin, LSD, and ayahuasca produce rapid and long-term remission of symptoms. These drugs cause fewer side effects than traditional medications and yield longer-lasting results without addiction. Additionally, healthy eating and exercise contribute significantly to positive mental health. Effects of lifestyle interventions for mild and moderately severe mental health disorders equal or surpass those of traditional medication. In more severe cases, a combination of the two methods yields greater treatment outcomes. This poster strives to bring forth awareness of alternatives such as these and facilitate greater holistic treatment for mental illness.

Complications of Invasive Treatments in Critically Ill Patients

Author(s):
Shannon Egan
Hayley Neilson
Connor Boucher
Faculty Mentor: Julie Fagan

Summary

Purpose: The purpose of this poster is to discuss the complications of invasive treatments in critically ill patients. Specifically, complications of interventions for patient populations including burn, cardiac, and oncology. Significance: Although invasive interventions are

necessary to optimize outcomes, complications of these interventions are not as frequently reviewed. Little is discussed about the possible long term effects of these complications. Findings: Relevant peer-reviewed studies were examined and several supported possible complications from life-saving interventions. Research about outcomes related to minimizing complications and staying proactive about preventative measures was also found. Conclusion: It is essential to extend the conversation around these complications beyond initial life-saving treatments to ensure comprehensive and ongoing patient care.

Exploring the Impact of Complementary & Alternative Therapies on Health Outcomes

Author(s):
Maeve Perron
Alyssa McLachlan
Madison Azoff
Shandiin Clark
Faculty Mentor: Julie Fagan

Summary

The purpose of this poster is to explore the role of alternative therapies—including herbal medicine, positioning, music therapy, and select medical procedures—as supportive interventions alongside standard treatments for serious and chronic health conditions. A literature review examined current evidence related to these approaches. Herbal medicine has been used to support cardiovascular health by modulating cardiac biomarkers and reducing inflammation. Positioning techniques, particularly in palliative care settings, enhance patient comfort and assist in managing respiratory function. Music therapy demonstrates effectiveness in reducing anxiety, promoting relaxation, and improving well-being among mechanically ventilated ICU patients. Additionally, procedures such as left atrial appendage closure offer a non-pharmacologic option for stroke prevention in patients with atrial fibrillation who cannot tolerate anticoagulation. While these therapies offer meaningful improvements in symptom and quality of life, they are not substitutes for evidence-based treatments. Overall, the findings support integration of complementary therapies to enhance patient-centered care.

Impact of Simulation Learning on Nursing Students' Clinical Preparedness and Anxiety

Author(s):
Kate McGrath
Madison Soble
Faculty Mentor: Julie Fagan

Summary

This poster explores how simulation learning affects nursing students' readiness for clinical practice and their anxiety levels. Simulation is an important part of nursing education because it helps students connect what they learned in the classroom with real-life situations. Many students feel nervous when starting hands-on care, but practicing in a simulated environment can help reduce those nerves. Our literature review found that students who participated in simulation felt more confident, prepared, and satisfied with their learning. Simulation also gave them the chance to safely practice skills like medication administration and teamwork, which helps prevent medical errors and improves patient safety. This practice is especially helpful when clinical site opportunities are limited. While simulation is clearly beneficial, there are still barriers such as funding, staffing, and access to high-tech equipment. Overall, our findings show that simulation is a valuable tool that is effective when integrated into nursing curriculums.

Research Gaps and Treatment for Postpartum Depression

Author(s):
Graci Kaiser
Jada Hare
Faculty Mentor: Julie Fagan

Summary

An estimated 12% of women experience postpartum depression (PPD), and 15% of those attempt suicide. Barriers including negative healthcare experiences and fear of stigma often delay care or lead to inadequate treatment. This poster aims to highlight research gaps and explore effective treatment options for PPD. Women, particularly those of childbearing age, are often excluded from pharmacokinetic (PK) studies, making it difficult to establish safe treatment guidelines. Inadequately treated PPD poses risks to the mother and the baby. Recent meta-analyses of PK studies, sibling-control studies, and studies discussing pharmacotherapy vs. psychotherapy were reviewed. Limited PK data exists regarding antidepressants in pregnancy, and sibling studies suggest prenatal antidepressant exposure may not increase risk of adverse outcomes. Psychotherapy is considered the safest and most effective first-line treatment. Future studies should be more inclusive, improve data accuracy, explore long-term outcomes for parenting stress, and evaluate effective therapeutic techniques for the management of PPD.

Serious Side Effects of Common Birth Control Methods

Author(s):
Anna Sargent
Mollie Durand
Faculty Mentor: Julie Fagan

Summary

Purpose This poster provides insight into the side effects of common birth control options. Significance Birth control is commonly used among female patients, including hormonal and nonhormonal methods. Each method has benefits and risks. More education is needed regarding the side effects of birth control and pain relief for procedures related to birth control. Findings The many side effects of birth control include increased risk of blood clots with hormonal forms of birth control. Pain is also a side effect of insertion of some forms of birth control. Pain control methods like lidocaine injection and nerve stimulation for these procedures is effective and more providers should start using them as options. Conclusion Women seeking birth control should be provided with ample education on the pros and cons of each form. This will allow them to make the best decision regarding their healthcare needs.

The Impact of Antidepressants and Probiotics on Pain and Symptom Management in Adults with Crohn's Disease

Author(s):
Catherine Donovan
Abigail Sewall
Faculty Mentor: Julie Fagan

Summary

Crohn's disease (CD) is a chronic inflammatory bowel disease (IBD) that impacts quality of life. While traditional treatments focus on immunosuppression, emerging evidence suggests antidepressants and probiotics may offer additional benefits. Antidepressants, particularly SNRIs and TCAs, have been shown to reduce inflammation and alleviate chronic pain, improving symptom management. Probiotics, especially Bifidobacterium longum, may support gut health by regulating inflammation and strengthening the intestinal barrier, though evidence for disease remission remains inconclusive. This literature review highlights the potential of these therapies in CD management and the need for further research to target the vast array of symptoms in this condition. Nurses play a crucial role in patient education and advocating for holistic care by integrating mental and physical health in addition to traditional methods of treatment. A multidisciplinary approach is essential for optimizing treatment outcomes and improving the quality of life in CD patients.

Weightloss Solutions: Lifestyle or Medication?

