

**NORTH CENTRAL COLLEGE**

**HONORS  
DAY**

**THURSDAY, APRIL 18  
8:30 a.m. - 7 p.m.**

**2024!**



**NORTH CENTRAL  
COLLEGE 1861**

## THE RALL LEGACY



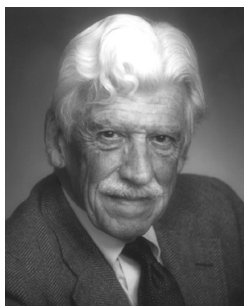
The Rall name has held a special place in North Central's history since 1917, when Dr. Edward Everett Rall (pictured left) was inaugurated as the College's fifth president.

During his three decades of service to the College, Rall steered North Central through two World Wars and the Great Depression, and doubled enrollment from 447 to 929. He also directed a major campus expansion that included Pfeiffer Hall, Kaufman Hall and Merner Field House. In 1930, the Rall House on South Brainard St. was purchased by Charles Rall, Edward's brother, for the Rall family. Since then, five College presidents have resided in the house with their families, and it is now home to academic programs.

The Rall legacy continued with Rall's sons, graduates of the College who both earned an M.D. and a Ph.D. Today's Symposium is named for Joseph '40 (see below). David '46 is considered the founder of modern environmental medicine. He identified ways to prevent leukemia from spreading to the brain and headed both the National Institute of Environmental Health Sciences and the National Toxicology Program.

President Rall died in 1975, but the College still honors his vision of the ideal education—one that “develops the power to think, produces the open mind, destroys prejudice, and inculcates a genuine love of truth and hatred of sham or intellectual hypocrisy.”

## DR. JOSEPH E. RALL '40 1920 - 2008



The annual Rall Symposium for Student Research was named in 1998 to honor Joseph Edward “Ed” Rall '40, M.D., Ph.D. (pictured left), an internationally renowned research scientist whose half-century career at the National Institutes of Health (NIH) included serving as director of all intramural research. Before joining the NIH, Rall was a fellow at the Mayo Foundation in Rochester, Minn., and taught at Cornell University Medical College and the Sloan-Kettering Institute.

A thyroid specialist, Rall helped devise therapies to prevent thyroid disease. He authored more than 160 scientific papers and books and earned numerous awards from the medical and scientific communities. He received honorary doctorates from North Central College, the Free University of Brussels and the University of Naples. The University of Minnesota Mayo Foundation honored him with an Outstanding Achievement Award, and North Central awarded him the Distinguished Alumnus Award in 1966.

Rall took a leadership role in the College's 1995 Kresge Science Challenge that brought \$2 million in new support to his alma mater's science program. He also inspired the creation of the Rall Symposium. For many years, Rall invited esteemed scientists to speak at the Symposium and collaborated with students on their research projects.

## 2024 RALL SYMPOSIUM FOR STUDENT RESEARCH

An institution of the liberal arts and sciences, North Central College provides an impressive array of opportunities for students to design and conduct independent scholarly research projects in the sciences, social sciences, humanities, business, preprofessional disciplines, and fine arts. Undergraduate and graduate students can examine their own disciplines and make interdisciplinary connections as they plan, collect and evaluate data, document results and present their findings.

Students can collaborate with faculty in their ongoing research, or students can design and implement their own independent projects under faculty supervision. A number of these projects are carried out as part of the College Scholars Honors Program, and many have been funded by the Richter Grant program. North Central students regularly present the results of their scholarly and artistic work at local, regional and national professional meetings.

North Central College celebrates the 26th year of the Rall Symposium for Student Research in 2024. The Symposium is named for Joseph Edward “Ed” Rall '40, M.D., Ph.D. Rall was involved in the Symposium from its inception until his death in 2008 and played a critical role in attracting Nobel Laureates and other distinguished scholars to speak to attendees. Students who were part of Beta Beta Beta, the American Chemical Society and Pre-Health Organization initiated the first Rall Symposium in 1998. They were supported by President Emeritus and Life Trustee Harold R. Wilde, Ph.D., and Professor of Mathematics and Dean of Faculty Emeritus R. Devadoss Pandian, Ph.D.

# HONORS DAY 2024

- 8:30 a.m. to noon** . . . . . **26th Annual Rall Symposium for Student Research**
- 8:30 to 9:20 a.m.** . . . . . **Poster Presentations Session 1**  
*Judy G. Stevenson Hall, Wentz Science Center, 131 S. Loomis Street*
- 9:35 to 10:55 a.m.** . . . . . **Oral Presentations**  
*Various classrooms, Wentz Science Center*
- 11:10 a.m. to noon** . . . . . **Poster Presentations Session 2**  
*Judy G. Stevenson Hall, Wentz Science Center*
- Noon** . . . . . **Luncheon**  
*Kaufman Dining Hall, 221 S. Brainard Street*
- 1:30 p.m.** . . . . . **48th Annual Honors Convocation**  
*Wentz Concert Hall, 171 E. Chicago Avenue*
- 3:30 p.m.** . . . . . **Reception**  
*Wentz Concert Hall Lobby, Fine Arts Center*
- 4:30 to 7 p.m.** . . . . . **Honor Society Events**  
*Locations listed below*

## HONOR SOCIETY EVENTS

### 4:30 p.m.

- GAMMA IOTA SIGMA**  
 Actuarial Science  
*Room 101, Wentz Science Center*
- ALPHA ETA**  
 Allied Health Professions  
*Multipurpose Room, New Hall*
- LAMBDA ALPHA**  
 Anthropology  
*A.A. Smith House*
- BETA BETA BETA**  
 Biology  
*Room 254, Wentz Science Center*
- LAMBDA PI ETA**  
 Communication and Media  
*Smith Hall, Old Main*

- OMICRON DELTA EPSILON**  
 Economics  
*Room 200, School of Business & Entrepreneurship*
- KAPPA DELTA PI**  
 Education  
*Judy G. Stevenson Hall, Wentz Science Center*
- SIGMA TAU DELTA**  
 English  
*Koten Chapel, Kiekhofler Hall*
- SIGMA NU TAU**  
 Entrepreneurship  
*Room 200, School of Business & Entrepreneurship*
- FINANCIAL MANAGEMENT ASSOCIATION**  
 Finance  
*Room 200, School of Business & Entrepreneurship*

- PHI ALPHA THETA**  
 History  
*Student Lounge, 2nd floor, Harold & Eva White Activities Center*
- SIGMA BETA DELTA**  
 Management  
*Room 200, School of Business & Entrepreneurship*
- MU KAPPA TAU**  
 Marketing  
*Room 200, School of Business & Entrepreneurship*
- PI MU EPSILON**  
 Mathematics  
*Room 101, Wentz Science Center*
- NU RHO PSI**  
 Neuroscience  
*Judy G. Stevenson Hall, Wentz Science Center*

- PSI CHI**  
 Psychology  
*Judy G. Stevenson Hall, Wentz Science Center*
- ALPHA KAPPA DELTA**  
 Sociology  
*A.A. Smith House*
- SIGMA DELTA PI**  
 Spanish  
*Campus Store*

### 5:30 p.m.

- CHI ALPHA SIGMA**  
 Athletics  
*Third Floor, Residence Hall/ Recreation Center*
- TAU SIGMA**  
 Transfer Students  
*Smith Hall, Old Main*

### 6 p.m.

- BLUE KEY**  
 Leadership  
*Judy G. Stevenson Hall, Wentz Science Center*

### 6:30 p.m.

- ALPHA ALPHA ALPHA**  
 First Generation  
*Wentz Concert Hall, Fine Arts Center*

### April 24

- DELTA PHI ALPHA**  
 German

### April 25 at 12 p.m.

- JAPANESE NATIONAL HONOR SOCIETY**  
 Japanese  
*Room 244, Language Resource Center, Oesterle Library & Learning Commons*

# POSTER PRESENTATIONS: SESSION I 8:30 - 9:20 a.m.

Judy G. Stevenson Hall, second floor, Dr. Myron Wentz Science Center

**Magnetic Innovations: Designing a Magnetometer Circuit Board**  
Emmanuel Agyekum '26, Electrical Engineering  
Advisor: Paul Bloom

**Face Estimation and Arousal: The Effects of Personality and Caffeine on the Number of Faces Estimated**  
\*Alexia Bustamante '24, Psychology  
\*Daphne Kolody '25, Psychology  
Advisor: Mary Jean Lynch

**The Impact the BSA had on Black Culture and the Reaction from White Students at North Central College During the 1960s and 1970s**  
Jessie Anaya '25, Secondary Education and Social Science/History  
Advisor: Ann Keating

**Social Emotional Learning Within Children's Museums**  
\*Julia Andersen '24, Psychology  
\*Samia Islam Saba '25, Behavioral Neuroscience and Psychology  
Advisor: Nicole Rivera

**Common Mycorrhizal Networks Mediate Intraspecific Competition**  
\*Nicole Baker '24, Biology  
Ian Rosales '25, Biological Science  
Advisor: Joanna Weremijewicz

**Y-Doped NaSICON Fabrication Through Mechanical and Thermal Activation**  
\*Madeline Barickman '25, Mechanical Engineering  
\*Abigail Barickman '25, Mechanical Engineering  
Advisor: Shan-Ju Chiang

**Fabrication of Ce-Doped NaSICON Through Integrated Mechanical and Thermal Activation Methods**  
\*Abigail Barickman '25, Mechanical Engineering  
\*Madeline Barickman '25, Mechanical Engineering  
Advisor: Shan-Ju Chiang

**I Won't Dance, Why Should I? Using Self-Determination Theory to Explore Persistence and Dropout Among Competitive Dancers**  
Natalie Barnes '24, Psychology  
Advisor: Leila Azarbad

**Lasting Legacies of Lies: The Deconstruction of the 'Good Italian' Myth in Fascist Italy Pre-WWII and During**  
Jules Billings '24, English Writing  
Advisor: Shereen Ilahi

**Navigating the Leadership Landscape: Understanding the Impact of Communication Styles, Gender Dynamics, and Mentorship on Women in Leadership**  
Paulina Bogdan '23, Organizational Communication and Marketing  
Advisor: Amy Buxbaum

**Effects of Diet Quantity on Nuptial Gift Giving by Male *Gryllodes sigillatus***  
\*Kyla Border '25, Biology  
\*Zach Mottlow '25, Biology  
Advisor: Chandreyee Mitra

**Family Visits to a Children's Museum**  
\*Sarah Bukowski '25, Psychology  
\*Elysse Thompson '25, Psychology and Sociology  
\*Jehana Jusufi '24, Psychology  
Advisor: Nicole Rivera

**Primary Healthcare Services in Developing and Developed Nations: A Comparative Study of Tanzania and the United States**  
Hannah Campbell '24, Health Science  
Advisor: Kristin Paloncy-Patel

**A New View of the Black Panthers: Women and Infant Health**  
Julia Clarke '24, Psychology  
Advisor: Gregory Wolf

**Using FT-IR to Quantify Amount of Caffeine in Coffee Beans**  
Julie Concepcion '24, Chemistry  
Advisor: Jeffrey Jankowski

**The Effects of Arm Care on Injury Prevention: A Critically Appraised Topic**  
Jessica Cruz '25, Masters of Athletic Training  
Advisor: Scott Ellis

**Functionality of Human COX10 Gene Mutations and Their Connections to Leigh Syndrome Using *Saccharomyces cerevisiae***  
\*Rebecca DeSouza '26, Biology  
\*Nmesoma Onyejekwe '26, Biochemistry  
Advisor: Steve Johnston

**Dryland Resistance Training and Its Effect on Swimming Performance: A Critically Appraised Topic**  
Paige Doherty '25, Masters of Athletic Training  
Advisor: Scott Ellis

**Crystal Structures of Large-Volume Commercial Pharmaceuticals**  
Tawnee Ens '24, Biology  
Advisor: James Kaduk

**Muscles and Mental Health**  
\*Macy Fleury '26, Exercise Science  
Le'Char Morgan '25, Exercise Science  
Marissa Madl '25, Exercise Science  
Advisor: Rachel Luehrs

**Effect of Nutrition on Male Calling Behavior in the Tropical House Cricket *Gryllodes sigillatus***  
\*Nathaniel Fukutake '24, Biomedical Science  
\*Cleo Hawthorne '25, Biological Sciences  
Advisor: Chandreyee Mitra

**Jump Landing Interventions' Effects on ACL Injury Rate**  
Antonio Garcia '25, Masters of Athletic Training  
Advisors: Kendall Selsky and Taylor Arman

**Cold Water Immersion vs. Contrast Water Therapy**  
Jennifer Garcia '25, Masters of Athletic Training  
Advisor: Taylor Arman

