Gordon State College

Undergraduate Research Symposium

PROGRAM AND ABSTRACTS

Wednesday April 23rd, 2025

PROGRAM OUTLINE

Podium Presentations: 9:00am-11 pm

IC 111

Poster Presentations: 11:00am-12:15 pm

IC 4th floor lobby

Awards Ceremony: 12:30 pm

IC 4th floor lobby

PODIUM PRESENTATIONS: 9:00AM – 11:00AM (IC 111)

9:00 - 9:20
Taylor Preston - ***Finding Equilibrium Constant Values for the Ethanol-Acetic Acid Reaction***

9:20 – 9:40
Holton Bell and Tanner Browning - ***Climate Change vs. Birds in the Southern United States***

9:40-10:00
Alexys Gibson, and Cole Mclaughlin, - ***Evolutionary Comparison of Cyclin D1 in Humans and Three Primate Species***

10: 00 – 10:20
Lani Stanton - ***Meta Analysis on MAT: Methods of Practice and Barriers to Access***

10:20 – 10:40
Qasim Ahmed - ***Measuring the Brightness and Color Change of RZ-Aries***

POSTER PRESENTATIONS: 11:00 pm – 12:15 pm (IC 4th floor lobby)
Awards Ceremony: 12:30 pm (IC 4th floor lobby)

ACKNOWLEDGMENTS

The Undergraduate Research Symposium Committee would like to thank, President Green, Dean Vilchiz, the judges, and the faculty mentors of our presenters.

The Undergraduate Research Symposium Committee consists of:
Dr. Cori Newton (Chair)
Dr. Alan Burstein
Dr. David Janssen
Dr. Joseph Jones
Dr. John George
Dr. Stephen Powers
Mrs. Melanie Mertz

PODIUM PRESENTATION ABSTRACTS

Finding Equilibrium Constant Values for the Ethanol-Acetic Acid Reaction

Taylor Preston

Faculty mentor: Dr. Richard Schmude Jr.

The purpose of this research project was to find equilibrium constant values for the Ethanol-Acetic Acid reaction. The chemical equation for the Ethanol-Acetic Acid reaction is as follows, $HC_2H_3O_{2\,(aq)}$ + $CH_3CH_2OH_{\,(aq)}$ = $Ester_{(aq)}$ + $H_2O_{(l).}$ In the Fall 2024 semester, when making our reaction mixtures, we made one with no catalyst, one with 10% HCl, one with 2 drops of 6M H_2SO_4 and one with 4 drops of 6M H_2SO_4. Throughout the course of our research, we found that 2 drops of 6M H_2SO_4 was the adequate catalyst. So, in the Spring 2025 semester, we made more reaction mixtures. However, this time we made reaction mixtures using 2 drops of 6M H_2SO_4 only and obtained more equilibrium constant values for this reaction. Moreover, at an average lab temperature of 20 degrees Celsius, my average computed equilibrium constant value was 0.6356.

Climate Change vs. Birds in the Southern United States

Holton Bell and Tanner Browning

Faculty mentor: Dr. Cori Newton

Climate change can be described as a fluctuation in global or regional climate. This change can especially affect birds in temperate regions like equatorial birds and winter birds because of their sensitive temperature threshold, seasonal/temperature dependent migration patterns, and slowly deteriorating habitat viability. Previous research has validated climate change effects however they lack the ability to tie multiple studies together across a variety of bird species. The goal of this research is to provide an overview of the impacts of climate change on several populations of birds located within the Southern United States. To accomplish this goal, a review of numerous research studies was conducted to comparatively analysis and identify trends based on the climatic effects on birds in, or passing through, the Southern United States. Six overall negative trends among the bird populations were identified. The climate change related tends included, differing migration patterns, decreased temperature tolerance, water elevation effecting aquatic species and nesting sites, invasive species migration, weather changes affecting nesting viability and offspring fitness and reproductive time shifts. This study has various applications. Birds are sensitive indicators of environmental health. Therefore, understanding the changes going on within bird populations can help predict future effects on other ecosystems. In addition, this study highlights the urgency to implement strategies to revert and change the course of these climate change effects on these bird species before it is too late.