Author(s):
Nora Riendeau
Tessa LaBarre
Faculty Mentor: Julie Fagan

Summary

This poster examines literature on treatment options for obesity. Obesity affects a significant portion of adults and is linked to various health risks, including heart disease, diabetes, and certain cancers. Weight loss medications, particularly second-generation appetite-modulating medications (AOMs), show promise in managing obesity, though their long-term effects remain understudied. While AOMs assist in weight reduction, they do not address underlying factors like obesogenic environments. A multifaceted approach combining lifestyle modifications (nutrition counseling, physical activity) with medications or bariatric surgery leads to more sustainable weight loss outcomes. Primary care physicians (PCPs) play a critical role in guiding individualized treatment plans, and patients who are informed about their obesity and receive counseling are more likely to succeed in weight loss. For effective, long-term obesity management, AOMs should be paired with lifestyle changes to tackle both physical and behavioral aspects of the condition.

What impact does paternal smoking and alcohol consumption prior to conception have on newborn health outcomes?

Author(s):
Jessica Woodaman
Liana Gobin
Faculty Mentor: Julie Fagan

Summary

The purpose of this literature review is to discuss the often overlooked impact of preconception paternal substance use on newborn health. There is an imbalance in the research gap regarding the emphasis of maternal health on fetal development compared to paternal contributions. Literature findings revealed that paternal alcohol and smoking use prior to conception causes DNA degeneration leading to newborn deficits. Preconception alcohol consumption can result in neurological dysfunctions and increase the risks for infant mortality and stillbirth by over 20 percent. Preconception smoking can correlate to congenital abnormalities such as heart disease, and place newborns at a higher risk for birth defects compared to a non-smoking biological father. The lifestyle choices of fathers in the preconception period are critical in the fetal development and health of newborns.

What interventions are beneficial for pregnant women to have positive birth outcomes?

Author(s):
Ashley Tierney
Alexi Brochu
Faculty Mentor: Julie Fagan

Summary

Purpose: This poster compares effects of interventions such as weight loss medications and childbirth education on pregnancy outcomes. Significance Maternal obesity and childbirth education are both directly related to pregnancy outcomes. Data shows that 27.5% of US women over 20 years of age are overweight, with an additional 41.9% of women having obesity, including 11.9% who are severely obese. Findings Weight loss through medication can improve chances of a healthy pregnancy. Attending childbirth education conducted over three or more sessions was associated with reduced use of pain medication, reduced use of planned cesarean, and increased shared decision making. Conclusion Interventions such as weight loss medications and childbirth education classes can have a beneficial impact on pregnancy outcomes. Additional research is necessary to determine long term effects of weight loss medications. Research should also be done to determine if outcomes differ based on in person vs online childbirth education classes.

Protest and Performance

High Needs Drive

Author(s):
Isabella Kieran
Jackson Stanton
Leigh Rohe
Elizabeth Hassell
Faculty Mentor: Jessie Chapman

Summary

This High Needs Drive, a mutual aid protest, aims to support The Bridge House by mobilizing community resources. These community resources will provide essential supplies and increase awareness. Organized in partnership with The Bridge House, the initiative focuses on collecting items such as unopened nonperishable food items, coffee supplies, and case management supplies. These items will help individuals at The Bridge House with immediate living conditions but also support their long-term living. By uniting citizens, organizations, and volunteers, the campaign aspires to create a more compassionate and proactive approach to addressing one

of society's most urgent issues. This campaign will be from Monday, April 14th, until Friday, April 25th, with drop off locations at Hannaford Supermarket, Ladders Thrift Store, Pease Public Library, Ice Arena, and the Office of Community Impact.

Psychology

A Cognitive Task's Impact on Anxiety Levels

Author(s):
Olivia Bradfield
Madysen Crowley
Faculty Mentor: Tyler Wilks

Summary

The purpose of this study was to explore the relationship between engaging in a cognitive task and self-reported anxiety levels. We asked participants to first complete 10 math questions to the best of your ability. We asked participants to answer a short survey asking about the level of anxiety they experience while answering the math questions.

Attractiveness in Relationships

Author(s):
Ava Feeney
Annalee Roy
Tayla Keefe
Faculty Mentor: Tyler Wilks

Summary

This study explores how relationship status influences perceived attractiveness. Specifically, it investigates whether individuals are rated as more or less attractive depending on whether they are single or in a romantic relationship. It is hypothesized that individuals in relationships will be rated as more attractive than single individuals.

Difficult Tests and Worries

Author(s):
Klemens Berberich
Faculty Mentor: Dr. Tyler Wilks

Summary

Factors Influencing Test Anxiety: The study examined anxiety levels based on the anticipated difficulty of the test questions.

Effects of Sleep on Cognitive Functioning

Author(s):
Ezra Speers
Faculty Mentor: Tyler Wilks

Summary

I’m planning to study the effect of sleep on cognitive function. This is a broad topic that impacts everyone, so gaining a deeper understanding could help anyone. I'll be putting out a survey asking people to complete a memorization task and asking how long they slept the night before. I'm looking for a correlation between time spent sleeping and scores on the cognitive test. My hypothesis is that if people get more sleep they'll do better on the task. This is a non-experimental correlation study. I'm planning to analyze my data using Pearson's r test.

Effects of White Noise and Vibrating Sounds on Nomophobic-Related Emotions

Author(s):
Scott Miller
Charlie Miller
Faculty Mentor: Angela Kilb

Summary

Smartphones have the ability to notify us through vibrating sounds and make us feel good when we get a notification, and the adverse effects of losing this ability to connect to our world – such as panic and strong feelings of social exclusion – need further study. This experiment was designed to see if the inability to check one’s phone created strong feelings of nomophobia, the fear of being without one’s phone. Students are put into control and experimental groups. The control group watches a video of white noise, and the experimental group vibrating sounds. Students also take a personality questionnaire that measures personality traits. We expect the experimental group to rate higher on the nomophobic scale, and neuroticism to correlate the most to nomophobia.

How Certain Tasks Affect Self-Consciousness

Author(s):
Sofia Orama
Brooke Henderson
Faculty Mentor: Angela Kilb

Summary

We set up this experiment to see how certain tasks affect self-consciousness. From the data we collect we can better understand what makes people self- conscious. The participants are instructed to answer embarrassing questions about themselves. The experimental group is instructed to record a video of themselves answering the questions to invoke more self-consciousness, the control group is tasked to answer the same questions but not instructed to record. We predict that participants in the experimental group, those who record themselves, will report higher self-consciousness scores than those in the control group. Additionally, we expect that individuals with a more negative self-image (or lower self-esteem) will report greater increases in self-consciousness, suggesting a positive correlation between neuroticism and self-consciousness.