\*Denotes presenters

**Sticky Situations***Moderator: Raleigh Blasdell**Location: WSC 013***Sounds Two Good: The Effects of Audio Quality in Online Interviews***\*Samantha L. Kaczmarek '25, Psychology, Criminology, and Sociology**\*Arran M. Hung '24, Psychology**\*Ella A. Pfeiffer '26, Psychology**Advisor: Karl Kelley***Expressing Leadership Style: How Sense of Coherence Affects Presentation in Job Interviews***\*Gia Yetter '24, Psychology**\*Isabella LaRocco '26, Psychology and Exercise Science**Advisor: Karl Kelley***A Look Into the Accessibility of Special Education for Students in Rural Schools***Grace Shelly '24, Elementary Education**Advisor: Nicole Rivera***The Impact of Campus Security Cameras on Crime Deterrence and Perception of Safety***Sarah Andrey '24, Sociology and Criminology**Advisor: Raleigh Blasdell***Learning in Leadership***Moderator: Melissa Proulx**Location: WSC 015***Social Media for Impactful Coaching***\*Paige Runkle '25, Sport Management**\*Hailey Poe '25, Sport Management and Ethical Leadership**Advisor: Carly Drake***Construct and Ecological Validity of Executive Function Assessments: TrailsX and Wisconsin Card Sorting Test***\*Faith Bicking '24, Psychology and Behavioral Neuroscience**\*Miranda Baker '26, Molecular Neuroscience**Advisor: Karl Kelley***The Lens of Attachment: How Managers Attachment Styles Bias Perceptions of Employees Transgressions***Tabitha Judd '24, Psychology**Advisor: Karl Kelley***Growing Through Life: Can Sense of Coherence Training Positively Affect College Student Leaders?***Erica Johnson '24, Human Resource Management**Advisor: Karl Kelley***Place and Proximity***Moderator: Brian Hoffert**Location: WSC 036***The Salem Witch Trials: Feminine Behavior and Bad Neighbors***Sarah Hein '24, Secondary Education/Social Science and History**Advisor: Ann Keating***ROAM: A New Identity of Hunting***Eric Rodriguez '24, Graphic Design**Advisor: Hale Ekinci***Amusing to All: Segregation, Discrimination, and Perseverance in Chicago's Amusement Parks, 1893-1950***Nathan Schwartzkopf '24, History and French & Francophone Studies**Advisor: Luke Franks***Japanese Pop for All: Language Localization's Contribution to Japan's Pop Culture Success***Tori Seggebruch '24, Japanese and East Asian Studies**Advisor: Brian Hoffert***Ecology and the Environment***Moderator: Chandreyee Mitra**Location: WSC 101***Plasma-Assisted Destruction of Polystyrene Nanoplastics***\*Maria Alvarado '24, Chemistry**Matthew Winburn, University of Nebraska-Lincoln (UNL)**Advisor: Chin Li Cheung (UNL)***Validating the Use of Filter Paper as a Non-Invasive Hormone Monitoring Technique in *L. tasmaniensis****\*Ian LaPat '24, Biology and Environmental Studies**Dr. Kerry Fanson, La Trobe University**Advisor: Gregory Ruthig***Multihost Pathogen Creates Ecological Links Between Its Hosts and Influences Host Population Dynamics***Maisha Marzan '25, Biology and Applied Mathematics**Advisors: Gregory Ruthig and Marco V. Martinez***Developing a Novel Method for Counting and Identifying Water Molds in Field Samples***Justyn Salas '24, Biology: Biomedical Science**Advisor: Gregory Ruthig***Handling Pressure***Moderator: Georgine Maisch**Location: WSC 104***Navigating Autism: Caregivers Experiences***Nicole Brandy '24, Psychology**Advisor: Nicole Rivera***The Intake of Omega-3 Fatty Acids and Depression in College Athletes***Julia Siston '24, Accounting**Advisor: Kim Milano***Mental Health and Student-Athletes:****How the Mental Health Education Level of the****Surrounding Support Affects the Student-Athlete***Tyler Donovan '24, Journalism & Media Communication**Advisor: Krystina Sarff***How Gender Roles and Patriarchal Systems Contribute to the Conversation of Domestic Violence in Hmong Communities***Madison Dillon '25, English and Secondary Education**Advisor: Lisa Long***Patriarchy and Politics***Moderator: Sean Kim Butorac**Location: WSC 254***The Othering and Ownership of Eve:****The Creation of Patriarchal Domination***Ashlyn Allemant '25, Sociology**Advisor: Jennifer Smith***The Doctrine of Pornography Addiction: Responding to Dysfunctional Sexual Ethics Within Conservative Christianity***Sophia Hiatt '24, Religious Studies**Advisor: Wioleta Polinska***When She Was Enough: America's Long Struggle Towards the First Female President***Tahbata Zuniga Diaz '24, Political Science and Writing**Advisor: Suzanne Chod***The Cost of Control: The Implications of Overturning Roe v. Wade***Tessa DeJonge '24, Biochemistry and Philosophy**Advisor: Shaheen Moosa**\*Denotes presenters*

## ORAL PRESENTATIONS 9:35 - 10:55 a.m.

Dr. Myron Wentz Science Center

### Data and the Future

Moderator: Stuart Patterson

Location: WSC 256

#### A Cooler World: Comparative Analysis of Climate Mitigation Strategies Within the Paris Agreement Framework

Reese McMullen '24, Global Studies and Spanish  
Advisor: William Muck

#### Forecasting Triple A Corporate Bond Yields

\*Michael Capobianco '24, Finance  
\*Mike Klazura '24, Accounting and Finance  
Advisor: Najrin Khanom

#### Life Expectancy vs. Net Income

\*Joshua Ganesh '24, Business Economics, Entrepreneurship  
Lexi Psarros '24, Business Economics  
Shoya Nagayama '25, International Student  
Bruno Burkhardt da Silveira '24, Business Economics  
Advisor: Najrin Khanom

#### Midwest Median Existing Single-Family Home Prices from January 2013 to December 2025

\*Nathan Stallionis '24, Finance  
\*Kelly Rosine '25, Finance and Accounting  
Conrad Parente '23, Finance  
Advisor: Najrin Khanom

### New Creations

Moderator: Laura Lodewyck

Location: WSC 354

#### Dead Shot: A Collection of Poetry

Elizabeth Morris '24, English Literature  
Advisor: Lisa Long

#### Horror as a Mirror

Chloe Kallberg '24, Writing  
Advisor: Sohinee Roy

#### Dev131 Robot

\*Diego Esquivel '24, Computer Science & Engineering  
\*Tyler Fortune '25, Computer Science  
\*Om Sharma '25, Computer Engineering  
\*Wissam Koraichi '26, Computer Science and Physics  
\*Cesar Real '26, Computer Engineering  
Advisor: Donghwoon Kwon

#### From Ancient Royalty to Modern Science:

#### Advancing Tyrian Purple Synthesis

Julie Concepcion '24, Chemistry  
Advisor: Nick Boaz

---

### Exploring Identities

Moderator: Sophie Hand

Location: WSC 356

#### NCC Exploring Identities Series:

#### A Journey of Intersectionality and Storytelling

\*Juan Espinoza '26, Special Education  
\*Andres Perez Delgadillo '26, Secondary Education: Social Studies  
\*Junrong Qian '24, Japanese and East Asian Studies  
\*Jovany Hernandez '24, Health Science  
\*Adeline Salgado '25, Psychology  
\*Diego Mateo '25, Masters of Education in Trauma Informed Care  
Advisor: Sophie Hand

## POSTER PRESENTATIONS: SESSION II 11:10 a.m. - 12 p.m.

Judy G. Stevenson Hall, second floor, Dr. Myron Wentz Science Center

#### Measuring Zoospore Shedding Rate of Water Molds on Different Host Species

\*Dallas Gillson '26, Biology: Biomedical Science  
\*Evelyn Kandler '26, Biochemistry  
Advisor: Gregory Ruthig

#### Vanished Without a Trace: The Evolution to the Disappearance of North Central College's Weekend College Program

Mia Giometti '26, History/Social Studies and Secondary Education  
Advisor: Ann Keating

#### Is There a Correlation Between Daytime Napping and Improved Athletic Performance Among Physically Active Individuals

Nina Guitron '25, Masters of Athletic Training  
Advisor: Taylor Arman

#### Refining an Approachable Synthesis of Ruddlesden-Popper Type Lead Halide Perovskite Colloidal Quantum Dots for Undergraduate Experimentation

Bel Holland '24, Chemistry  
Advisor: Orion Pearce

#### Blackbeard and Differential Opportunity Theory

\*Madeleine Hughes '25, Criminology  
\*Alyssa Marcelain '26, Criminology  
\*Erin O'Connor '26, Graphic Design  
Wafa Syed '24, Psychology  
Advisor: Raleigh Blasdell

#### The Birth of an Icon: Art, Film, and Sissi, The Empress of Austria

Marina Jòkanović '26, Musical Theatre and Art History  
Advisor: Gregory Wolf

#### Low-Dose Ketamine Does Not Impact Anxiety-Like Behaviors in Male and Female Sprague-Dawley Rats

\*Nicole Kwilosz '24, Behavioral Neuroscience and Psychology  
Kelsey Morrison '24, Molecular Neuroscience  
Stephanie Sherrod '24, Psychology and Molecular Neuroscience  
Lukasz Teper '25, Psychology and Behavioral Neuroscience  
Avinash Moses '25, Molecular Neuroscience  
Ari Watts '26, Molecular Neuroscience  
Natalie Falco '26, Molecular Neuroscience  
Advisor: Michael Stefanik

\*Denotes presenters

## POSTER PRESENTATIONS: SESSION II 11:10 a.m. - 12 p.m.

Judy G. Stevenson Hall, second floor, Dr. Myron Wentz Science Center

### The Nazi Venture to Revive Extinct Animals: Contemporary Implications

Anna Lakomiak '27, Undecided - School of Business  
Advisor: Gregory Wolf

### Investigating Transcriptional Changes in the Absence of PCM During Stationary Phase in Escherichia coli

Madison Lange '24, Biology: Biomedical Science  
Advisor: Jonathan Visick

### Phenotypic Effects of Various Mutations in the COX10 Gene

\*Abigail MacKenzie '25, Biological Sciences  
\*Kyle Mudler '25, Biochemistry  
Advisor: Steve Johnston

### The Effectiveness of a Student-Led Campus Event on Improving Students' Knowledge of the Benefits of Exercise on the Brain

Marissa Madl '26, Exercise Science  
Advisor: Rachel Luehrs

### Feeling of Belonging in Higher Education: Social Identity and Student Success Factors

Juan Martinez '23, Psychology  
Advisor: Liana Peter-Hagene

### Modernizing Calorimetry in Undergraduate Lab Curriculum

Alyssa Mead '26, Nuclear Medicine Technology  
Advisor: Orion Pearce

### Effects of Low-Dose Injections of Ketamine on Memory in Male Sprague Dawley Rats

\*Kelsey Morrison '24, Molecular Neuroscience  
Nikki Kwilosz '24, Psychology and Behavioral Neuroscience  
Avinash Moses '25, Molecular Neuroscience  
Stephanie Sherrod '24, Psychology and Molecular Neuroscience  
Lukasz Teper '25, Psychology and Behavioral Neuroscience  
Ari Watts '26, Molecular Neuroscience  
Natalie Falco '26, Molecular Neuroscience  
Advisor: Michael Stefanik

### Comparing MedPC and ANY-Maze Operant Chamber Data Collection During Cocaine-Seeking and Cue-Induced Reinstatement in Differentially Reared Rats

\*Trinity Murray '26, Molecular Neuroscience  
\*Benjamin Klemm '25, Psychology  
\*Shephanie Sherrod '24, Molecular Neuroscience and Psychology  
Richard Mills, Stoelting Co. and Adjunct Professor at North Central College  
Margaret Starr, Stoelting Co.  
Advisor: Margaret Gill

### Homosexuality and the Holocaust

Natalie Nestler '25, Elementary Education  
Advisor: Shereen Ilahi

### Complementary or Substitute Goods: An Economic Analysis of Marijuana and Alcohol

Noah Obermeyer '24, Psychology and Behavioral Neuroscience  
Advisor: Najrin Khanom

### Will Athletes With an Acute Sport-Related Concussion Have a Faster Recovery If They Start Aerobic Exercise After the Concussion Occurs?

Marlena Osterhues '25, Masters of Athletic Training  
Advisor: Taeopae Wetterman

### Sports vs. Clubs: Conforming With Peers

\*Natalie Peters '24, Psychology  
\*Elsie Vences '24, Psychology  
Mia Rogers '25, Humanities and Psychology  
Advisor: Marissa Bamberger

### Arthroscopic Hip Treatment & Return to Play Outcomes: A Critically Appraised Topic

Abby Pyburn '25, Masters of Athletic Training  
Advisor: Taylor Arman

### Retinal Image Pre-Processing Using Equalization and thReshoding (RIPPER)

\*Santiago Ramirez '26, Computer Science and Finance  
\*Ethan Ebarvia '25, Computer Science  
\*Nicholas Quigley '24, Computer Science  
Advisor: Nnamdi Nwanze

### Exploring the Relationship Between Overdose Fatalities and Correctional Funding Using Data Mining Techniques

Theresa Rumoro '24, Computer Science  
Advisor: Nnamdi Nwanze

### Exploring Interactions Between Museums and Theme Parks

Nathan Schwartzkopf '24, History and French & Francophone Studies  
Advisor: Nicole Rivera

### Cupping Therapy as Pain Management in Patients With Chronic Neck and Shoulder Pain: A Critically Appraised Topic

Clairese Urchell '25, Masters of Athletic Training  
Advisors: Kendall Selsky and Taylor Arman

### KPC Mouse Pancreatic Cells Demonstrate Thermal Sensitivity

Thomas-Shadi Voges '24, Biochemistry and Mathematics  
Advisor: Nancy Peterson

### Energy State Approximation for Different Island Configurations

Nicholas White '26, Mathematics and Physics  
Advisor: Susan Kempinger

### Creating a Socialist Identity: The Iconography of East German Political Posters

Alexander Wickersheim '26, German and Secondary Education  
Advisor: Gregory Wolf

\*Denotes presenters

### **Magnetic Innovations: Designing a Magnetometer Circuit Board**

*Emmanuel Agyekum '26, Electrical Engineering*

*Advisor: Paul Bloom*

In collaboration with Fermilab, this project at North Central College, led by Dr. Paul Bloom, focused on redesigning a magnetometer circuit board for the Muon G-2 experiment. Aimed at addressing limitations from proprietary software and design flaws in the existing model, the project adopted open-source solutions to enhance manufacturing flexibility and functionality. The redesigned board features an improved 3-axis Hall sensor system for precise signal conditioning, crucial for the experiment's data collection. Despite challenges in circuit interpretation, software use, data analysis, and soldering, the team successfully developed a versatile and reliable prototype. This innovation not only surmounts previous constraints but also broadens its application in particle physics and advanced optical instruments, highlighting the significant impact of undergraduate research in advancing experimental physics tools in resource-limited settings.

### **Face Estimation and Arousal: The Effects of Personality and Caffeine on the Number of Faces Estimated**

*\*Alexia Bustamante '24, Psychology*

*\*Daphne Kolody '25, Psychology*

*Advisor: Mary Jean Lynch*

Research suggests that introverts feel overwhelmed and anxious in groups. An established difference between introverts and extraverts is their cortical arousal levels, with introverts having higher levels than extraverts. With caffeine consumption causing an expected change in cortisol levels, it was hypothesized that introverts who have consumed the caffeinated coffee will overestimate the number of reported faces, particularly those seen as "threatening," when compared to extraverts. Participants (n=260) were assigned into the caffeine or decaf condition at random. To allow the caffeine to take effect, participants completed the Eysenck Personality Inventory (EPI) and additional questionnaires. Then participants viewed a 60-slide Powerpoint and estimated the number of faces on each slide, which displayed 10 to 100 threatening, neutral, or happy faces. Upon analysis, it was found that introverts and extraverts, as identified by the EPI, did not seem to differ in their recorded responses towards the number of faces estimated.