Evolutionary Comparison of Cyclin D1 in Humans and Three Primate Species

Alexys Gibson and Cole Mclaughlin

Faculty mentor: Dr. Cori Newton

Cyclin D1 plays a crucial role in regulating cell cycle progression by facilitating the G1-to-S phase transition. This study investigates the genetic similarities of the Cyclin D1 gene across humans (Homo sapiens) and three primate species: the drill monkey (Mandrillus leucophaeus), Bornean orangutan (Pongo pygmaeus), and golden snub-nosed monkey (Rhinopithecus roxellana). Gene sequences were sourced from the National Center for Biotechnology Information (NCBI) database, aligned using MAFFT, and analyzed to construct a phylogenetic tree with Phylo.io. Results indicate that the Cyclin D1 sequence of the Bornean orangutan shares the highest similarity with the human sequence (96.99%), while the golden snub-nosed monkey exhibits the lowest similarity (94.97%). The phylogenetic analysis underscores the evolutionary conservation of Cyclin D1 among primates and highlights its potential significance in cell cycle regulation and cancer research

Meta Analysis on MAT: Methods of Practice and Barriers to Access

Lani Stanton

Faculty mentor: Dr. Jane-Marie McKinney

Medication Assisted Treatment (MAT) is a harm reduction approach to address the ongoing Opioid Use Disorder (OUD) epidemic. The OUD epidemic has claimed over 800,000 lives in the United States since the 1980s. This analysis examines the development and implementation of MAT, by explaining its origins in social justice movements and its evolution into the evidence-based practice it is today. This research analyzes twelve treatment models used nationally and the primary medications used; Methadone, Buprenorphine, and Naltrexone. By integrating opinions of medical professionals and people in recovery, this analysis examines the barriers to MAT access, including insurance limitations, geographic hindrances, and systemic funding challenges. This analysis argues for expanded education (community and medical professionals), policy reform, and increased funding to overcome existing barriers, installing MAT as a crucial strategy in addressing the ongoing opioid epidemic.

Measuring the Brightness and Color Change of RZ-Aries

Qasim Ahmed

Faculty mentor: Dr. Richard Schmude Jr.

From December 17th, 2024, to March 13th, 2025, we measured the magnitude of RZ-Aries (a variable star) through different filters. Magnitude is the measurement of a star's brightness. Most stars have nearly fixed magnitudes, but variable stars have a changing magnitude. Variable stars can change in brightness for many reasons, but by taking magnitude measurements through different filters, we can try to understand some causes of the brightness variability. To get data, we used an 8 cm refractor telescope with an SSP-5 or SSP-3 photometer attached. We collected brightness data through a V (green) filter and then an R (red) filter on the same nights. We used the known brightness of comparison stars Rho-Aries and Delta-Aries to ensure consistent data. The average brightness values measured through the V filter was 5.897 magnitudes. We also measured periods ranging from 38 to 60 days, which are consistent with previous data. To determine the color, we can use the R filter magnitude and subtract it from the V filter magnitude (V-R index). The average V-R value was 2.579 magnitudes. Plotting out the V and R values, we see a positive linear correlation with an R-squared value of 0.926. This means that as the star gets dimmer, it becomes red (cooler) in color, and as it gets brighter, it becomes blue (hotter) in color. Temperature change is a possible reason for the star's brightness variability, and continuing to take measurements will help us understand why this star changes in brightness.

POSTER PRESENTATION ABSTRACTS

Why Are Nurses Leaving the Healthcare Field After One Year?

Evelyn Sofolo

Faculty mentor: Kelly Wilson MSN-Ed

The high turnover rate among newly graduated nurses is contributing to critical staffing shortages in healthcare facilities in the United States. This study investigates the reasons behind this early departure from the nursing profession. Through a literature review and survey responses from newly licensed nurses, key themes emerged, including job stress, burnout, and unsafe nurse-to-patient ratios. Additionally, many nurses reported experiencing imposter syndrome and feeling unsupported by their employers, exacerbating their struggles in the transition from academia to clinical practice. The findings highlight a disconnect between workplace expectations and the realities of the profession, with many new nurses feeling overwhelmed and inadequately supported by management. While some nurses persevere and adapt, many leave within the first year, signaling a need for better support systems, mentorship programs, and workplace policy changes. Addressing these issues proactively may help improve nurse retention, ensuring a more stable and sustainable healthcare workforce.