How does the amount of time spent on your smartphone effect feelings of FOMO?

Author(s):
Olivia Hobson
Faculty Mentor: Tyler Wilks

Summary

This study explores the relationship between smartphone use and the feelings of FOMO among individuals in a digitally connected society. As smartphones have become an important part of daily life, their role in shaping social perceptions and emotional well-being has gained increasing attention. Through an online survey, this research investigates how the relationship of smartphone usage correlates with reported levels of FOMO.

Impact of stress on motivation

Author(s):
Breanna Stockman
Faculty Mentor: Tyler Wilks

Summary

The study at hand was designed to test whether or not the level of perceived stress predicts motivation to exercise, and does this relationship follow an inverted-U pattern consistent with

the Yerkes-Dodson Law? I predict the more u pattern will show, having little motivation in categories low stress and high stress, and strong motivation when experiencing moderate stress.

Meditation Effects on Pretest Relaxation

Author(s):
Olivia Aultman
Faculty Mentor: Tyler Wilks

Summary

I am a college student in a psychology course called Research Methods and Statistics II. Students in this course are required to conduct an empirical study relevant to psychology, where we will collect data from human participants, analyze and interpret the data, and write an APA-style research report summarizing our findings. The topic I am interested in is "Meditation & the effect of how much relaxation it may give" and the research question I am exploring in my study is "Will a 5 min meditation aid in more or less relaxation after asking to think about an upcoming exam/stresser?". I plan to address this research question by "A 5 min meditation or distracting video. And seeing which one or none of them help in giving more/less relaxation before a test/stressful event."

Recreating test anxiety with math questions and a time limit

Author(s):
Blake
Alexa Flanagan
Molly Glew
Faculty Mentor: Angela Kilb

Summary

This experiment was designed to recreate test anxiety, by asking the participants a series of math questions. With two groups, each group got a different set of math equations, one being harder than the other experiment was to see if test anxiety could be recreated. We thought this experiment would show some signs of test anxiety when we compared the data from the two groups. These findings would help us understand test anxiety, and the causes for test anxiety.

Shredding Stress: Strategies Skiers Use to Reduce Stress

Author(s):
Antonie Hruskova
Faculty Mentor: Dr. Clarissa Palmer

Summary

This study examined perceived stress and coping mechanisms among members of the Alpine ski team at Plymouth State University. The purpose was to explore how student-athletes manage stress on a daily basis, during training, and in competition. An anonymous online survey was distributed via email to all team members, yielding 12 responses from participants of diverse backgrounds, including North America and Europe. Findings indicated that athletes experienced significantly lower stress levels during training compared to competition and daily life. The highest stress levels were reported during competitive events. Participants identified a variety of coping strategies, many of which aligned with affective approaches documented in previous research. These results highlight the importance of supporting athletes with targeted stress management techniques, particularly in high-pressure competitive settings.

Stimulated Auditory Processing and Memory Retention

Author(s):
Alyssa Zimont
Faculty Mentor: Tyler Wilks

Summary

The current experimental study is conducted for the purpose of identifying inexpensive and accessible strategies in helping students learn in a noisy environment, such as a classroom. Prosodic speech and tone of voice can be an important and helpful tool for educators when keeping students attentive to a lecture, especially in a loud and distracting environment. Using a between subjects design where participants only experience one condition. Participants are recruited through Plymouth State University's SONA system. Each condition contained a simulated lecture video based on the enthusiasm of the narrator, with background noise interference. Participants experiencing an enthusiastic prosodic lecture model will perform significantly better on a recall and comprehension questionnaire than those who experience a normal prosodic lecture model.

The Effect of Societal Standards on Body Esteem

Author(s):
Haley McAllister
Summer Williams
Faculty Mentor: Angela Kilb

Summary

Understanding the effect of societal standards on body esteem is important because societal ideals often shape how an individual feels about themselves, which affects self worth and

mental health. By learning more about body esteem, people can learn to separate their own personal worth from their appearance and society's expectations. In this experiment, participants either viewed images of people with unrealistic body types or people with realistic body types, followed by a body esteem test. We expect participants who viewed the unrealistic photos to have lower body esteem than participants who viewed the realistic photos. We also expect that of the Big Five personality traits, body esteem will be most associated with neuroticism. With this information we can raise awareness about the negative impacts of social media and unrealistic beauty standards in society.

The Effects of Family Support and College Student stress

Author(s):
Olivia Griffin
Faculty Mentor: Melissa Paiva-Salisbury

Summary

This study compared students stress levels with parents who were married and parents who were divorced. There was also a comparison to see if students with divorced parents have less familial support over students had who had still married parents. Data was collected via a Qualtrics survey containing demographic questions, the 14-question perceived stress scale (PSS), and four familial support questions. The numerical results of this study are still being reviewed and will be presented on the poster. However, the data reviewed so far, shows statistical significance that students whose parents are married have more familial support over students whose parents are divorced. A future study could be conducted with a narrowed stress perspective. Rather than an overall PSS, stress could be measured more specifically by asking questions pertaining to financial stress, stress around a lack of support, and family support aiding in reduce stress during the academic year.

The Impact of Dream Recollection on Creative Thinking

Author(s):
Skylar Hammes
Abigail McKee
Faculty Mentor: Tyler Wilks

Summary

Our study, Student Memory Recall and Problem Solving, highlights memory retrieval's influence on creative problem-solving, determining if recalling dreams impacts creative capabilities. There's no grounded theories between dream recollection and creative thinking, however, there are studies suggesting a significant correlation. In completing this study, we've contributed to the scientific knowledge of this lesser studied topic, which has potential applications in

innovation management and creative careers. Participants wrote about a recent event or dream in detail. After completing this writing task, they solved a series of word puzzles in a performance task known as the Remote Associates Test, a reliable measure for creative problem-solving. An independent samples t-test was used to interpret if recent dream recall, in comparison to recent life event recall, influences creative capabilities and problem-solving in college students - which we're looking forward to sharing during our showcase.