### **The Impact the BSA had on Black Culture and the Reaction from White Students at North Central College During the 1960s and 1970s**

*Jessie Anaya '25, Secondary Education and Social Science/History*

*Advisor: Ann Keating*

While the Black Student Association played a vital role in the spread of Black Culture on campus, it also led to a series of negative reactions from some white students at North Central College during the 1960s and 1970s. The Black Student Association's goal was to push for the recruitment of black students and financial aid for those students and work to get more courses in Black studies, Black faculty, and more spaces for Black Culture on campus. The group worked to promote events to educate and enlighten other students at North Central about what it is like being Black on a majority-white campus. In an analysis of articles published in North Central's Chronicle between 1969 and 1978, I found that the Black Student Association played a prominent role in spreading awareness for Black Culture and the impact of the group is still felt on campus today.

### **Social Emotional Learning Within Children's Museums**

*\*Julia Andersen '24, Psychology*

*\*Samia Islam Saba '25, Behavioral Neuroscience and Psychology*

*Advisor: Nicole Rivera*

Children's museums serve as a place for preschoolers to engage in social emotional learning (SEL). For this study, we aimed to assess how parents/caregivers view their 3-5 year old's engaging in SEL during a visit to a children's museum and what they observe. We also aimed to discover how parents/caregivers feel museums facilitate their child(ren)'s SEL learning. As a part of a national study, we collected data from over 300 participants from 10 museums across the country through an online questionnaire administered to parents/caregivers approximately 2-3 days after their visit. Our results show positive perceptions in SEL from the view of parents/caregivers who generally view children's museums as a place for their child to engage in different activities that teach them about regulating and expressing their emotions through play, as well as how different exhibits help them to achieve this.

### **Common Mycorrhizal Networks Mediate Intraspecific Competition**

*\*Nicole Baker '24, Biology*

*Ian Rosales '25, Biological Science*

*Advisor: Joanna Weremijewicz*

Invasive Canada thistle is considered, "the worst weed in the US" because it is agriculturally costly. Like most plants in the world, its roots associate with arbuscular mycorrhizal (AM) fungi to meet nutritional needs. Filaments of AM cells can connect Canada thistle belowground to neighboring roots in common mycorrhizal networks (CMNs). We explored the role of CMNs in mediating interactions between Canada thistle, and its congeneric, Pasture thistle. We hypothesized, due to its invasiveness, Canada thistle would gain an advantage from CMNs. We grew plants in combinations with the same (intraspecific) or different species (interspecific), with severed or intact CMNs. We found CMNs mediated intraspecific competitive interactions for both species, resulting in significantly smaller plants, and no evidence of interspecific interactions. Generally, in plant ecology, pressures in intraspecific interactions are stronger than interspecific interactions, our research demonstrates that CMNs are involved in facilitating these interactions.

*\*Denotes presenters*



## Y-Doped NaSICON Fabrication Through Mechanical and Thermal Activation

\*Madeline Barickman '25, Mechanical Engineering

\*Abigail Barickman '25, Mechanical Engineering

Advisor: Shan-Ju Chiang

NaSICON materials have emerged as promising candidates for sustainable energy storage due to their high availability, ionic conductivity, and thermal and chemical stability. In order to be used in energy storage, materials must have high ionic conductivity when the heat resistance level is low. NaSICON materials have a relatively high ionic conductivity at elevated temperatures, so there is a need to develop a consistent manufacturing process. This study aims to improve the density and ionic conductivity of yttrium NaSICON materials through mechanical activation and one-step sintering process. The results show that fully densified Y-doped NaSICON has 100% higher total conductivity at room temperature than the same material prepared from general solid-state sintering method. This study provides an alternate solution for synthesizing high ionic conductivity NaSICON at low cost for many energy storage systems.

## Fabrication of Ce-Doped NaSICON Through Integrated Mechanical and Thermal Activation Methods

\*Abigail Barickman '25, Mechanical Engineering

\*Madeline Barickman '25, Mechanical Engineering

Advisor: Shan-Ju Chiang

NaSICON materials have been proven to be good candidates for a wide variety of energy storage devices. Sodium ions alone have an ionic conductivity lower than what is needed for energy storage, so doping is necessary. This research aims to improve the density of cerium doped NaSICON materials through mechanical activation and sintering while also maintaining a high ionic conductivity. The ball milling process was performed with two different chemical variations of cerium-doped powder for two different time periods. Then, each powder was pressed into pellets and placed into a furnace at 1100 °C for 12-24 hours to execute the sintering process in air. The pellets density was calculated using Archimedes method. X-Ray Diffraction (XRD) and Electrochemical Impedance Spectroscopy (EIS) were used to check for impurities and test ionic conductivity. The pellets' densities were average, and the lower density was due to air bubbles generated during the heating process.

## I Won't Dance, Why Should I? Using Self-Determination Theory to Explore Persistence and Dropout Among Competitive Dancers

Natalie Barnes '24, Psychology

Advisor: Leila Azarbad

One of the most commonly-studied topics in sports psychology are the motives that competitive athletes have to quit their teams. However, few studies have examined reasons for dropout among competitive dancers through the lens of Self-Determination Theory (SDT). This study aimed to investigate potential correlations among competitive dancers' psychological need fulfillment (as outlined by SDT), commitment, and plans to quit teams. Participants consisted of 28 competitive dancers who completed an online Qualtrics survey indicating how well their psychological needs were fulfilled and how committed they were to their teams. Results revealed a significant positive correlation between need satisfaction and affective commitment and a significant negative correlation between need frustration and affective commitment. Qualitative data analysis revealed that common reasons for considering quitting dance included poor coaching, interpersonal tensions, and stressful schedules. Findings present important implications for improving competitive dancers' team experiences and their persistence in the sport.

## Lasting Legacies of Lies: The Deconstruction of the 'Good Italian' Myth in Fascist Italy Pre-WWII and During

Jules Billings '24, English Writing

Advisor: Shereen Ilahi

Italy's role in the Holocaust rarely receives the attention it deserves, partly because of the myth of Italian benevolence, which holds that Italy acted sympathetically towards its Jewish population before and during the war. I engaged in critical textual analysis of primary and secondary sources to discover whether this myth is rooted in truth. Based on my research, I argue that the Italian government harshly persecuted its Jewish population both in the years leading up to the war and during it. These findings directly dispel the 'good Italian' myth that general history clings to.

## Navigating the Leadership Landscape: Understanding the Impact of Communication Styles, Gender Dynamics, and Mentorship on Women in Leadership

Paulina Bogdan '23, Organizational Communication and Marketing

Advisor: Amy Buxbaum

As society increasingly recognizes gender diversity in leadership, this thesis explores evolving perceptions, particularly for female-identifying individuals. It investigates how communication styles, gender dynamics, and mentorship impact women in leadership roles. Addressing gaps in existing research, the study employs qualitative interviews with college student leaders and professionals. Findings reveal insights into communication preferences, gender-related challenges, and the significance of mentorship. Emphasizing face-to-face communication, particularly nonverbal cues and empathy within it, the findings uncover insights into how female leaders navigate their roles, highlighting communication preferences, challenges stemming from gender norms, and the role of mentorship in their professional journeys. The information gathered contributes to existing literature by offering a deeper understanding of the unique challenges and opportunities faced by female leaders across various professional contexts.

\*Denotes presenters

## Effects of Diet Quantity on Nuptial Gift Giving by Male *Gryllodes sigillatus*

\*Kyla Border '25, Biology

\*Zach Mottlow '25, Biology

Advisor: Chandreyee Mitra

In many species males provide females with nuptial gifts to entice them to mate. This gift can take many forms—e.g., a prey item they have caught or, in the case in the species we study, a gelatinous mass that the male himself produces. Our research investigated the effects of diet on nuptial gifts in *Gryllodes sigillatus*, the tropical house cricket. Male crickets were placed on a high- or low-quantity diet upon reaching sexual maturity and trials consisted of placing treated males with a female and noting time to mating, mass of the nuptial gift provided, and mass of the ampulla containing sperm. We found that no significant effects of diet quantity on measured characteristics, but did see significant effects of family of origin, body mass, and room temperature on some measures. Further research is needed to examine if the gifts differed in other ways such as nutrient content.

## Family Visits to a Children's Museum

\*Sarah Bukowski '25, Psychology

\*Elysse Thompson '25, Psychology and Sociology

\*Jehana Jusufi '24, Psychology

Advisor: Nicole Rivera

Visits to a children's museum are shared hands-on opportunities for young children and their guardians, which allows them to engage more with their children. The goal of this study is to explore guardians' perceptions of the value of visits to the children's museum. 20 families were recruited at a Midwestern children's museum to participate in a full-visit observation, survey and post trip interview. Findings indicate the value of the museum visit to provide opportunities for socialization and learning in a trusted space. The top motivations for the visit was the child experience, quality family experience, and learning experiences. These observations also indicated that there were more child-led transitions than their guardians. Families value play for their children's brain development, imagination and problem solving. The adult's perception of the museum as a "yes space" allows the child to engage in self-directed play.

## Primary Healthcare Services in Developing and Developed Nations: A Comparative Study of Tanzania and the United States

Hannah Campbell '24, Health Science

Advisor: Kristin Paloncy-Patel

Healthcare systems' pivotal role in enhancing well-being underscores the broader challenges in orthopedic healthcare disparities between nations, reflecting issues of accessibility and quality. The purpose of this research study was to compare orthopedic healthcare services in the United States and Tanzania, aiming to uncover disparities and underlying factors affecting access and quality. Data was collected through an in-depth structured interview with Dr. Steven Meyer, a physician with extensive experience in the United States and Tanzania, focusing on themes such as resource allocation, infrastructure, and workforce challenges. Responses from the interview were then compared to an analysis of public health data and healthcare statistics. Dr. Meyer's experiences underscore stark contrasts in healthcare access and resource allocation between Tanzania and the United States, revealing challenges including transportation barriers and financial constraints in Tanzania, while the U.S. boasts advanced facilities. Collaborative efforts among governments, healthcare professionals, and communities are vital for addressing disparities and fostering equitable healthcare delivery globally.

## A New View of the Black Panthers: Women and Infant Health

Julia Clarke '24, Psychology

Advisor: Gregory Wolf

Mainstream media often portrays the Black Panther Party (BPP) as a militant, violent, anti-American, and especially anti-white nationalist group. While these constructed images of the BPP appease many whites, they do not represent the organization's historical significance and lasting contributions to public health. My research explores how the BPP dismantled systemic and structural racism through their 10 Point Program by focusing on healthcare issues with maternal and infant care. Building on the research of Bassett, Owens, and Fett, my project reveals a more historically accurate image of the BPP's healthcare efforts, still observable 50 years later. By examining the works of former BPP members and the active efforts of the sole Black Panther clinic still in operation today, my project explores the increasingly destructive maternal and infant health disparities as well as the Party's efforts towards sickle cell testing, free breakfasts, and access to preventive and prenatal care.

## Using FT-IR to Quantify Amount of Caffeine in Coffee Beans

Julie Concepcion '24, Chemistry

Advisor: Jeffrey Jankowski

This is a "proof-of-concept" study to determine if it is possible to quantify caffeine in coffee using Fourier-Transform Infrared (FTIR) spectroscopy with an unmodified ATR crystal. Three solvents were tested with different degrees of success - dichloromethane, water, and methanol. The first approach was to make a calibration curve using various concentrations of caffeine (1.2%, 1.0%, 0.8%, and 0.6%) in dichloromethane. However, this technique resulted in weak signals in the IR spectra. The second method was concentrating the sample of 0.6% caffeine on the ATR crystal and producing a concentration calibration curve. This method created a stronger IR signal but lost some linearity. A different solvent not considered in this research may work.

\*Denotes presenters

## The Effects of Arm Care on Injury Prevention: A Critically Appraised Topic

Jessica Cruz '25, Masters of Athletic Training

Advisor: Scott Ellis

The utilization of arm care programs in preventing upper extremity injuries among baseball and softball players has been discussed for quite some time. The basis of that statement is why this problem, intervention, comparison, outcome (PICO) question was created. This critically appraised topic focuses on answering the question: does arm care prevent shoulder injuries in baseball and softball players compared to no arm care? After reviewing three articles using the PRISMA level of evidence, the results showed that baseball and softball players must incorporate some preventative arm care program to continue playing their sport. The preferred reporting items for systematic reviews and meta-analyses (PRISMA) helped determine that preventative arm care programs effectively limit the number of shoulder injuries when they combine stretching and strengthening in the muscles under the most stress during throwing.

## Functionality of Human COX10 Gene Mutations and Their Connections to Leigh Syndrome Using *Saccharomyces cerevisiae*

\*Rebecca DeSouza '26, Biology

\*Nmesoma Onyejekwe '26, Biochemistry

Advisor: Steve Johnston

Leigh Syndrome is a rare neuromuscular degenerative disease, arising from impaired production of adenosine triphosphate due to defective oxidative phosphorylation in mitochondria. This is due to the dysfunctionality of the mitochondrial protein, cytochrome c oxidase (COX10). There are some mutations in the COX10 gene known to result in Leigh Syndrome, however, the pathogenic effects of many of the reported mutant alleles are unknown. We investigated five known but uncharacterized human polymorphisms in the COX10 gene. We chose to study five human missense COX10 alleles with uncertain clinical significance and evolutionarily conservation: D132Y, I127T, Q71L, R58H, and S32A. The corresponding mutations were constructed and introduced into COX10-deficient *Saccharomyces cerevisiae*, where we could measure mitochondrial function through phenotypic testing. We found all five mutations to be pathogenic, with each losing COX activity and the ability to grow aerobically. Loss of functionality in the mutated alleles indicates a causative relation to Leigh Syndrome.

## Dryland Resistance Training and Its Effect on Swimming Performance: A Critically Appraised Topic

Paige Doherty '25, Masters of Athletic Training

Advisor: Scott Ellis

In the sport of competitive swimming, some of the most seen injuries in every patient population are shoulder pathologies. The focus of this critically appraised topic is to find out how does dryland resistance training affect upper body strength in swimmers. After reviewing three studies that examine this topic and were appraised using the PEDro scale, the articles scored a 2 for the level of evidence. The results found that it is beneficial to swimmers for both performance and strength to do dryland resistance training before the start of in water practice. This study is relevant for those in the athletic training field because we know that injury can be prevented if the muscles are stronger. Dryland resistance training is something that can be implanted into practice before swimming that will not only increase performance but could also prevent injury.