Calf vs Adult Manatee Skeletal Muscle Myoglobin Levels

Holton Bell, Naneshka Rodriguez, and Kaleb Lopez- Cruz

Faculty mentor: Dr. Cori Newton

Myoglobin can be characterized as a type of protein located within striated muscles of vertebrates. This protein encodes for a single polypeptide chain that is capable of binding with oxygen. Myoglobin is utilized within marine animals such as the Florida Manatee for storing and supplying oxygen to muscles for ATP production during prolonged dives. Due to limited studies on Florida Manatees and their myoglobin levels this research aims to fill that gap. The goal of this research is to quantize the myoglobin concentration in muscle tissue samples from Florida Manatees and to explore potential correlations between these concentrations and factors such as age. To accomplish this goal, epaxial muscle samples were collected and further tested. Florida manatee calf swim muscle myoglobin levels are only 15% of adult tissue levels (0.72 mg/g vs 4.75 mg/g, respectively) indicating that the animals are immature at birth and that concentrations rise as the animal matures. Furthermore, Florida Manatee adult myoglobin levels (4.75 mg/g) are much lower than juvenile bottlenose dolphin (26.8 mg/g) and many other adult marine animals. Lower muscle myoglobin levels in adult manatees may be lower than other marine animals due to a less active lifestyle as an herbivore. Manatees may, however, utilize other ATP-producing pathways for diving and these pathways should be explored.

Unlocking Secrets of Metabolism Through Ratios of Energy Carriers

Lyndsey Rigdon and Aastha Jaiswal

Faculty mentor: Dr. Cathy Lee

This study explores the ratios of key energy carriers - ATP/ADP, NADH/NAD+, and the mitochondrial proton gradient — in metabolic regulation and energy homeostasis. Through an innovative learning module, introductory biochemistry students at Gordon State College learned how these ratios influence the direction of biochemical pathways of glycolysis, the tricarboxylic acid cycle, the electron transport chain, and oxidative phosphorylation. Students examined how the balance of these ratios affect the relationship between energy intake and expenditure by using fun analogies and real-world scenarios in a poster presentation. Additionally, students observed weight control and the effects of diabetes treatments like Ozempic. Post surveys show improved retention and clarity of metabolism in energy dynamics.

Cost-effective isolation and characterization of bacterial species and temperature-dependent pigment production

Vining Mitcham

Faculty mentor: Dr. Theresa Stanley

This research is being conducted to determine the effects of temperature on pigment production of bacteria isolated from common foods at 15°C. Pigment production and general growth characteristics were compared for bacterial cultures grown in 15°C to cultures grown in 37°C. The cultures were grown on nutrient agar. Cultures were originally obtained from the CURE performed in Dr. Stanley's BIOL 3340 – Microbiology in Fall 2024, taken from swabs of various foods including milk, eggs, turkey, and fish. Each culture produced a pigment as follows: A) white, B) yellow-1, C) yellow-2, D) yellow-orange, E) peach, and F) orange. Cultures were further characterized by Gram and biochemical reactions.

The State of Modern Assault Drones and the Countermeasures Against Them

William Shiflett

Faculty mentor: Kelly Carter

The recent rapid emergence and innovations of modern drones has completely changed the approach to the modern battlefield. Since the terrorist attacks against the United States on September 11th, 2001, the use of armed drones in combat areas has increased dramatically to alleviate and control the global threats through remote controlled aircraft use. These aircraft can perform surveillance and various attacks such as cyber-attacks, or by carrying payloads of high-grade explosives. Recently, the use of AI has rapidly improved attack efficiency by enabling drones to be autonomous in their missions. Since 2001, major superpower countries have been rapidly researching, improving, and producing increasingly effective drones. The goal of this research is to survey the history and uses of drones used in modern combat scenarios and the effective countermeasures that have been put in place against them.

Myoglobin Level Comparisons in Florida Manatees and juvenile Bottlenose Dolphins

Renay Brown and Yareliz Rodriquez

Faculty mentor: Dr. Cori Newton

Marine mammals tend to possess higher levels of myoglobin in their locomotor muscles compared to those of land mammals. Myoglobin is a protein that helps store oxygen in the muscles for ATP production while marine mammals are diving and holding their breath. However, there is not much information on myoglobin levels in the swim muscles of Florida manatees. This study aimed to fill that gap by looking at the myoglobin content in manatees of different age groups. The results showed that juvenile manatees have much lower myoglobin levels (0.72 mg/g) compared to adults (4.74 mg/g), suggesting that manatees are born with less oxygen storage ability in their muscles, which likely improves as they grow. Interestingly, adult manatees also have lower myoglobin levels than more active swimmers like juvenile bottlenose dolphins, which may reflect their slower, herbivorous lifestyle. This difference in myoglobin levels emphasizes how much development occurs as manatees mature. Given that manatees move more slowly, their lower myoglobin levels may simply be a result of their less active way of life compared to more energetic species. However, it is also possible that manatees rely on other ways to produce energy, like anaerobic respiration, during swimming. Future research will focus on tracking how myoglobin levels change across different age groups of Florida manatees and explore other energy pathways they might use while swimming.