Through a Parent's Eyes: Personality and Play in Early Childhood

Author(s):
Sophie Miller
Alexandra Lomba
Faculty Mentor: Tyler Wilks

Summary

Play serves as an essential element in the developmental process of children. Their cognitive, social and emotional growth depends heavily on creative and imaginative play. It enables children to grow their social abilities while exploring their environment and expressing their personalities. Parents who examine their children's personalities and play patterns may let their intimate bond with their children affect their evaluation of their children's play behavior through their perception of personality traits. An essential issue emerges from the dynamic between parents' subjective evaluations and the real play behaviors displayed by their children. Understanding differences between observed and reported behaviors demonstrates how parental cognitive processes influence child development. We will investigate the connection between parental assessments of their children's personality traits and their judgments of their children's play behavior. This study will evaluate the precision of parental assessments as well as potential biases and developmental consequences in parent-child interactions.

IQ test

Author(s):
Sam merrill
Beau Fellows
jaedyn McLaughlin
Faculty Mentor: Angela Kilb

Summary

This study examines how manipulated feedback influences self-reported anger, which is important for understanding how everyday interactions affect emotional regulation. Participants were randomly assigned to either a positive or aggressive emotional condition. In the positive condition, participants were told all their answers on a simple quiz are correct,

while in the aggressive condition, they were told all answers are wrong, regardless of accuracy, to induce frustration. After, all participants completed a survey measuring their current anger levels. We predict that those in the aggressive condition will report significantly higher anger than those in the positive condition. These findings may offer insight into how feedback in educational, workplace, or social settings can unintentionally escalate emotional responses. Additionally, we predict that individuals with higher traits of neuroticism will report more intense anger in response to negative feedback than those with lower neuroticism, suggesting personality contributes to emotional reaction.

The Effect of Ethical Priming on Perception of Lying Behavior

Author(s):
Emily Khan
Erin Tripp
Alexis Davis
Faculty Mentor: Angela Kild

Summary

We gave participants ethical scenarios where they could choose to lie or be truthful. Half received morally ambiguous scenarios designed to score higher on the Lying in Everyday Situations (LiES) scale, while the other half received scenarios where truth-telling would be more beneficial. We predict there to be a correlation between self-reported lying and conscientiousness, regardless of which experimental group the participant is in. Studying people's perceptions of their lying behaviors helps to understand human interaction. Understanding how individuals perceive and report their own lying behaviors can offer deeper insight into the dynamics of human interaction. These findings could have practical implications for improving communication in personal relationships, workplace settings, and therapeutic settings, where honesty and self-awareness is vital.

Social Work

Policy and first responders involvement with substance use

Author(s):
Arianna OConnor
Victoria McDuffee
Emily Antrim
Evan Perry
Faculty Mentor: Alison Mitchell

Summary

This project will take a look at policies in the State of New Hampshire regarding first responders and substance use disorders. Substance use and abuse are very prevalent and deadly issues, and some first responders aren't adequately trained to handle individuals under the influence who may not understand what is going on. We aim to find what policies are in place and what our recommendations for policies would be, in order to reduce imprisonment of those with substance use disorders while getting them rehabilitation and medical assistance instead.

Tabletop Presentations

Art (BFA)

Our Body, Our Canvas, Our Choice

Author(s):
Emily Barker
Sydney Budaj
Adriana Cepeda
smj1057@usnh.edu
Faculty Mentor: Jessie Chapman

Summary

This exhibit will be a week long art exhibit on reproductive rights, bodily autonomy, and healthcare access. At our table, we will be including a slideshow of works included in the exhibit. We will also include the brochures, and posters used for our event.

Art and Design

Weather It's Possible

Author(s):
Emma Soares
Jake Crowley
Mia Clarke
Ava Coriaty
Faculty Mentor: Elizabeth Ahl

Summary

See the results of experimentation with different public art pieces standing up to winter weather. Take a look at the materials used in them to see what worked out the best and the worst against the elements, and while you're there check out some opinions from art students here at Plymouth about the art pieces, as well as their thoughts on art and its possible effects on SAD, Seasonal Affective Disorder. Don't know much about SAD? Don't worry, with the research about it provided at this display, you'll learn not only the basics but also some lesser-known-facts.

Computer Science

Tenney Mountain Trail Map App

Author(s):
Ty Mittleider
Faculty Mentor:

Elman Bashar

Summary

This project was a joint project for my Systems Analysis and Mobile App Development courses. The goal was to go out into the world and solve a technological need for a business. I reached out to Tenney Mountain Resort and offered to build them an interactive trail map app that shows information relating to the status of the mountain. Such information includes whether trails are open or closed, weather information, etc. It is still a work in progress, but a prototype is available for demonstration.

Business Administration

Panther Provisions

Author(s):
Joe Zuber
Kayleigh Smith
Chris West
Faculty Mentor: Tinglan Yang

Summary

There are currently three initiatives set up for panther provisions provided by the Enactus club: 1: Combating Food Insecurity Through Campus and Community Partnerships In collaboration

with the Plymouth State University Food Pantry, this project aims to address food insecurity by collecting and distributing non-perishable food items to local pantries and community members in need. 2: Panther Guardian Kit Panther Guardian is an initiative focused on substance use awareness and harm reduction. The project provides access to critical resources such as Narcan, first aid supplies, and recovery information, serving both the Plymouth State campus and the wider community. 3: Professional Clothing Closet: Empowering Students for Career Success This initiative offers students access to high-quality professional attire for interviews, career fairs, and LinkedIn headshots. By collecting new and gently used clothing donations, we make it easy to present with confidence, ensuring that students can put their best foot forward in career-building opportunities.

Entrepreneurship

Panthers for Prevention x MPA

Author(s):
Jackelyn Cawthron
Hanna Laskey
Sebastian Purcell
Christopher Faherty
Faculty Mentor: Bonnie Bechard

Summary

Plymouth State University (PSU) students will collaborate with Mount Prospect Academy to create a peer mentorship and adventure-based prevention program that focuses on experiential learning, skill-building, and education. The program will combine Adventure Therapy, mentorship, and substance abuse education to equip youth with the tools they need to build resilience and make positive life choices.