## Crystal Structures of Large-Volume Commercial Pharmaceuticals

Tawnee Ens '24, Biology

Advisor: James Kaduk

The crystal structures of three commercial pharmaceuticals have been solved and refined using synchrotron X-ray powder diffraction data, and optimized using density functional theory techniques. Molnupiravir, ( $C_{13}H_{19}N_{3}O_7$ ) (Lageviro) inhibits replication of SARS-CoV-2, and has been granted emergency use to treat COVID-19. The crystal structure consists of stacked double layers with a two-dimensional hydrogen bonding network within the layers. Valbenazine ( $C_{24}H_{38}N_{2}O_4$ ) (Ingrezza) is used to treat Tardive Dyskinesia, an involuntary movement disorder. The crystal structure consists of loosely packed discrete molecules. Anthraquinone-2-Carboxylic Acid ( $C_{15}H_{8}O_4$ ) is an anti-inflammatory derived from trumpet tree bark. The crystals consist of needles made up of stacks of hydrogen bonded molecules. The structure solution was complicated by an impurity, which could be removed by recrystallization.

## Muscles and Mental Health

\*Macy Fleury '26, Exercise Science

Le'Char Morgan '25, Exercise Science

Marissa Madl '25, Exercise Science

Advisor: Rachel Luehrs

The correlations between exercise and mental health are constantly being assessed. This study was conducted to see how an 8-week, individualized exercise program impacted mental health among participants with or without clinical mental health diagnoses. It also assessed enjoyability and the likelihood of training continuation post-study. Fifteen participants signed up for the Cardinal Fit exercise program, all of which were faculty, staff, and students. To collect data for this study, participants completed self-report questionnaires before and after working with a student coach for those 8 weeks. These surveys included questions about stress, anxiety, and mood. At the conclusion of the program, 93% of participants reported better mental health. Participants also reported lower stress levels post-study (pre 18 vs. post 15;  $p=0.08$ ); however, symptoms of anxiety remained stagnant (pre: 6.3 vs. post: 5.9;  $p=0.79$ ). These findings suggest that the study improved subjective mental health ratings and stress levels.

\*Denotes presenters

## Effect of Nutrition on Male Calling Behavior in the Tropical House Cricket *Gryllodes sigillatus*

\*Nathaniel Fukutake '24, Biomedical Science

\*Cleo Hawthorne '25, Biological Sciences

Advisor: Chandreyee Mitra

In the tropical house cricket, *Gryllodes sigillatus*, males produce long-range calling songs to attract females, a behavior that incurs costs but is critical in reproductive success. If a male's access to nutrients is limited, less energy is expected to be allocated towards calling, lowering a male's fitness. Newly matured male crickets were fed either a high-nutrient diet (cat food) or a low-nutrient diet (a mixture of cellulose and cat food). One to two weeks after maturation, males were recorded separately in anechoic chambers, as well as in a group over 3 hours segments. Our findings show that males on a high-nutrient diet were more likely to call, and diet significantly impacted song characteristics, affecting the number of pulses and chirp duration without affecting pulse duration, chirp rate, and dominant frequency. These results suggest that optimal nutrition not only increases calling activity but also enhances specific aspects of song quality.

## Jump Landing Interventions' Effects on ACL Injury Rate

Antonio Garcia '25, Masters of Athletic Training

Advisors: Kendall Selsky and Taylor Arman

Anterior cruciate ligament (ACL) injuries and other knee injuries are often caused by faulty jump landing mechanics. Training proper jump landing mechanics can influence risk factors for knee injury by influencing kinematics, kinetics, and ligamentous strain. A critical appraisal of relevant literature was completed in order to understand how jump landing training influences knee injury risk factors in athletes. A search of relevant databases was performed using terms including jump landing mechanics and injury prevention which identified five studies for appraisal. Studies related to male and female athletes were included. It was found that these interventions positively influenced ACL injury risk and kinetic and kinematic risk factors for knee injury. Plyometric interventions were found to be effective strategies to reduce the risk of knee injuries. This review provides added support for implementing jump landing mechanics training for preventing knee injury in athletes.

## Cold Water Immersion vs. Contrast Water Therapy

Jennifer Garcia '25, Masters of Athletic Training

Advisor: Taylor Arman

Knowing the effects of therapeutic modalities on recovery is important for Athletic Trainers (ATs) and the physically active individuals (PAI) they treat. This critically appraised topic looks to understand the effect of cold-water immersion (CWI) compared to contrast water therapy on recovery. The importance of comparing and finding the best available interventions for PAI is to help them reduce fatigue levels and recover faster after the specific physical activity. Three systematic review articles were selected, based on established inclusion and exclusion criteria. All three articles were analyzed and scored a 24/27 on the PRIMSA scale and level 1a on the CEMB Level of Evidence Scale. Based on this appraisal, cold-water immersion is more beneficial than contrast water therapy for recovery in PAIs.

\*Denotes presenters

**Sticky Situations***Moderator: Raleigh Blasdell**Location: WSC 013***Sounds Two Good: The Effects of Audio Quality in Online Interviews***\*Samantha L. Kaczmarek '25, Psychology, Criminology, and Sociology**\*Arran M. Hung '24, Psychology**\*Ella A. Pfeiffer '26, Psychology**Advisor: Karl Kelley*

Increasingly companies are moving job interviews online. As many people have experienced with online meetings, there is a wide variety in video and audio quality. The current research examined how lower quality audio effected perceptions of candidate fit with a job. In this study participants read a job description, evaluated an applicant resume, and listened to a portion of an online interview. All material was exactly the same except participants were assigned to one of three conditions: high, medium, and low-quality audio (audio quality was electronically altered using software). They then evaluated the candidate's work ethic, intrapersonal, and interpersonal qualities, as well as their ability to completed job tasks. Statistically significant differences were found between the low-quality and the medium-quality conditions. Evaluators weighed positive resume information more heavily in the low-quality condition but weighed negative interview information more heavily in the medium-quality condition. Implications of these patterns will be discussed.

**Expressing Leadership Style: How Sense of Coherence Affects Presentation in Job Interviews***\*Gia Yetter '24, Psychology**\*Isabella LaRocco '26, Psychology and Exercise Science**Advisor: Karl Kelley*

The current study examines how sense of coherence (SOC) influences leadership style presentation in job interviews. Research suggests coherent leadership can improve workplace conditions such as employee productivity. Previous research has also found that work-SOC is an important factor of workplace health in terms of active states of well-being. But there has not been much investigation into the relationship between sense of coherence and the presentation of effective leadership style in job interviews. This study explores the relationship between SOC and leadership style presentation by having participants engage in a mock interview for a job of their choice, focusing on asking situational judgement questions regarding leadership, and giving them an SOC-29 questionnaire. We expect participants with high SOC scores will express more effective leadership elements than those with low SOC scores. The results did not support the hypothesis, limitations and future possibilities will be discussed.

**A Look Into the Accessibility of Special Education for Students in Rural Schools***Grace Shelly '24, Elementary Education**Advisor: Nicole Rivera*

In 1975 the first draft of IDEA, the Individuals with Disabilities Education Act, was written into law to provide protections surrounding students with disabilities and their right to an equitable education. This study investigates the accessibility students have to special education in rural schools. Through a thorough review of the literature, and interviews with two different schools that fit into the rural demographic, a strong relationship between low-funding and a lack of staff to screen children for services they may need has been made clear. Additionally, lower population size contributes to a lower payscale at a rural school, which makes recruiting for specialized departments, such as special education, incredibly difficult. These findings suggest that the access to special education in rural schools is severely lacking due to under-funding, which in turn, leads to understaffing and the inability to screen children.

**The Impact of Campus Security Cameras on Crime Deterrence and Perception of Safety***Sarah Andrey '24, Sociology and Criminology**Advisor: Raleigh Blasdell*

Security and personal safety are high priorities for both college students and administrators. With recent calls to provide heightened security on college campuses, some institutions—especially smaller schools with limited resources for expanding personnel—have increased their use of security cameras to provide continuous situational awareness and serve as a crime deterrent. However, little research exists on the utility of security cameras in these environments. The present study examines the impact of the expanded use of security cameras on a small college campus with regard to crime deterrence, disciplinary action, and student perceptions of safety. The results indicate that while, in some cases, students find security cameras beneficial as a crime deterrent, they feel that there are other purposes for which they are helpful, such as feeling safe and building trust. The results also indicated that students believe there are areas on campus where safety measures could be increased.

*\*Denotes presenters*

## Learning in Leadership

Moderator: Melissa Proulx

Location: WSC 015

### Social Media for Impactful Coaching

\*Paige Runkle '25, Sport Management

\*Hailey Poe '25, Sport Management and Ethical Leadership

Advisor: Carly Drake

High school and collegiate sports teams are active on social media. Yet, there is little research on how the teams' accounts are run, or the messages they share. To address this gap, we interviewed coaches of female athletes in high school and college to understand their engagement with and use of social media. Our preliminary findings show that social media is unregulated in most levels of amateur athletics, with coaches fending for themselves when determining what and how to post. Team social media accounts act like businesses, even though they have different goals than businesses. The content we see from these accounts is mainly created with the intention of capturing the attention of recruits by highlighting team accomplishments. These findings have important practical implications for not only coaches, but for anyone who is running a social media account for an organization that targets a majority female audience.

### Construct and Ecological Validity of Executive Function Assessments: TrailsX and Wisconsin Card Sorting Test

\*Faith Bicking '24, Psychology and Behavioral Neuroscience

\*Miranda Baker '26, Molecular Neuroscience

Advisor: Karl Kelley

The current project is an ecological and construct validation test for two executive functioning (EF) assessments. EF measures the cognitive abilities/skills necessary for goal-directed behavior. The two tests utilized were the Trails-X (a path finding connect the dots test) and the Wisconsin Card Sort Test (WCST --a rule finding test). After completing one of these tests, participants were put into an escape room designed to require real-life problem-solving skills. A regression analysis indicated a significant negative slope of -5, suggesting a five second decrease in time to complete the escape room for every one unit increase in Trails-X T-score. Overall T-scores on the Trails-X were significantly negatively correlated with the total time (in seconds) it took to escape ( $r = -.783$ ). No significant correlations were found for WCST. While more research needs to be done, the results in this study are promising for the validity of the Trails-X assessment.

### The Lens of Attachment: How Managers Attachment Styles Bias Perceptions of Employees Transgressions

Tabitha Judd '24, Psychology

Advisor: Karl Kelley

People generally perform better when they believe their evaluations are just and fair. Leaders (managers, teachers, coaches) often feel they are just and fair, but can sometimes be biased. This study examines how a leaders' attachment style can bias them when mediating conflict. Participants were asked to imagine they were manager evaluating a workplace transgression. They reviewed materials about an organizational conflict then evaluated an employee recommended an outcome. We also evaluated the participant's attachment style using the Relationship Style Questionnaire. Results suggested that attachment style did not significantly bias their views but there were subtle trends indicating that the bias could be more subtle. Further research needs to be conducted to shed light on the complexity of a leader's attachment style and decision-making processes.

### Growing Through Life: Can Sense of Coherence Training Positively Affect College Student Leaders?

Erica Johnson '24, Human Resource Management

Advisor: Karl Kelley

Antonovsky's sense of coherence (SOC) theory and construct details how people can overcome and recover from setbacks based on their ability to utilize different resources. Research has shown higher SOC is correlated with greater wellbeing. The current project focuses on addressing a literature gap by developing an intervention program to increase SOC. This study recruited 13 paraprofessional student leaders at North Central College. They attended two in-person trainings and participated in activities targeting learning about SOC and its three components. Pre and post assessments measuring SOC-related concepts and perceptions on the training also occurred. I hypothesized engaging in these actions would result in positive increases in the measured constructs and be evaluated as beneficial to the individual and their work as a leader. Significant positive changes in pre-post tests for grit and other measured variables occurred. Additionally, all post-test measures evaluating the effectiveness of the program were significantly above neutral.

\*Denotes presenters

## Place and Proximity

Moderator: Brian Hoffert

Location: WSC 036

### The Salem Witch Trials: Feminine Behavior and Bad Neighbors

Sarah Hein '24, Secondary Education/Social Science and History

Advisor: Ann Keating

Salem Village, Massachusetts experienced a crisis in 1692 during which 15 women were executed for practicing witchcraft. They were not just mothers or housewives; they were vital members of the community. While economic, political, and social issues influenced the trials, the pattern of accusations and certain verdicts can be traced to gender norms and the perception of individual women in the community. Women were not excluded from being accused based on religion, wealth, or societal status. Several highly respected women were accused and executed. Through the analysis of 7 trial transcripts and lead secondary sources, I found a pattern of accusations related to past neighborly disputes not related to witchcraft. In many cases, neighbors used those past negative encounters with certain accused women as evidence of witchcraft. Those transcripts shed light on the importance of neighborly relationships within Salem before and during the witch trials.

### ROAM: A New Identity of Hunting

Eric Rodriguez '24, Graphic Design

Advisor: Hale Ekinci

"ROAM" is a branding project that aims to revolutionize the hunting industry responsibly and sustainably. The project not only challenges conventional norms in hunting but also pushes the boundaries of design. I kick-started the initiative by gathering insights from the local urban population about their feelings, perceptions, and thoughts on hunting. These findings played a crucial role in shaping the design and marketing strategies for "ROAM." The brand's goal is to give voice to diverse perspectives on hunting and its effects on the environment and human relations. "ROAM" serves as a platform for dialogue around common misconceptions amongst the urban population. Utilizing mediums such as ad campaigns, motion graphics, and website design, "ROAM" effectively communicates its ideology through marketing and showcases how graphic design can make a social impact.

### Amusing to All: Segregation, Discrimination, and Perseverance in Chicago's Amusement Parks, 1893-1950

Nathan Schwartzkopf '24, History and French & Francophone Studies

Advisor: Luke Franks

Chicago's urban amusement parks proclaimed themselves to be spaces of wholesome and health-giving entertainment for the city's growing population, despite the open discrimination at their gates. Born out of a World's Fair that refused African American participation, amusement parks in Chicago refused service to Black people while hiring them to partake in demeaning and dangerous amusements. Community leaders would organize to construct amusement parks for African Americans. Following the 1919 Race Riot that claimed the life of his nephew Eugene, Augustus L. Williams led the charge to promote Joyland Park, an amusement park by-and-for African Americans. Joyland would struggle to find success, and later community members would push for inclusion through protests and the legal system. This work is based on heavy archival research. Newspaper articles, advertisements, interview notes and images combine to tell a story of urban amusement and conflict in which race played an enduring and formative role.

### Japanese Pop for All: Language Localization's Contribution to Japan's Pop Culture Success

Tori Seggebruch '24, Japanese and East Asian Studies

Advisor: Brian Hoffert

Global demand for Japanese anime, comics, films, and video games has risen monumentally in the past forty years, largely due to successful strategies for delivering the pop culture experience across national borders in target audiences' languages— a process called localization. There have been few opportunities for the public to witness this work in action, unless they were acquainted with someone who taught themselves Japanese translation outside of company settings. Localizing enables Japanese media products to become big hits and maximize profits in nearly any other country's market. This is accomplished through culturally conscious marketing, editing content to boost appeal to non-Japanese consumers, and translating Japanese texts to be understood easily worldwide. As opposed to general conceptions that media platforms like animation, comics and video games are entirely separate from one another, my findings indicate that Japanese pop culture has found international success because it's all subsumed into one easy-to-export package.