Panther Packers

Author(s):
Cassie Irish

Ashley Gruber

Colby Cherwek

Max Olsson

Faculty Mentor: Bonnie Bechard

Summary

Our program is a way for college students, staff, and the campus as a whole to reduce waste during and around move out day each year. We will solve this problem by partnering with other organizations and the university in order to collect unwanted items and either donate them to a good cause or make them available for other students to purchase at a low cost. Unlike traditional donation drives or recycling efforts, we combine on-campus convenience, donation, and resale—creating a circular system that benefits both the environment and students. With a passionate team and strong partnerships, Panther Packers is ready to grow into a lasting campus tradition.

Youth In Motion

Author(s):
Jenna Aziz
Connor Gagnon
izacc mazzeo
Olivia Howard
Faculty Mentor: Bonnie Bechard

Summary

This is a community-based program that promotes physical, mental, and social growth and development in our local youth through fun, structured activities. Only 20%-28% of 6–17-year-olds meet the 60 minutes of recommended physical activity per day, and we are planning a program to help increase that number. We want to give our local youth an outlet for physical activity that will combine fitness, mentorship, and social skills to support overall development and build healthy habits. Physical activity facilitators will lead sessions that build confidence, promote teamwork, and build social skills in an inclusive space.

Environmental Science and Policy

Easton Natural Resource Inventory

Author(s):
Meaghan Fisher
Elijah Pinette
Leo Hallagan
Faculty Mentor: Amy Villamagna

Summary

In New Hampshire, municipalities use Natural Resource Inventories (NRIs) to inform decision-making processes. An NRI is a document that summarizes what resources exist in a given town.

Easton's NRI was last updated in 2012 and had minimal interactive components. The objective of this 2025 revision is to provide resources that will contribute to the sustainability of the town in collaboration with the Easton Conservation Commission. We used ArcGIS Pro and ArcGIS Online to develop an online NRI sourcing data from NH GRANIT, USGS, SSURGO, and existing NRIs. This updated Easton NRI offers an assessment of the town's ecological and physical attributes with enhancements in climate change and GIS visualization data. The addition of the climate change sections strengthens the NRI in this ever-changing environment. The report concludes with recommendations for climate-adaptive land management, community engagement, and long-term conservation planning to ensure Easton's natural heritage is protected in a changing environment.

Sandwich NH Natural Resource Inventory

Author(s):
Sam O'Hara
Bryan Truong
Dan Nelson
Gabriel Hollis
Faculty Mentor: Amy Villamagna

Summary

The Town of Sandwich NH is seeking assistance creating a Natural Resource Inventory so they can coordinate land conservation efforts and maintain a list of the natural resources at their disposal. Our NRI is intended for use by local government and nonprofits, to identify and prioritize the protection of the resources deemed most important to the Sandwich community. Modeled after Eaton's web-based Inventory, our NRI utilizes data from the 2011 Sandwich Master Plan, NH Granit GIS Clearinghouse, and the town Tax Maps. This data was then put into ArcGIS Online to create dynamic maps and a StoryMap website. There are four sections in the site, each containing multiple maps and text. The Sandwich Conservation Commission will update the NRI after our project concludes to align with their future conservation plans, and the website we create will replace an out-of-date 2011 pdf, bringing Sandwich's environmental planning into the digital age.

Squam Lakes Tributaries Water Quality Initiative

Author(s):
Maia Brown
Emily Banner
Matt Coleman
Charlie Blair
Faculty Mentor: Amy Villamagna

Summary

Monitoring tributary health is an effective but underutilized approach to assessing lake health. In partnership with The Squam Lake Association (SLA) and Hubbard Brook Experimental Forest, this project aims to integrate community participation in tributary monitoring to protect the lake from anthropogenic water quality degradation. We sampled six tributaries along the west side of Squam Lake to develop a protocol for monitoring physical and chemical parameters that may contribute to pollution. The water quality parameters of focus were pH, conductivity, water temperature, nitrogen, phosphorus, sulfates, and chlorine. Through a combination of field work, lab work, and literature review, we created a plan for volunteers to effectively sample the tributaries and what measures can be taken to improve data collection. The data collected will be used to inform the SLA of potential pollution through nutrient loading originating in the lake's tributaries to allow for conservation efforts to preserve lake health.

Thornton's Conservation Compass: An NRI for Forever

Author(s):
Claire Becker
Matthew Kelly
Faculty Mentor: Dr. Amy Villamagna

Summary

New Hampshire municipalities use Natural Resource Inventories (NRIs) to provide decision-makers with the essential data needed to develop regulations and conservation plans, ensuring an ecologically resilient future. Thornton, a town rich in natural resources and biodiversity, shares much of its land with the White Mountain National Forest (WMNF). Preserving this land is crucial to the well-being of the town's residents and wildlife. Our project, part of a multi-year effort, aims to equip Thornton's residents and select board members with comprehensive data and actionable regulatory recommendations to guide local legislation, such as zoning ordinances. Over the past semester, we developed an ArcGIS StoryMap featuring nine key sections: Topography and Elevation, Surface Geology, Agricultural Resources, Wetland Resources, Wildlife Habitat, Areas of Ecological Significance, Conserved Lands, and Scenic Quality. These interactive maps and narratives present visually appealing and user-friendly data, providing a vital tool for sustainable decision-making and conservation planning.

Wildlife Trail Camera Education and Community Outreach

Author(s):
Sarah O'Neill
Chris Roy
Alanna Hoag
Jess Proulx
Faculty Mentor: Amy Villamagna

Summary

Trail cameras provide an accessible, low-impact way to observe wildlife and connect people with local ecosystems. Our project aims to make trail camera use more accessible to the public, regardless of age, background, or experience. We partnered with the Newfound Lakes Region Association and the Bristol Public Library to develop educational resources to support community engagement with wildlife and local ecosystems. Our team created a user-friendly trail camera manual and an instructional YouTube video to accompany kits available at the library. Additionally, we updated deer and bear ecology pamphlets for NH Fish and Game and explored ways to incorporate wildlife imagery into classroom education. Field testing helped us refine the user guide, while research into wildlife behavior and environmental education informed our outreach efforts. By improving access to trail camera technology and wildlife knowledge, our project fosters environmental awareness, inspires stewardship, and strengthens the connection between communities and their local ecosystems.

INCP - Integrated Capstone

Accessibility for Playgrounds

Author(s):
Skylar Heine
Alexis Akins
Erin McEvoy
Laylah Tsay
Faculty Mentor: Dr. Elisabeth Johnston

Summary

We are working on the concept of making playgrounds more accessible. Accessibility in terms of making sure every population can access it. Specifically for children with disabilities. Our project focuses on Fox Park and what it would look like it was made accessible for everyone.