\*Denotes presenters

### Plasma-Assisted Destruction of Polystyrene Nanoplastics

\*Maria Alvarado '24, Chemistry

Matthew Winburn, University of Nebraska-Lincoln (UNL)

Advisor: Chin Li Cheung (UNL)

Microplastics have been found in an estimated 30%-90% of water sources and have a range of potential health effects whose full impact is still unknown. It is postulated that these particles serve as sorbents for organic contaminants and pathogenic biofilms, which pose a risk to drinking water quality. These microplastics may further degrade by means of chemicals such as natural oxidants to yield nanoplastic particles. Literature reports that advanced oxidation processes (AOPs) can serve as effective methods via reactive oxygen species for the decomposition of various organic contaminants, but research in the degradation of nanoplastics is limited. This work focuses on reporting our use of a falling-film plasma reactor to effectively destroy polystyrene nanoplastics in water (99% removal). Furthermore, we aim to reveal the kinetics of nanoplastic degradation and characterize major reaction products through the course of the remediation process.

### Validating the Use of Filter Paper as a Non-Invasive Hormone Monitoring Technique in *L. tasmaniensis*

\*Ian LaPat '24, Biology and Environmental Studies

Dr. Kerry Fanson, La Trobe University

Advisor: Gregory Ruthig

Wildlife endocrinology is the study of hormones in wild animals. Increasingly, wildlife conservation has utilized endocrinology to monitor reproduction and stress and to improve animal husbandry. Endocrinology is becoming increasingly common in evaluating and monitoring endangered species and developing non-invasive methods for extracting hormones is an increasing necessity. My research is focused on developing a new non-invasive method for collecting cortisol in *L. tasmaniensis* using filter paper to collect dermal secretions. Previous studies have verified dermal swabbing on amphibians. Unlike the dermal swab method, the filter paper method does not require any handling of individuals. My research is the first known example of dermal secretions validated in an Australian anuran as well as the first application of using filter paper for sample collection in any anuran. Preliminary trials of the method appear to be biologically significant but further explorations are necessary to refine the technique for use in conservation programs.

### Multihost Pathogen Creates Ecological Links Between Its Hosts and Influences Host Population Dynamics

Maisha Marzan '25, Biology and Applied Mathematics

Advisors: Gregory Ruthig and Marco V. Martinez

Multihost pathogens infect more than one host species. We mathematically modeled population dynamics of a multihost pathogen ecological system. This system encompasses multiple hosts interconnected through a shared pathogen (*Saprolegnia*), with varying susceptibility to the pathogen. Pathogens infecting multiple species create ecological links, even between species not directly interacting. Our objective was to ascertain whether the presence of different host species with varying susceptibility indirectly influences infection on specific hosts, in our case, bullfrogs. We generated a deterministic mathematical model for populations of susceptible, dead, infected, and colonized hosts, including the pathogens, using a 5 x 5 system of ordinary differential equations. We used Python to develop dynamic numerical solutions and interactive plots for our model. We calculated the community basic reproductive number,  $R_0$ . We concluded that alternative host species have indirect negative effects on each-other by amplifying the number of infective propagules of their shared pathogens.

### Developing a Novel Method for Counting and Identifying Water Molds in Field Samples

Justyn Salas '24, Biology: Biomedical Science

Advisor: Gregory Ruthig

Water molds (Oomycota) are aquatic multi-host pathogens that infect many species of amphibians and aquatic invertebrates. We developed a method for the quantification of reproductive propagules (zoospores) responsible for water mold transmission between hosts using Microwell Plates (MWP) and selective media. We compared five concentrations of water mold zoospores created from serial dilutions, using a hemocytometer and our MWP method. There was a close relationship between hemocytometer counts and MWP counts, giving us confidence that MWP provided accurate and precise counts of zoospore concentrations. When we tested water samples from local wetlands, the MWP method was effective and precise. To confirm that the growths on MWP are our target species, *Saprolegnia ferax*, molecular methods of identification using specific probes and primers in a quantitative polymerase chain reaction (qPCR) were designed and will be tested. This method will allow ecologists to identify and count a common pathogen of many aquatic organisms.

\*Denotes presenters



## Handling Pressure

Moderator: Georgine Maisch

Location: WSC 104

### Navigating Autism: Caregivers Experiences

Nicole Brandy '24, Psychology

Advisor: Nicole Rivera

Caregivers are defined as parents, siblings, etc. who care for another individual without monetary compensation. Caregivers have unique experiences that must be understood to increase public awareness and improve resources. The present study focuses on the perspectives of caregivers of individuals with autism, with the goal of understanding their experiences. The Resilience Theory serves as the framework to understand these experiences, citing that protective factors, risk factors, and overlapped factors contribute to the caregiver experience. Five interviews were conducted with caregivers, addressing topics such as coping, challenges, and resources. The findings were consistent with the literature in terms of how these factors interact to form caregiver experiences. Some major themes were feelings of guilt, coping strategies, impact on professional life, and desire for public awareness. This research provides an overview into the understanding of caregivers' experiences.

### The Intake of Omega-3 Fatty Acids and Depression in College Athletes

Julia Siston '24, Accounting

Advisor: Kim Milano

Depression impacts many individuals and is influenced by diet. Athletes have increased physical and mental demands as well as increased nutrient requirements to achieve peak performance and overall well-being. Research on omega-3 fatty acid intake shows protective benefits for newborns and elders, as well as beneficial effects on anxiety and depression in different populations. However, few studies have looked at consumption of omega-3s and depression in college aged individuals, specifically athletes. This study examined 50 college athletes' frequency of omega-3 consumption and their self-reported depressive symptoms using the Patient Health Questionnaire (PHQ) to determine a correlation. Initial analysis with descriptive statistics indicates that 71% of participants consume less than 1-2 number of servings of omega-3s weekly which is below recommended levels. In addition, 40% of participants report mild/moderate depressive symptoms. Correlation statistics will determine if a relationship exists and if athletes should be encouraged to consume foods high in omega-3s.

### Mental Health and Student-Athletes: How the Mental Health Education Level of the Surrounding Support Affects the Student-Athlete

Tyler Donovan '24, Journalism & Media Communication

Advisor: Krystina Sarff

This research investigates the current perceived mental health support at a Division III (DIII) National Collegiate Athletics Association (NCAA) athletics department and its campus-wide student counseling services. Background research presents information on the NCAA, student-athlete mental health issues, and the benefits of receiving mental health support. Utilizing a mixed methods approach, an online survey was distributed to student-athletes at the DIII institution to gauge their view of mental health and experiences within their athletics community. Findings indicate student-athletes not only prioritize and are aware of their mental health, but also share their experiences with peers. Conversely, they are reluctant to seek out coaching staff during mental health struggles and lack confidence in their coaches' mental health support. They also indicate uncertainty in the usefulness of on-campus counseling and wellness. This research can assist DIII NCAA athletics department promote student-athlete well-being and foster a healthier and more supportive athletic community.

### How Gender Roles and Patriarchal Systems Contribute to the Conversation of Domestic Violence in Hmong Communities

Madison Dillon '25, English and Secondary Education

Advisor: Lisa Long

In the memoir, *The Latehomecomer* (2008), Kao Kaila Yang represents domestic abuse/ patriarchal structures embedded in Hmong culture that refugees brought from Southeast Asia. Research on Hmong communities and refugee communities that came to the U.S. in the late 20th/ early 21st centuries suggests that treatments for psychological effects of domestic abuse should be culturally specific/ sensitive to the dynamics of native communities. Western language of "domestic abuse" doesn't align with Hmong ideologies of "honor," and masks the complexity of their cultures. In *The Latehomecomer*, gender roles/ patriarchy contributes to the abuse that occurs within families represented. However, contrary to the dominant view that all Hmong communities and family structures cause men to be authoritarian in all cases, this memoir depicts how women can be strong family leaders. This text exposes stereotypes and brings light to stories where women are leaders of their families and are strong, powerful, and respected.

\*Denotes presenters

## Patriarchy and Politics

Moderator: Sean Kim Butorac

Location: WSC 254

### The Othering and Ownership of Eve: The Creation of Patriarchal Domination

Ashlyn Allemand '25, Sociology

Advisor: Jennifer Smith

The creation story of Adam and Eve has historically had profound patriarchal symbolic meaning. Eve's derivation from the rib of Adam and his naming of her, as well as the punishment Eve receives from God, perpetuate themes of both othering and ownership. Othering refers to Eve's existence as a subset of Adam, while ownership refers to her lack of autonomy and agency. These themes represent how patriarchy was crafted from Judeo-Christian thought. Drawing upon the research of Gerda Lerner in *The Creation of Patriarchy*, my project argues that these themes are a means to justify modern patriarchal dominance and the treatment of women as sexual and lesser beings. The story of Adam and Eve, and Eve's role in it, thus help explain the subordinate position that women assume today.

### The Doctrine of Pornography Addiction: Responding to Dysfunctional Sexual Ethics Within Conservative Christianity

Sophia Hiatt '24, Religious Studies

Advisor: Wioleta Polinska

My research examines how Christian stances on pornography impact Christian pornography addicts, arguing that fundamental shifts in teachings are necessary for the health and progress of individuals and congregations. In religious, feminist, and academic circles, the morality of pornography and the existence of pornography addiction is widely debated. My research not only combines these disciplines but uses a feminist, queer, and sex-positive lens. Methods include critical analysis of popular and academic sources. Results show that many Christian anti-pornography arguments contribute to a culture of shame and repression. Furthermore, these stances lead to pathologizing healthy sexual behavior in non-addicts and stigmatize effective care for actual addicts. From this research, I conclude that redefined Christian teachings should encourage comprehensive sexual education, including female pleasure and queerness, separate lust and addiction from normal sexual arousal, and reject one-size-fits-all sexual prescriptions.

### When She Was Enough: America's Long Struggle Towards the First Female President

Tahbata Zuniga Diaz '24, Political Science and Writing

Advisor: Suzanne Chod

In the thick of the 2024 presidential elections, the question of when America will be ready to elect its first female president is the inspiration for this creative nonfiction piece that seeks to understand who will shatter the highest glass ceiling. This piece weaves research on contemporary accounts of women in political office to imagine a woman who could win the presidency. Since social conditions already point to who this woman must be to shatter this ceiling, this piece will outline how those conditions shape and define this hypothetical first female president. These conditions are formulated in my project by three components of identity, political background, and campaigning in the general to primary elections which all help give an understanding of what the journey and process will look like for a specific woman to be able to run and win the presidency.

### The Cost of Control: The Implications of Overturning Roe v. Wade

Tessa DeJonge '24, Biochemistry and Philosophy

Advisor: Shaheen Moosa

In light of the overturn of Roe v. Wade, it is necessary to determine whether the restrictions on abortion rights are justified. I outline biological and ethical perspectives to determine at what stage of pregnancy embryos can be considered independent life. Further, I examine the implications of awarding personhood status, and the rights inherent to the status, to the fetus. In conjunction with this determination, this paper also discusses the implications of the overturn of Roe v. Wade and what branching effects can be expected following the ruling. Through a comparative study of outcomes in both abortion-restrictive areas and areas without abortion restrictions, I posit that the cost of control may outweigh the benefits to the babies born from a refusal of abortion services. I conclude that the overturn of Roe v Wade provides little benefit, and opens the possibility of furthering inequity and negative socioeconomic outcomes in underprivileged populations.

---

## Data and the Future

Moderator: Stuart Patterson

Location: WSC 256

### A Cooler World: Comparative Analysis of Climate Mitigation Strategies Within the Paris Agreement Framework

Reese McMullen '24, Global Studies and Spanish

Advisor: William Muck

This project conducts a comparative analysis of climate action plans among states participating in the Paris Climate Agreement, aiming to identify the most effective strategies for limiting global warming to two degrees Celsius. Initially, the study hypothesized that a state's classification as a carbon source or sink landscape would explain variations in plan ambition and effectiveness. Utilizing data from the Climate Action Tracker's four tiers of climate sufficiency, a comprehensive database was constructed to test this hypothesis. Findings suggest that while a state's landscape classification lacks explanatory value, GDP per capita and the level of democracy strongly correlate with climate sufficiency tiers. This study underscores the importance of these findings in developing state-level strategies aligned with the objectives of the Paris Climate Agreement.

\*Denotes presenters

## Forecasting Triple A Corporate Bond Yields

\*Michael Capobianco '24, Finance

\*Mike Klazura '24, Accounting and Finance

Advisor: Najrin Khanom

We examine patterns in Triple A corporate bond yields, because of their heightened security and investment appeal, and present forecasts spanning from January 2024 to January 2026, grounded in historical trends. Our research delves into the period from January 1st, 2010, to January 1st, 2024, encapsulating the repercussions of the COVID-19 pandemic on Triple A bonds. Data for our study originates from FRED economic data, specifically designated as Moody's Season A corporate bond yields. Employing regression analyses, we explore linear, exponential, and quadratic trends while adjusting for seasonality and cycles. Our evaluation of models hinges on criteria such as Adjusted R-squared, Akaike Information Criteria, Schwarz Information Criteria, as well as in-sample and out-of-sample root mean squared errors. Ultimately, our findings identify the quadratic trend, incorporating seasonality and two autoregressive lags, as the most efficacious method for predicting future Triple A corporate bond rates.

## Life Expectancy vs. Net Income

\*Joshua Ganesh '24, Business Economics, Entrepreneurship

Lexi Psarros '24, Business Economics

Shoya Nagayama '25, International Student

Bruno Burkhardt da Silveria '24, Business Economics

Advisor: Najrin Khanom

This paper explores the complex relationship between life expectancy and net income in the United States, with a focus on comparing data across the fifty states and the US as a whole. The study uses monthly state-wide panel data and country level time series data of US from 1990 to 2020 to evaluate the relationship between net income and life expectancy. The study controls for access to healthcare, nutrition, lifestyle choices, educational attainment, and death rates. This aims to provide insights that can inform policy decisions and public health initiatives. The results, are sensitive to the model choice. A significant negative relationship is found between net income and life expectancy in the state-level panel data with state and time fixed effects. A positive but not significant relationship is found in country level time series data.