Action Project Proposal

Author(s):
Chloe Saulnier
Bryce Harmon
Evan Gilsdorf
Scooter Summa
Faculty Mentor: Hannah Mallon

Summary

Our project is to teach young adults ages 20-27 the importance of financial stability during and after college. The game we have designed is based off of the board game "LIFE", where there will be a starting point of where you start in terms of how much money you have and also how much debt you are in. This will determine the starting point of the game and will be the start of your adventure, choosing what to spend money on.

Action Project Proposal: Wags and Warmth Warriors

Author(s):
Mary Riley
Amina Osman
Joshua Kagan
Faculty Mentor: Hannah Mallon

Summary

In our project we want to bring awareness to the rising number of abused and abandoned animals. We also want to share how people can help any abused or abandonded animals. Lastly we want to highlight the important work that animal shelters do and how people can contribute to their work. There will be an interactive element to our presentation as well. We are donating to a local shelter and plan on having supplies available to for anyone to help complete a blanket that will then be donated.

Anti-Capitalist Zines

Author(s):
Thomas Fifield
Sam Rogers
Kay Bailey
Dylan Lee
Faculty Mentor: Jessie Chapman

Summary

Our ZINES aim to provide nuanced, helpful, and community based commentary on how to dis-engage from the capitalist consumer ecosystem we all undeniably live under. Our ZINES, titled with varying motifs such as “Under Consumer 101” and “Anti-Capitalist Zines” aim to engage a college audience on smarter food, clothing, and shopping options. These ZINES are available all over campus, primarily in D&M, Rounds, and the HUB; featuring fun recipes, local shop recommendations, community activities, product re-using tips, and fun crafts and flow charts! Each ZINE will have a QR code with access to a digital library of all our published ZINES, and we encourage readers to reprint or create their own ZINE! We want to meaningfully engage PSU’s campus uncensored and without restriction, providing insight on how capitalism has dug its iron claws into each of us, giving a helping hand to help YOU break from the status quo!

Closing the Skills Gap: The Power of Play in High School Education

Author(s):
Preston Bechard
Nick Sivieri
Dylan Leonard
Owen Walton
Faculty Mentor: Elisabeth Johnston

Summary

Our goal for this project is to spread the word and inform people (through our research and through the guidance of a local highschool teacher) that employers continue to report a critical skills gap in creativity, problem-solving, and adaptability among new employees. Our research explores how incorporating purposeful play into high school level education can help close this skills gap and better prepare students for today’s dynamic career landscape. We plan to use this presentation opportunity to show people by using research and examples we developed that play can be an effective and underutilized tool in high schools to develop those missing skills that employers are looking for.

Family-Work Life Balance: Highlighting local family events in the Plymouth area.

Author(s):
Alexia Bassett
Katie Moore
Serendipity Kiejza
Justine Brueggeman
Faculty Mentor: Katharine Harrington

Summary

Finding affordable, local family events in the Plymouth area can be challenging. Due to the busy lifestyles of the average working American, family time is compromised because of a lack of Paid Time Off (PTO). Our group aims to bring awareness to this issue by emphasizing the importance of balancing free time and family time through local events. To reach our goal, our group has attended a family event hosted by Communities for Alcohol and Drug-Free Youth. By highlighting the community events we have found in Plymouth, we are making the effort to promote using free time to connect with your family. We have also created a digital and physical calendar and bookmark for distribution by Pease Public Library, with a collection of upcoming family events. This allows for the promotion of family-based events and helps foster a community that prioritizes utilizing PTO for family time.

Four Days, Full Life

Author(s):
Coral Chamberlin
Brandon Shantz
Nevaeh Fay
Montana Currier
Faculty Mentor: Katharine Harrington

Summary

Imagine a campus where your week includes more time to move, breathe, and connect without sacrificing your education. This project proposes a shift to a 4-day class schedule for academic programs at Plymouth State University, freeing up one weekday to promote physical activity, wellness, and community engagement. The extra day would encourage students and faculty to take advantage of the University's many recreational and wellness resources, fostering a culture of health and balance on campus. Our team researched health benefits of being physically active, gathered campus feedback about workload and freetime for both students and faculty, and explored how this change could support academic success while enhancing overall well-being. We are meeting with the administrators at Plymouth State in hopes of making this idea a reality. The goal is to create a more flexible and engaging campus experience that prioritizes both learning and lifestyle.

Global Horizons: Unlocking the Advantages of Working Abroad

Author(s):
Ethan Bryce
Esmaylin Dumais
Daniel Whitney
Halle Hackenson
Faculty Mentor: Katharine Harrington

Summary

All developed countries except the U.S. have requirements for paid vacation time. Our capstone class explores global differences in paid time off (PTO) laws and workplace cultures. Our project includes both a pamphlet and an on-campus event to raise awareness about the benefits of working abroad. The pamphlet presents comparative international PTO policies, alumni interviews, negotiation tips, and student-friendly visuals. The interviews serve to ground our research in real-world experiences and to give fellow students authentic insights into international work-life balance. To share our findings, we plan to host an informational event on campus, where we'll distribute pamphlets, offer snacks and stickers, and engage in conversation. We are also partnering with Career Services, the Idea Center, and faculty to broaden distribution. Our goal is to inspire PSU students to consider global opportunities and advocate for better working conditions.

Heating Up

Author(s):
Olivia Hobson
Keegan O'Connor
Cameron Patton
Dale Stratton
Faculty Mentor: Hannah Mallon

Summary

An engaging board game that explores all aspects of firefighting. Experience real-life scenarios to learn about the job and its risks while building teamwork skills.

Master of Moderation

Author(s):
McKenzie Ball
Riley O'shaughnessy
Mario Silva

Caleb white
Faculty Mentor: Hannah Mallon

Summary

A game based on responsible drinking habits. There are positives and negatives in regards to night life, and we want to leave people with the impression that it's okay to drink, in moderation. You'll never know how events will affect your physical and mental health.