## Midwest Median Existing Single-Family Home Prices from January 2013 to December 2025

\*Nathan Stalilionis '24, Finance

\*Kelly Rosine '25, Finance and Accounting

Conrad Parente '23, Finance

Advisor: Najrin Khanom

Purchasing a house is the most important financial decision an individual will make in their lifetime. This paper examines Midwest median existing single-family home price increases in recent years and uses past data to forecast future prices. The data ranges from January 2013 to December 2022 and the forecast spans January 2023 to December 2025. We analyze linear, quadratic, and exponential price trends and adjust for seasonality and cyclicity. Results indicate housing prices mirror an upward quadratic trend with monthly seasonality and cycles. Measurements for Adjusted R-squared, Akaike Info Criterion (AIC), Schwarz Info Criterion (SIC), in-sample and out-of-sample Root Mean Squared Error (RMSE) are used for model evaluation. We find a quadratic trend with seasonality and two lags in the price values to be the best time-series model for forecasting future housing prices.

---

## New Creations

Moderator: Laura Lodewyck

Location: WSC 354

## Dead Shot: A Collection of Poetry

Elizabeth Morris '24, English Literature

Advisor: Lisa Long

Dead Shot is a collection of poetry reflecting on the modern-day college experience, from starting classes in the midst of a global pandemic to graduating in a world threatened by a climate crisis. It combines the fear of planning for an uncertain future while dealing with the mental repercussions of trauma, to explore the contemporary college experience from the authors own perspective. The title, Dead Shot, refers to the state of an espresso shot left out for too long, making the shot bitter, unsatisfactory, or commonly referred to in the coffee world, "dead". The layout of the collection structurally represents the three distinct layers of a fresh shot of espresso: crema, body, and heart. Through utilizing the complexities of espresso, the collection aims to show the effects of multiple aspects of life converging into one overall experience that tackles the bitterness of the 21st century.

## Horror as a Mirror

Chloe Kallberg '24, Writing

Advisor: Sohinee Roy

The horror genre has largely been misunderstood as exploitative. Of course, there are corners of the culture that reflect poorly on the genre, but it is critical to understand horror as a reflection of our generational fears, preserved and relived for decades. While this cutting-edge-toward-camp phenomenon is most blatantly seen on screen, horror literature is an intentionally transgressive medium that exposes cultural fears at every turn. By tracing the journey from gothic literature to modern novels in the practice, we can reflect on what monsters represent, and how certain literary devices invoke fear. Reflecting on the Danse Macabre art movement of the medieval times, Jane Austen's take on the gothic novel, and Stephen King's comprehensive horror guide, I crafted a horror novella based around fears we experience in the 2020s.

\*Denotes presenters

## Dev131 Robot

\*Diego Esquivel '24, Computer Science & Engineering

\*Tyler Fortune '25, Computer Science

\*Om Sharma '25, Computer Engineering

\*Wissam Koraichi '26, Computer Science and Physics

\*Cesar Real '26, Computer Engineering

Advisor: Donghwoon Kwon

This study investigates the hard-coded implementation of an object avoidance model and depth perception system on a Jetson Nano robot. Leveraging machine learning and stereo vision techniques, the robot autonomously navigates environments while avoiding obstacles. The Triangulation depth perception system enhances spatial awareness, enabling accurate localization and mapping from a single lens. Through real-time data processing, including ultrasonic and infrared inputs, the model dynamically adjusts the trajectory of the robot to ensure collision-free movement. Experimental results demonstrate the machine's effectiveness in various scenarios. By incorporating environmental mapping into its functionality, the Jetson Nano robot lays the groundwork for adaptive and context-aware navigation in real-world settings. Moving forward, the project team aims to extend this research by incorporating the capabilities to read letters through image recognition frameworks; further enhancing the robot's cognitive abilities and practical applications.

## From Ancient Royalty to Modern Science: Advancing Tyrian Purple Synthesis

Julie Concepcion '24, Chemistry

Advisor: Nick Boaz

Tyrian Purple (6,6'-dibromoindigo) is one of the oldest purple dyes in history. The color has always been associated with royalty. In antiquity, collecting over 10,000 snails to produce one gram of dye was necessary. It is now possible to produce synthetic dyes; however, it is not feasible. We aimed to create a new synthetic pathway to make Tyrian purple by brominating an acetal-protected benzaldehyde to create 4-bromo 2-nitro benzaldehyde. 4-bromo 2-nitro benzaldehyde is a precursor to Tyrian purple. However, current synthetic methods to create 4-bromo 2-nitro benzaldehyde are inaccessible. We successfully made 4-bromo-2-nitro benzaldehyde. While working with Tyrian purple, we created a method to make Tyrian purple carmine, a soluble version of Tyrian purple due to having a sulfate group attached. Making Tyrian purple soluble made it possible to characterize Tyrian purple.

---

## Exploring Identities

Moderator: Sophie Hand

Location: WSC 356

## NCC Exploring Identities Series: A Journey of Intersectionality and Storytelling

\*Juan Espinoza '26, Special Education

\*Andres Perez Delgadillo '26, Secondary Education: Social Studies

\*Junrong Qian '24, Japanese and East Asian Studies

\*Jovany Hernandez '24, Health Science

\*Adeline Salgado '25, Psychology

\*Diego Mateo '25, Masters of Education in Trauma Informed Care

Advisor: Sophie Hand

This session proposes a culminating event to the 2023-24 Exploring Identities series. Throughout the academic year, invited speakers shared stories about their unique, intersectional, and often marginalized identities. The series aims to promote inclusivity, a stronger sense of belonging among diverse students, and greater curiosity, understanding, and empathy among the broader college community. During this proposed session, we, both current and former students from diverse backgrounds, will continue the conversation through our own auto-ethnographic narratives. As students of marginalized identities often remain so when the college celebrates students' achievements, the Rall Symposium offers an ideal opportunity to continue the aims of the Exploring Identities project while acknowledging the many pathways to acquiring and disseminating knowledge, and the talent of authentic storytelling. We will be working with faculty members to research and practice storytelling skills in preparation for the session.

\*Denotes presenters

### Measuring Zoospore Shedding Rate of Water Molds on Different Host Species

*\*Dallas Gillson '26, Biology: Biomedical Science*

*\*Evelyn Kandler '26, Biochemistry*

*Advisor: Gregory Ruthig*

Infectious pathogenic microorganisms called water molds are common inhabitants of river and lake ecosystems. They can infect various aquatic animals, including native amphibians, vertebrates and invertebrates. We tested the shedding rate of water mold zoospores from dead and living hosts in nearby wetlands by performing a 96-well plate assay. We placed the animals in 20 ml water baths for 60 minutes and added the water to the 96-well plates that contained selective media which favored water mold growth. We tested waterbugs and snails and found that waterbugs had higher shedding rates than snails. Because water molds are multi-host pathogens, learning which species are better hosts is essential to understanding the ecology of these microorganisms.

### Vanished Without a Trace: The Evolution to the Disappearance of North Central College's Weekend College Program

*Mia Giometti '26, History/Social Studies and Secondary Education*

*Advisor: Ann Keating*

During President Gael D. Swing's tenure at North Central College, he remained committed to boosting student enrollment. After the Evangelical Theological Seminary property purchase, Swing was able to accomplish his goal with the establishment of the Center for Continuing Education, which offered a variety of programs for degree-seeking adults in the form of Weekend and Evening College. In the late 1980s and early 1990s, Weekend College was at its height, offering a surplus of courses in the most demanded majors. However, the program vanished in 2009 with no explanation, though it was clear that this program benefited the College, especially with enrollment and endowment. In a careful analysis of North Central's Chronicle of more than twenty articles between 1981 and 2009, I found that Weekend College boosted North Central College out of a time of hardship, and despite its disappearance, its impact still lingers on the campus to this day.

### Is There a Correlation Between Daytime Napping and Improved Athletic Performance Among Physically Active Individuals

*Nina Guitron '25, Masters of Athletic Training*

*Advisor: Taylor Arman*

Physically active individuals (PAIs) undergo physical and cognitive stresses when training. A full night of sleep is crucial for recovery, but it is not always possible; daytime napping compensates for the lost time. While many people find napping disadvantageous, some studies have shown the benefits of daytime napping on physical and cognitive functioning. Therefore, the focus of this critically appraised topic was to answer the clinical question: Is there a correlation between daytime napping and improved performance among physically active individuals? Three studies were appraised: two systemic reviews of randomized controlled trials and a meta-analysis. All studies earned a Level 1 on the CEBM Level of Evidence Scale (CEBM LOE) and between 26 and 27 on the PRISMA checklist. Based on this critical appraisal, evidence suggests that daytime napping positively influences the athletic performance and overall functioning of PAIs.

### Refining an Approachable Synthesis of Ruddlesden-Popper Type Lead Halide Perovskite Colloidal Quantum Dots for Undergraduate Experimentation

*Bel Holland '24, Chemistry*

*Advisor: Orion Pearce*

Colloidal perovskite quantum dots are a modern semiconductor material not widely integrated into the undergraduate lab setting due to syntheses requiring specialized conditions or materials. In this research, a synthesis of  $(\text{BA})_2\text{PbBr}_4$ ,  $(\text{BA})_2(\text{MA})\text{Pb}_2\text{Br}_7$ ,  $(\text{BA})_2(\text{MA})_2\text{Pb}_3\text{Br}_{10}$ , and  $(\text{MA})\text{PbBr}_3$  for undergraduate lab analysis is presented. The synthesis is done at room temperature, without specialized materials, and produces samples of isolated numbers. The produced quantum dots demonstrate photoluminescence and quantum confinement effects that can be used to teach undergraduate students about the nature of quantum confinement.

### Blackbeard and Differential Opportunity Theory

*\*Madeleine Hughes '25, Criminology*

*\*Alyssa Marcelain '26, Criminology*

*\*Erin O'Connor '26, Graphic Design*

*Wafa Syed '24, Psychology*

*Advisor: Raleigh Blasdell*

Edward Teach, more widely known as Blackbeard, is one of the most notorious pirates of all time. This research sought to examine and explain Blackbeard's crimes using criminological theory. Differential Opportunity Theory, coined by Richard Cloward and Lloyd Ohlin, explains deviant behaviors as utilizing illegitimate means to achieve a goal when access to legitimate means is unavailable. Considering the socio-political context following the War of the Spanish Succession, our findings suggest that Blackbeard's lack of access to legitimate life opportunities and access to preexisting subcultural paths to socially defined goals likely influenced his deviant and criminal behaviors. These findings illustrate the importance of intervention strategies to alleviate social conditions contributing to crime by developing programs to increase prosocial opportunities for success and the availability of meaningful employment.

*\*Denotes presenters*

## The Birth of an Icon: Art, Film, and Sissi, The Empress of Austria

Marina Jökanović '26, Musical Theatre and Art History

Advisor: Gregory Wolf

Adored by the masses but thwarted at court, Empress Elisabeth (1837-1898), nicknamed Sissi, sat beside Franz Joseph I on the Habsburg throne. Today, her fame reaches as far as the Dual Monarchy once did. Empress Elisabeth's status as the beloved royal beauty symbol and the 19th century Princess Diana is a product of her fairytale-like portrayal in art, film, and theater. My project explores how the Empress' tragedy continues to be represented through contrary lenses to suit various ideological and political purposes. While Romy Schneider's wide-eyed, innocent Sissi uplifted post-war Austria, Vicky Krieps' Elisabeth ridiculed social norms of the time. My project proves that interpretive and artistic liberties have forced Sissi's character to evolve alongside contemporary sensibilities. I argue that the Empress' on-screen persona is more of an ideological platform than a historical figure, more of a vessel of influence than an unhappy woman.

## Low-Dose Ketamine Does Not Impact Anxiety-Like Behaviors in Male and Female Sprague-Dawley Rats

\*Nicole Kwilosz '24, Behavioral Neuroscience and Psychology

Kelsey Morrison '24, Molecular Neuroscience

Stephanie Sherrod '24, Psychology and Molecular Neuroscience

Lukasz Teper '25, Psychology and Behavioral Neuroscience

Avinash Moses '25, Molecular Neuroscience

Ari Watts '26, Molecular Neuroscience

Natalie Falco '26, Molecular Neuroscience

Advisor: Michael Stefanik

Overdose deaths from opioid use disorder have risen over the past two decades, and there is a need for effective treatments to alleviate withdrawal symptoms such as heightened anxiety. Ketamine has recently been used to aid depression and anxiety, and our lab found that low-dose injections of ketamine decreased drug-seeking during withdrawal from oxycodone in male rats. It is not known what kinds of behaviors are impacted by ketamine. We hypothesized that ketamine may decrease drug-seeking by decreasing anxiety-like behaviors. To test this, male and female Sprague-Dawley rats were administered ketamine (6mg/kg, i.p.) or saline and immediately placed on an elevated plus maze to measure anxiety-like behaviors. Results indicate females have lower baseline levels of anxiety-like behavior compared to males. Ketamine administration did not impact anxiety measurements in either sex. This finding suggests that ketamine may reduce drug seeking by some other behavioral mechanism other than anxiety relief.

## The Nazi Venture to Revive Extinct Animals: Contemporary Implications

Anna Lakomiak '27, Undecided - School of Business

Advisor: Gregory Wolf

Broadly introduced in Diane Ackerman's 2007 novel, *The Zookeeper's Wife*, the work of Lutz and Heinz Heck, Third Reich directors of the Berlin and Munich Zoos, aims to complete the process of "de-extinction" by back-breeding domesticated animals to elicit traits of primeval, Germanic animals. My research explores the inner workings and outcomes of the Heck brothers' experimental probing, as the dangers that surfaced can translate into the modern development of genome editing. Building on the findings of Douglas Richmond, Jamie Lorimer, and Clemens Driessen, I argue that the product animals of the Heck brothers' de-extinction program are a representation of tangible nostalgia and nationalism for Nazi Germany, conceptually heightening the National Socialist ideas of racial superiority and purity. These Nazi efforts at achieving animal racial purity and superiority may then inevitably find themselves in modern de-extinction endeavors, such as CRISPR/Cas9, though not in the backdrop of National Socialist ideology.

## Investigating Transcriptional Changes in the Absence of PCM During Stationary Phase in *Escherichia coli*

Madison Lange '24, Biology: Biomedical Science

Advisor: Jonathan Visick

Over the lifespan of an organism, proteins are damaged from unfolding or misfolding, potentially causing loss of function of key protein. Damaged proteins have been linked to aging and autoimmune diseases. Our lab studies isoaspartyl protein damage, occurring from the isomerization of aspartate amino acids. The enzyme PCM can reverse the isomerization to repair the protein and has been shown to improve longevity in diverse organisms. Survival of *Escherichia coli* lacking *pcm* is reduced by protein unfolding stressors like heat or oxidation. We hypothesize PCM increases long-term survival of *E. coli* by maintaining protein folding. *E. coli*'s response to the lack of repair was examined by sequencing mRNA from *pcm+* and  $\Delta pcm$  strains. Bioinformatic analysis of sequencing revealed *ibpA* (a heat-shock chaperone) was overexpressed in  $\Delta pcm$  strains, supporting our hypothesis. Testing of  $\Delta pcm$  and  $\Delta ibpA$  mutants will be done under protein-unfolding stressors to examine the gene's role in *E. coli*.

\*Denotes presenters

## Phenotypic Effects of Various Mutations in the COX10 Gene

*\*Abigail MacKenzie '25, Biological Sciences*

*\*Kyle Mudler '25, Biochemistry*

*Advisor: Steve Johnston*

Leigh Syndrome is a genetic neurometabolic disease caused by mutations in genes contributing to a functioning oxidative phosphorylation pathway. One of the genes that can be mutated is COX10, which plays a vital role in the electron transport chain. This gene codes for the protein Cox10p, and this specific protein converts heme b to heme o. To better understand the clinical outcomes of patients with this disease, specific single amino acid mutations in Cox10p were chosen and studied in *Saccharomyces cerevisiae*. These variants included P213S, L258H, A303D, Q322P, and T380I. The function of these variants was assessed by measuring the ability of the yeast to grow on specialized media and by directly measuring COX activity. Based on the data collected all of the chosen mutants led to nonfunctional phenotypes in yeast.

## The Effectiveness of a Student-Led Campus Event on Improving Students' Knowledge of the Benefits of Exercise on the Brain

*Marissa Madl '26, Exercise Science*

*Advisor: Rachel Luehrs*

Many college students know the benefits of physical activity on physical health, but few understand its benefits on mental health and cognitive function. EXSC 390 students hosted a scavenger hunt event to educate students on the benefits exercise has on the brain. Twenty-four hours after the event, the research team administered a survey to students who attended the event to develop an understanding of the knowledge they gained from this event. Fifteen college students completed the survey. A control group of 16 college students who did not attend the event also completed the survey. Results demonstrated that both groups (control and experimental) thought exercise effectively improved mental health ( $p = .605$ ). A greater number of students who attended the event felt that exercise is linked with higher academic performance ( $p = .014$ ). The findings suggest that the scavenger hunt event was beneficial in educating students about the benefits of exercise on academic performance.

## Feeling of Belonging in Higher Education: Social Identity and Student Success Factors

*Juan Martinez '23, Psychology*

*Advisor: Liana Peter-Hagene*

This study investigated higher education student belonging and its correlational relationships with social identity, socio-economic status, grade-point average, status as first-generation student, and status as an on-campus resident. Data was collected via survey from college students ( $N = 57$ ). As predicted: the more a participant endorsed a marginalized identity (identifying as a racial / ethnic minority, gender minority, sexual minority, transgender, or disabled), they then had lower belonging; the higher the grade-point average a participant reported, they then had higher belonging; and when a student responded yes to being of first-generation status, they then had lower belonging. However, contrary to what this study predicted: the higher a student self-reported their socio-economic status, they did not then have higher belonging; and when a student responded yes to being an on-campus resident, they did not then have higher belonging. Findings implicate that belonging correlates with many parts of a student's identity.

## Modernizing Calorimetry in Undergraduate Lab Curriculum

*Alyssa Mead '26, Nuclear Medicine Technology*

*Advisor: Orion Pearce*

It is imperative that data collection in undergraduate labs is repeatable, guiding students to make inferences which model classroom concepts. The sensitivity of North Central's current Parr 1451 Solution Calorimeter records inconsistent enthalpy measurements of diprotic acids. This research identified alternative methods for students to achieve consistent enthalpy data. Instability of the singly deprotonated succinic acid species causes isolation of the first enthalpy of deprotonation to be mechanistically difficult. The implementation of a thermometric titration provides manual control of solution temperatures and equivalences. Students can manipulate these variables to define clear endpoints of the first and second enthalpy, thereby reducing the effects of hypothesized molecular rearrangement. We found the reverse reaction, in which disodium succinate was protonated with excess 1M hydrochloric acid, yielded the most precise measurements. In alignment with the college's ongoing awareness for green energy, a second laboratory procedure examining energy storage in hydrated salt bonds was refined.

*\*Denotes presenters*

## Effects of Low-Dose Injections of Ketamine on Memory in Male Sprague Dawley Rats

\*Kelsey Morrison '24, Molecular Neuroscience

Nikki Kwilosz '24, Psychology and Behavioral Neuroscience

Avinash Moses '25, Molecular Neuroscience

Stephanie Sherrod '24, Psychology and Molecular Neuroscience

Lukasz Teper '25, Psychology and Behavioral Neuroscience

Ari Watts '26, Molecular Neuroscience

Natalie Falco '26, Molecular Neuroscience

Advisor: Michael Stefanik

Ketamine, known for treating pain and depression, has recently gained attention for its use in treating substance use disorders (SUDs). Our lab found that sub-anesthetic injections of ketamine during withdrawal from oxycodone self-administration reduced drug seeking behavior in male rats. However, the mechanism for this effect is not known. Because ketamine is known to have amnesic properties, we tested if this reduction is related to memory impairment. Animals were trained to find a hidden platform in a Morris Water Maze (MWM; a classic test of learning and memory), then low-dose injections of ketamine (6mg/kg, i.p.) was administered to 20 male Sprague Dawley rats for 14 consecutive days. During training, animals decreased their latency to find the hidden platform. Two-way repeated-measures ANOVAs showed that latency did not change following daily ketamine injections, indicating the drug did not impact memory. These findings demonstrated that ketamine may impact other aspects of oxycodone seeking.

## Comparing MedPC and ANY-Maze Operant Chamber Data Collection During Cocaine-Seeking and Cue-Induced Reinstatement in Differentially Reared Rats

\*Trinity Murray '26, Molecular Neuroscience

\*Benjamin Klemm '25, Psychology

\*Shephanie Sherrod '24, Molecular Neuroscience and Psychology

Richard Mills, Stoelting Co. and Adjunct Professor at North Central College

Margaret Starr, Stoelting Co.

Advisor: Margaret Gill

Drug addiction is a multi-factorial disorder and environmental factors during childhood impact susceptibility to addiction during adolescence. Rearing rats in enriched (EC), social (SC), and impoverished (IC) conditions show similar changes as EC rats display a protective effect, seeking less drug than IC and SC rats. Male Sprague Dawley rats were reared in the three conditions and were trained to self-administer cocaine. Hardware and software interfaces for either MedAssociates and ANY-maze were utilized. Throughout cocaine self-administration and reinstatement, there were no effects of rearing or hardware/software on drug-seeking behavior. The EC rats responded significantly less than IC and SC rats throughout extinction. IC ANY-maze rats sought cocaine significantly more than EC and SC ANY-maze rats during cue-induced reinstatement. The current study highlights potential gaps in care that humans with differing socioeconomic statuses could be receiving from our healthcare systems.

## Homosexuality and the Holocaust

Natalie Nestler '25, Elementary Education

Advisor: Shereen Ilahi

This research discusses how Hitler turned sexually progressive Weimar Germany into a deeply homophobic nation. Paragraph 175 of the German Penal Code outlawed sex between two men. In 1929, an appeal to Paragraph 175 was passed and decriminalization began. Once the Nazis came into power, they stopped the appeal and broadened Paragraph 175 to include any "lewd activity" between two men to broaden prosecution. The Nazis revised this law to make homosexuality illegal. Thereby resulting in the deportation of 10-15,000 gay men to concentration camps where they were subjected to torture including experimentation, forced labor, and sexual assault. This research was conducted using the historical method of analyzing primary and secondary sources, including those written by gay men, Seel Pierre and Heinz Heger who survived the Holocaust. These autobiographies give a detailed first-person account of what it was like to face Nazi prosecution as a gay man.

## Complementary or Substitute Goods: An Economic Analysis of Marijuana and Alcohol

Noah Obermeyer '24, Psychology and Behavioral Neuroscience

Advisor: Najrin Khanom

We investigate the question of whether alcohol is a substitute or complementary good for marijuana. We utilize a staggered fixed effect difference and differences model, utilizing alcohol consumption data based on gallons of alcohol, per capita consumption rates for ages 14+ and 21+. This data is broken down by beer, wine, spirit, and all three together. Finally, this idea is considered from both a legal medicinal standpoint and a legal recreational standpoint in time. Our gallons of beverage measures is insignificant. Our ethanol per capita study provides significant evidence that consumption of spirits, wine, and overall per capita decreases after the legalization of marijuana. In addition, our study shows no effect of age on beverage type consumption or overall consumption. Recreational marijuana legalization leads to a stronger decrease of alcohol consumption.

\*Denotes presenters



## Will Athletes With an Acute Sport-Related Concussion Have a Faster Recovery If They Start Aerobic Exercise After the Concussion Occurs?

Marlena Osterhues '25, Masters of Athletic Training

Advisor: Taeopae Wetterman

A sport-related concussion (SRC) is a mild traumatic brain injury that occurs during sport or physical activity. SRC's are common injuries in athletes, and there is strong evidence that physical activity and aerobic exercise (AE) are beneficial as an intervention. Previous recovery consisted of the cocooning method, sitting in a dark room with no physical or cognitive stimulation, until research found that wasn't the best approach for recovery. Therefore, the goal of this clinically appraised topic was to answer the question: Will athletes with an acute sport-related concussion have a faster recovery if they start AE after the concussion occurs? Three cohort studies with level 4 evidence were appraised. After reviewing the articles, research found that athletes who participated in AE closely following their concussion had a quicker recovery, decreased symptoms, and a faster return to play, which supports the use of AE as an intervention in concussion recovery.

## Sports vs. Clubs: Conforming With Peers

\*Natalie Peters '24, Psychology

\*Elsie Vences '24, Psychology

Mia Rogers '25, Humanities and Psychology

Advisor: Marissa Bamberger

Prior research supports the effect of conformity on individuals' behavior. Less is known about online conformity and its relationship to extracurricular or sport-team involvement. This study aimed to determine whether self-reflective journaling with pressure to conform would affect students' comfort in sharing responses and whether this would differ depending on club or sport-team involvement. Participants responded to a self-reflective journaling prompt, then randomly assigned to a conformity intervention (sample peer journal entry and graph of peers' comfort sharing) or control. A questionnaire measured participants' comfort sharing. The findings suggest a statistically significant intervention-by-sport-involvement interaction effect on participants' comfort-sharing responses. Participants with sport-team involvement were more comfortable sharing responses when in the control than the conformity condition. The opposite was found among those with no sport-team involvement. The findings suggest that student-athletes are more resistant to conformity than their peers, which might affect their response to external peer pressures.

## Arthroscopic Hip Treatment & Return to Play Outcomes: A Critically Appraised Topic

Abby Pyburn '25, Masters of Athletic Training

Advisor: Taylor Arman

Hip joint injuries in high-level athletes are prevalent in competitive play, with most being managed conservatively. This critically appraised topic (CAT) aims to answer the question of how arthroscopic hip treatment affects return-to-play outcomes in high-level athletes. Three articles were selected based on the established inclusion and exclusion criteria. The articles received a 2a and 25/27 PRISMA score, 2c and 17/22 PRISMA score, and 2a and 20/27 PRISMA score. Based on this CAT, the clinical bottom line is that arthroscopic hip surgery is an effective treatment for returning to play at a highly competitive level. Two studies showed promising return to sport (RTS) rates at 93%. It is important to know if an athlete is considering arthroscopic hip surgery, there are promising success rates, few complications, and a high return to sport.

## Retinal Image Pre-Processing Using Equalization and thResholding (RIPPER)

\*Santiago Ramirez '26, Computer Science and Finance

\*Ethan Ebarvia '25, Computer Science

\*Nicholas Quigley '24, Computer Science

Advisor: Nnamdi Nwanze

The goal of this work is to provide a supervised training dataset to machine learning algorithms used to automate the detection of cardiovascular diseases (CVD) and eye health problems. The eyes allow non-invasive examination of the body's blood vessels which increases accesses to better health observation. Recent research, however, has shown that fundus images segmented by experts can be up to 20% incorrect. The use of a preprocessing technique (Retinal Image Pre-Processing Using Equalization and thResholding) allows non-experts to more accurately segment images with little to no training. Combining multiple independent segmentations of a single fundus image further serves to reinforce identified ocular vessels and reduce error rates. Composite segmentations can then be used as part of a supervised dataset to train and test machine learning approaches to retinal vessel segmentation and classification.

\*Denotes presenters

## Exploring the Relationship Between Overdose Fatalities and Correctional Funding Using Data Mining Techniques

Theresa Rumoro '24, Computer Science

Advisor: Nnamdi Nwanze

The opioid crisis is a prevalent issue resulting in numerous drug overdose fatalities. Understanding trends that lead to overdosing is vital for policymaking and resource allocation. Data mining techniques can reveal correlations between correctional funding and the opioid crisis. A multitude of socioeconomic factors have been examined thoroughly in past research. This paper, on the other hand, highlights the overlooked influence of policing on the opioid crisis using computer science methodologies. The work conducted shows that there is a direct relationship between correctional funding and overdose fatalities. Spearman's correlation analysis conducted on datasets containing correctional funding and overdose information demonstrated this direct relationship. Midwest states, notably the East North Central Division, demonstrate the highest correlation, indicating a complex effect with multiple impacts. These findings prove the significance of employing data mining techniques to display relationships between correctional funding and overdose fatalities.

## Exploring Interactions Between Museums and Theme Parks

Nathan Schwartzkopf '24, History and French & Francophone Studies

Advisor: Nicole Rivera

This study explores the ever fluid relationship between museums and theme parks, the design decisions they share, and the ways they can inform each other. While museums traditionally lean into their educational aspects, there has been a growing trend towards the incorporation of more dramatic presentation and technology to assist in creating an experience. Modern museums appear to be investing in edutainment, a combination of entertainment and education. Some museum professionals have expressed concern at these trends, fearing a loss of authenticity, effectiveness, and status for museums. Notes from a field visit to EPCOT at Walt Disney World are analyzed alongside semi-structured interviews with museum professionals. Although museums and theme parks are typically discussed in opposition, EPCOT presents an interesting case for the collaboration between museums and theme parks. Working alongside accredited institutions, EPCOT's galleries are easily accessible and often provide unique, rich cultural insights to the park's World Showcase.