Mind Over Medicine: Prioritizing Mental Health in Healthcare

Author(s):
Madison Gardner
Katarina Hermanowski
Erin Maniscalco
Faculty Mentor: Katharine Harrington

Summary

In a field built on caring for others, the mental health of those providing the care is too often overlooked. Our project aims to address mental health and stress levels within the healthcare field by providing valuable resources and support for healthcare students at Plymouth State University who are entering these careers. We have conducted research on the mental health challenges and symptoms faced by individuals in the field. We have compiled this information and have created resources in the form of posters and pamphlets. To promote our findings, we will host an interactive and informative event to spread awareness and give healthcare students access to resources to use in their future careers.

Play at PSU

Author(s):
Kayleigh Smith
Eva Chase
Kevin Henry
Faculty Mentor: Elisabeth Johnston

Summary

Attendance and engagement are a big part of grades and success here at PSU, yet not every student sees the importance. For our project, we want to implement more play into college classrooms to make them more engaging for the students.

Play Therapy

Author(s):
Paige Mackenzie
Katie Segien
Taylor Reynolds
Jenna Pichette
Faculty Mentor: Elisabeth Johnston

Summary

Our project is about what play therapy is and how it is important. We will specifically focus on how children with adverse childhood experiences (ACE) can benefit from play therapy.

Tackling Fast Fashion Through Craftivism

Author(s):
Jacob Garside
Jennifer Livingstone
Lindsey Ladd
Sadie Covill
Faculty Mentor: Jessie Chapman

Summary

In recent years, the practice of fast fashion and overconsumption has undergone substantial growth. In trying to keep up with the demand for these quickly and cheaply made clothes, they are sourced from unethical suppliers that rely on sweatshops and child labor to mass produce clothing on such a grand scale. With how quickly trends come and go and the ease of online shopping, dropshipping from companies such as SHEIN and Temu has become extremely popular and has increased the amount of clothing discarded yearly. In order to reduce fast fashion practices on campus, our group held a workshop for the PSU community focused on the skills of mending and upcycling clothing that was damaged or unwanted in some way. By teaching students on campus these skills, we were able to fight against fast fashion and teach useful skills that can be used for years to come.

The Benefits of a Paid Time Off Mandate on the Mental Health of Employees

Author(s):
John Perkins
Kayla Dimick
Kira Spampinato
Sidney Hatch
Faculty Mentor: Katharine Harrington

Summary

Do you ever feel like you just can't catch a break or maybe that you're outright drowning in work? Mental health struggles are a growing problem in the United States, and many Americans feel their job negatively contributes to their mental health. Vacations and time off in general positively impact mental health, yet the United States has no federal mandate on paid time off (PTO), unlike nearly every other country on the planet.. We have gathered research showing that PTO not only benefits mental and physical health, but also increases worker productivity. We then compiled this research into a compelling presentation that we shared with state representatives in order to suggest that New Hampshire takes the first step in mandating 3 weeks of PTO for all companies with 15 or more employees.

The Power of Zines and Storytelling

Author(s):
Kelsie Shaunessy
Alisha Rai
Ariana Hopewell
Adam Blanton
Faculty Mentor: Dr. Elizabeth Ahl

Summary

Oftentimes, students who do not major in the arts do not get the chance to indulge in creative expression. Research in the journal Frontiers in Education has shown that providing students with the opportunity to create zines allows learners to seek and find connections among previous knowledge and experiences. For our project, we have decided to help people create their own zines, which are small handmade booklets designed to tell stories, share information, and oftentimes make political statements. We aim to encourage human connection and storytelling through creating and sharing unique physical art. By providing individuals with a creative outlet, we can not only help spark creativity and shine a light on how useful art can be, but we can also help people positively engage with each other by sharing their stories.

PSU Community Quilt

Author(s):
Olivia DallaMura
Ryan Moriarty
Calvin Colbath
Sophia Torello
Faculty Mentor: Elizabeth Ahl

Summary

The College Experience is the name of the quilt/banner to represent college life here at Plymouth State. As each contributor adds their own piece to the quilt it adds another individual college experience to our quilt. Some students are academically pushed while others pay for the experience and measure it through precious memories and friends they made along the way. Through collaboration with contributors the quilt can form a realistic and representative idea of college life. This can lead to a better understanding of students' feelings and outlook on their experiences here, which can help the school to provide the right resources for everyone. As students see the quilt fill up there are many different aspects of college life that every individual can connect with and feel a sense of belonging in a community.

Management

Ice Cream Project

Author(s):
lukas larue
Luke Bryan
Jacob DelNegro
Faculty Mentor: Bonnie Bechard

Summary

Campfire Cones is a project for the Organizational Behavior and Team Development class. It focuses on teamwork, decision-making, and social impact. The product a vanilla sundae with hot fudge and brownie brittle was chosen through survey and taste test data. Profits support Plymouth Parks and Rec summer camp scholarships for underfunded kids, promoting outdoor access and youth development.

Music

Music as a lens through time

Author(s):
Nick Vigent
Makenna Genest-Horne
Guinevere Gilchrist
Katherine Nugent
Faculty Mentor: Elizabeth Ahl

Summary

In the project Music as a Lens Through Time, we will examine the connections between major historical events and top songs over the past 80 years, from 1945-2025. Our goal is to provide an interesting view of history. The combination of music and history invites people to see new perspectives including how society feels during hard times, what they use to distract or cope and how popular music eras begin. We will create and showcase an interactive timeline to give users an experience to remember, one that bridges the gap between two disciplines, music and history. By clicking on a time period, the user can find top songs and a brief history of the period with the option to learn more about a slew of different events and genres.

Physics

Effects of Blood Flow Restriction on Quadricep Muscle Activation, Force and Oxygenation

Author(s):
Courtney Cranshaw
Jade Guertin
Jacob Santos
Erin Cammarota
Faculty Mentor: Professor Moser

Summary

This experiment aimed to examine the effects of blood flow restriction (BFR) on the quadricep's muscle force, activity, and oxygenation. The hypothesis was that restricting blood flow would reduce oxygen delivery to the quadriceps, which would in turn lower muscle force output and activity. To test this, participants completed a BFR training protocol (30-15-15-15 reps with 30 seconds of rest between sets) without occlusion and with BFR cuffs applied at 80% occlusion pressure. Measurements were taken before the protocol, midway through, and after

completion. Muscle force was recorded using a digital dynamometer, muscle oxygenation was measured using a MOXY sensor placed on the rectus femoris, and muscle activity was assessed with EMG electrodes placed on the vastus lateralis. Two participants performed the protocol on both legs, under both conditions. The collected data was analyzed to evaluate how BFR impacts quadriceps performance and physiology.

Muscle Imbalances of the Lower Extremities in an Individual with Past Knee Injuries

Author(s):
Lauren Paige
Brooke Beaudet
Lane Davide
Colby Corson
Faculty Mentor: Brad Moser

Summary

Two subjects completed 3 reps of bodyweight squats, weighted goblet squats, and lateral lunges. One has a history of knee injury and surgery, while the other has no history of knee problems. Using EMG, force plates, and video analysis, both muscle and weight imbalances were measured to see if there was a notable difference in individuals with knee injuries.

The Effect of Altitude Pressure on Muscle Fatigue and Balance

Author(s):
Mackenzie Roys
Quinn Jones
Jennifer Colburn
Faculty Mentor: Brad Moser

Summary

Our group wanted to explore how a change in altitude will affect muscle fatigue and balance of a person. We used an altitude mask, which could be set to specific altitudes, and had a participant stand on a force plate with EMG electrodes. Each participant would complete ten squats for each set, there was a total of five sets, one of the sets being a control set without the mask, then a set with the mask at the altitude of Plymouth State University, 530 feet, then another set at 2900ft, 6070ft, and at 11220ft. Force plates were used to measure the change in balance, and the EMG electrodes were used to measure muscle contraction output, which can be useful in determining how the muscle is fatiguing over the experiment.

Theatre Arts

Designing Costumes for "Eurydice"

Author(s):
Lucas Johanson
Faculty Mentor: Daneé Gosselin

Summary

"Eurydice" is a retelling of the Greek myth of Orpheus and Eurydice. This version focuses on Eurydice and her time in the afterlife, reuniting with her father and trying to regain the memories of her life with her husband. As music is central to this play, it also became central to my design process, to help flesh out the characters in my mind, I asked the actors to tell me what styles of music they thought their character would listen to, as well as listening to the music within the production itself. This presentation will be a detailed look into the costumes and design process of Plymouth State Universities 2024 production of "Eurydice"

Lighting Design for PSU's "Twelfth Night"

Author(s):
Samuel Rogers
Faculty Mentor: Matthew Kizer

Summary

My presentation is about the work I did as the Lighting Designer for PSU's production of "Twelfth Night" by William Shakespeare. Included will be a laptop with a program which lets visitors view the lighting cues for Twelfth Night in a virtual 3D recreation of the Silver Center's Cheney Studio Theatre. Also present will be various pictures in booklet or poster board form from the production and other productions I've lighting designed for at PSU.

Lighting The Secret in the Wings

Author(s):
Sadie Covill
Faculty Mentor: Matt Kizer

Summary

My presentation will showcase the creative work I did as lighting designer for PSU's theatre production of The Secret in the Wings in the Elizabeth Cheney Studio Theatre. I plan to include a physical copy of the light plot that I drafted as well as a laptop presentation with professional production photos and additional paperwork that was done for the production.

Scenic Alchemy: Turning Limitations Into Design

Author(s):
Dillon Lorden
Faculty Mentor: Matt Kizer

Summary

For PSU's Twelfth Night, I was the scenic designer tasked with developing a concept in close collaboration with the director. We aimed to present a contemporary take on the play that explored themes of gender identity and expression through space. The original design supported arena staging, using asymmetry and intimacy to reflect the characters' fluid identities. After discovering multiple obstacles, the production shifted to a thrust configuration—requiring a full redesign in just three days. I quickly reassessed spatial needs, adjusted sightlines, and adapted the environment to maintain our conceptual integrity while accommodating the new staging. Despite the challenges, the final design remained cohesive, intentional, and grounded in our original goals. This experience reminded me that even the most well-planned designs can unravel—but staying flexible, focused on story, and responsive to change makes it possible to build something meaningful from the unexpected.

Activity/Performances

Outside HUB – Lawn

Early Childhood Education

Pop-up Play Event: Art & Block Play

Author(s):
Eva Wood
Matty Whiting
Morgan Drinkwater
Faith Milne
Faculty Mentor: Elisabeth Johnston

Summary

Engaging students and faculty in art and block play experiences. This includes watercolor, coloring pages, unit blocks and magnatiles. The goal is to educate people about the physical, cognitive and social emotional benefits of this type of play for kids.

Art (BFA)

The Creative Mind Unveiled

Author(s):
Lauren Ploss
Jamie Fortier
Dylan Haley
caitlyn.falvey@plymouth.edu
Faculty Mentor: Liz Ahl

Summary

Our project is taking a deep dive into how music specifically classical music affects the mind. We are going to see this by having participants draw/paint on one canvas without listening to music and the other canvas while listening to music.

Art History Teaching Gallery – A&M 310

Art History

Art History Alive

Author(s):
Sarah Parrish
Emily Anthony
Rose Boles
Rachel Carrasquillo
Faculty Mentor: Sarah Parrish

Summary

In the art exhibition Art History Alive, students in Foundations of Art History: 1400-1940 created tableaux vivants of historical artworks from the period covered by our course. French for "living pictures," tableaux vivants peaked in popularity between 1830 and 1920. The genre has performed a variety of functions, from an amusing parlor game to a political protest. Creating our own posed reinterpretations of historical artworks allowed us to enhance the original meaning of our chosen pieces, or to update them to reflect contemporary concerns. Looking closely at an image in order to recreate it also drew our attention to details that we may not have noticed otherwise, teaching us lessons about style, composition, and meaning we can incorporate in our own work. In turn, we hope to educate others about art and culture from 1400-1940 by displaying our work in the formal art exhibition Art History Alive.

Art History in 3D

Author(s):
Sarah Parrish
Bronwyn Axford
Gabby Bagley
Emily Barker
Faculty Mentor: Sarah Parrish

Summary

The study of art history has long been limited to two-dimensional printed reproductions or 2D projections. How can using cutting-edge 3D printing technology change our understanding of the past – and our present? For the art exhibition Art History in 3D, students visited the Plymouth State University Makerspace to 3D print artworks from before 1400. Each student also wrote an extended caption that provides background on the piece and explains how 3D printing can alter our understanding of it. Can 3D prints solve pressing issues of repatriation or accessibility? The works and captions are displayed in a formal art exhibition for others to experience. Afterward, they will become part of a permanent teaching collection for use in future art history classes, extending their impact for years to come.