## Cupping Therapy as Pain Management in Patients With Chronic Neck and Shoulder Pain: A Critically Appraised Topic

Clairese Urchell '25, Masters of Athletic Training

Advisors: Kendall Selsky and Taylor Arman

Chronic neck and shoulder pain are public health problems that affect a large amount of the adult population. Cupping therapy is commonly used to treat these conditions, however, there is limited evidence to support the use of cupping therapy to decrease pain in patients with chronic neck and shoulder pain. Therefore, the goal of this critically appraised topic is to determine the effects of cupping therapy on pain among patients with neck and/or shoulder pain. Four studies were appraised which consisted of well-designed, level 2 and 3 randomized controlled trials and a level 2 controlled pilot study. The results of the appraisal of evidence reveal statistically significant decreased pain in patients after cupping therapy when used for the treatment of chronic neck and shoulder pain. In summary, this evidence supports the use of cupping therapy for treatment of chronic neck and shoulder pain.

\*Denotes presenters

## KPC Mouse Pancreatic Cells Demonstrate Thermal Sensitivity

Thomas-Shadi Voges '24, Biochemistry and Mathematics

Advisor: Nancy Peterson

Pancreatic cancer is a devastating disease with an extremely low survival rate of 12%. Heat based treatments can enhance standard cancer therapies and may offer advantages in treating pancreatic cancer. When considering this type of therapy for future studies, it is important to know the appropriate thermal dose that inhibits the growth of pancreatic cancer cells. We used water bath hyperthermia and clonogenic survival assays to determine a surviving fraction of KPC mouse pancreatic cancer cells based on their ability to form colonies after exposure to various thermal doses, 37, 39, 41, 42, 43, and 44 °C for one hour. We found that KPC cells show a median 50% decrease from control in their ability to grow after treatment at 42 °C for one hour and a median 99% decrease from control after 43 °C for one hour. We conclude that KPC cells are thermally sensitive, motivating future studies with these cells.

## Energy State Approximation for Different Island Configurations

Nicholas White '26, Mathematics and Physics

Advisor: Susan Kempinger

Using simulation software MuMax3, we can determine if estimation of systems of multiple dipoles can be accurately estimated from two-dipole systems. Different three island systems can be simulated with disconnected islands or different configurations of connected dipole islands. Running the simulations of these configurations and comparing them to the expected values from the two dipole configurations, we arrived at extremely accurate results for estimation. Using these estimation techniques can save on computing power of certain multiple dipole configurations, and hopefully will lead to finding other ways to accurately extend descriptions to larger and larger systems.

## Creating a Socialist Identity: The Iconography of East German Political Posters

Alexander Wickersheim '26, German and Secondary Education

Advisor: Gregory Wolf

Founded in East Germany, the Socialist Unity Party of Germany (SED) not only controlled the government, but also used the media and propaganda to achieve their ideological goals. The SED employed its propaganda to create a specific socialist East German identity. My research focuses on how the SED crafted iconographic propaganda to influence the East Germans to accept socialism. I examine how the Socialists constructed visual representations of a distinct East German identity, as depicted in propagandistic art and political posters, which contributed to a profound change in East German society. The SED iconography promoted LPGs (large-scale collectivist farms), VEBs (publicly owned enterprises), and the FDGB (Free German Trade Union Federation) to create the socialist identity. Influenced by Childs, Husband, Kenntemich, Durniok, and Karlauf, I argue that these visual messages reform the East German identity through a rejection of the past and embracement of socialism.

*\*Denotes presenters*

# 48TH ANNUAL HONORS CONVOCATION 1:30 - 3:30 p.m.

Wentz Concert Hall, Fine Arts Center

\*Processional. . . . . "Proud Heritage" by William Latham  
North Central College Concert Winds . . . . . Dr. Lawrence Van Oyen, Conductor  
*Audience will please stand.*

Invocation. . . . . Rev. Eric Doolittle, Chaplain

Welcome . . . . . Dr. Anita Thomas, President

Awards Introduction. . . . . Dr. Abiódún Gòkè-Pariolá, Provost and Vice President for Academic Affairs

## COLLEGE OF ARTS & SCIENCES

ART and DESIGN . . . . . Ms. Hale Ekinci  
Diane Duvigneaud Senior Art Award: **Shelby Brown**  
Outstanding Major in Art and Design: **Austin Scott**

BIOCHEMISTRY . . . . . Dr. Stephen Johnston  
Outstanding Major in Biochemistry: **Thomas-Shadi Voges**

BIOLOGY . . . . . Dr. Gregory Ruthig  
Outstanding Major in Biology: **Justyn Salas**

CHEMISTRY and PHYSICS  
Outstanding Major in Chemistry: **Maria Alvarado** . . . . . Dr. Jeffrey Jankowski  
Outstanding Major in Physics: **Andrew Garcia** . . . . . Dr. Paul Bloom

COMMUNICATION and MEDIA STUDIES . . . . . Dr. Steve Macek  
John Madormo Outstanding Student Broadcaster: **Jesse Hudgins**  
Outstanding Major in Communication Studies: **Olivia Rosenberg**  
Outstanding Student in Forensics: **Hannah Pruett**  
Outstanding Major in Interactive Media Studies: **Andjela Kesar**  
Outstanding Major in Journalism and Media Communication: **Samuel Corbett**  
Outstanding Major in Organizational Communication: **Hannah Pruett**

COMPUTER SCIENCE and ENGINEERING . . . . . Dr. Donghwoon Kwon  
Outstanding Major in Computer Science: **Joshua Buhr**

ENGLISH STUDIES . . . . . Dr. Jennifer Smith  
Outstanding Major in English: **Elizabeth Morris**  
Outstanding Major in Literature: **Rebecca Elsen**  
Outstanding Major in Writing: **Julianne Billings**

HISTORY . . . . . Dr. Luke Franks  
Outstanding Major in Social Science/History: **Jennifer Smith**  
James Henry Breasted Class of 1890 Outstanding Major in History: **Nathan Schwartzkopf**

MATHEMATICS.....	Dr. Katherine Heller
Outstanding Major in Actuarial Science: <b>Simona Hudakova</b>	
Outstanding Major in Applied Mathematics: <b>Jeffrey Hemmelgarn</b>	
Outstanding Major in Mathematics: <b>Griffin Chapman</b>	
 MECHANICAL and ELECTRICAL ENGINEERING	
Outstanding Major in Mechanical Engineering: <b>Luke Zobrist</b> .....	Dr. Erfanul Alam
Outstanding Major in Electrical Engineering: <b>Christopher Fultz</b> .....	Dr. Daniel Rico-Aniles
 MODERN and CLASSICAL LANGUAGES .....	Dr. Norval Bard
Outstanding Student in Chinese: <b>Julia Vitucci</b>	
Outstanding Student in French: <b>Nathan Schwartzkopf</b>	
Outstanding Student in German: <b>Alexander Wickersheim</b>	
Outstanding Student in Japanese: <b>Junrong Qian</b>	
Outstanding Student in Spanish: <b>Maren Wilder</b>	
 MUSIC.....	Dr. Susan Chou
Clarence Juhnke Outstanding Music Major Award: <b>Colin Kampschroer</b>	
Outstanding Major in Music Education: <b>Taylor Woods</b>	
 PHILOSOPHY and RELIGIOUS STUDIES	
Outstanding Major in Philosophy: <b>Evan Gray</b> .....	Dr. Shaheen Moosa
Outstanding Major in Religious Studies: <b>Vivian Thurmond</b> .....	Dr. Shelley Birdsong
 POLITICAL SCIENCE .....	Dr. William Muck
Outstanding Major in Political Science: <b>Ethan Garard</b>	
 PSYCHOLOGY and NEUROSCIENCE	
Outstanding Major in Psychology: <b>Nicole Brandy</b> .....	Dr. Daniel VanHorn
Outstanding Major in Neuroscience: <b>Faith Bicking</b> .....	Dr. Karl Kelley
 SHIMER GREAT BOOKS SCHOOL .....	Dr. Stuart Patterson
Outstanding Student in the Shimer Great Books School: <b>Mia Rogers</b>	
 SOCIOLOGY, CRIMINOLOGY and ANTHROPOLOGY	
Outstanding Major in Sociology: <b>Abigail Black</b> .....	Dr. Louis Corsino
Outstanding Major in Criminology: <b>Sarah Andrey</b> .....	Dr. Raleigh Blasdel
Outstanding Major in Anthropology: <b>James Fetzer</b> .....	Dr. Matthew Krystal
 THEATRE.....	Dr. Laura Lodewyck
Outstanding Major in Musical Theatre: <b>Tariq Griffin</b>	
Outstanding Major in Theatre: <b>Christopher Talia</b>	
Outstanding Major in Theatrical Design and Technology: <b>Clare Salazar</b>	

## SCHOOL OF BUSINESS & ENTREPRENEURSHIP

ACCOUNTING.....	Ms. Sarah Kostelny
Outstanding Major in Accounting:	<b>Michael Klazura</b>
ECONOMICS and FINANCE.....	Dr. Gwendolyn Tedeschi
Outstanding Majors in Economics:	<b>Robert Behmer and Jeffrey Hemmelgarn</b>
Outstanding Major in Finance:	<b>Nathan Stalilionis</b>
HUMAN RESOURCE MANAGEMENT.....	Dr. Michael Montanye
Outstanding Majors in Human Resource Management:	<b>Katherine Huey and Erica Johnson</b>
MANAGEMENT and MARKETING	
Outstanding Major in Management:	<b>Nathan Halbrader</b> ..... Dr. Jeffrey Anstine
Outstanding Major in Marketing:	<b>Kaytlyn Tyler</b> ..... Dr. Donnavieve Smith

## SCHOOL OF EDUCATION & HEALTH SCIENCES

EDUCATION .....	Dr. Bruce Spitzer
Outstanding Major in Elementary Education:	<b>Paige Arendt</b>
Outstanding Major in Secondary Education:	<b>Justin DeCanio</b>
KINESIOLOGY.....	Dr. Kendall Selsky
Outstanding Major in Exercise Science:	<b>Jessica Ramirez</b>
HEALTH SCIENCES	
Outstanding Major in Health Science:	<b>Sierra Van Craenenbroeck</b> ..... Dr. Kristin Paloncy-Patel
Outstanding Major in Sport Management:	<b>Paige Runkle</b> ..... Dr. Jason Rice

## INTERDISCIPLINARY STUDIES

EAST ASIAN STUDIES.....	Dr. Brian Hoffert
Outstanding Major in East Asian Studies:	<b>Tori Seggebruch</b>
GLOBAL STUDIES .....	Dr. William Muck
Outstanding Major in Global Studies:	<b>Selemani Kamarindo</b>
ENVIRONMENTAL STUDIES.....	Dr. Reed Perkins
Outstanding Major in Environmental Studies:	<b>Ian LaPat</b>
INTERDISCIPLINARY STUDIES .....	Ms. Melissa Proulx
Dr. Francine G. Navakas Student in Interdisciplinary Studies:	<b>Raygn Jordan</b>

**RECOGNITIONS**

Class of 2024 College Scholar Honors Theses [see page 31] ..... Dr. Jennifer Jackson  
Scholar All-Americans [see page 32] ..... Dr. Daniel VanHorn

**COLLEGE AWARDS**

Outstanding Service to Student Life Award ..... Dr. Jessica Brown  
Award Recipient: **Jovany Hernandez**  
Margaret Youel Award ..... Dr. Jessica Brown  
Harold R. Wilde Distinguished Service Award ..... Ms. Paige Kozial  
Megan Sweeney '01 Award ..... Dr. Karl Kelley  
Award Recipient: **Erica Johnson**  
Outstanding Senior Awards ..... Dr. Anita Thomas  
Closing Remarks ..... Dr. Anita Thomas  
Alma Mater

North Central is the school we love,  
To her we sing this praise,  
And from the East and from the West  
You hear the voices raise...  
Hail! Hail! North Central Hail!  
Our Alma Mater true,  
We'll always, always loyal be  
To you, to you, to you.

\*Recessional ..... "Proud Heritage" by William Latham

*Please stand and remain in seats until faculty process out.*

*An Honors Reception will be held in the Wentz Concert Hall Lobby  
immediately following the Convocation.*

\*Audience will please stand.

## COLLEGE SCHOLAR HONORS THESES

<i>Student</i>	<i>Director</i>	<i>Thesis Title</i>
William Adamchik . . . . .	Rachel Luehrs . . . . .	Preparation of Incoming Freshmen: Understanding Capabilities and KPIs
Natalie Barnes . . . . .	Leila Azarbad. . . . .	I Won't Dance, Why Should I? Using Self-Determination Theory to Explore Persistence and Dropout Among Competitive Dancers
Angela Beniulyte . . . . .	Laura Lodewyck. . . . .	A Systemic Review of Patient Satisfaction and Accessibility with TeleRehabilitation
Faith Bicking . . . . .	Karl Kelley. . . . .	Analyzing the Ecological and Construct Validity of Executive Function Assessments: TrailsX and Wisconsin Card Sorting Test
Paulina Bogdan . . . . .	Amy Buxbaum . . . . .	"A Double-Edged Sword" - How Communication Styles, Gender Dynamics, and Mentorship Affects Women in Leadership
Nicole Brandy. . . . .	Nicole Rivera . . . . .	Navigating Autism: Caregivers Perspectives
Elena Buscher. . . . .	Lindsay Wexler . . . . .	Studying the Impact of the COVID-19 Pandemic on Reading Comprehension Teaching Strategies at the Elementary Level
Hannah Campbell. . . . .	Kristin Paloncy-Patel. . . . .	Primary Healthcare Services in Developing and Developed Nations: A Comparative Study of Tanzania and the United States
Julie Concepcion. . . . .	Jeffrey Jankowski. . . . .	Quantifying the Amount of Caffeine in Coffee Beans using FT-IR
Tessa DeJonge . . . . .	Shaheen Moosa . . . . .	The Cost of Control: The Implications of Overturning Roe v. Wade
Tyler Donovan. . . . .	Krystina Sarff . . . . .	Mental health and student-athletes: How the mental health education level of the surrounding support affects the student-athlete
Erica Johnson. . . . .	Karl Kelley. . . . .	Growing Through Life: Can Sense of Coherence Training Positively Affect College Student Leaders?
Ian LaPat . . . . .	Gregory Ruthig . . . . .	Validating the use of filter paper as a non-invasive hormone monitoring technique in <i>L. tasmaniensis</i>
Reese McMullen . . . . .	William Muck . . . . .	A Cooler World: Comparative Analysis of Climate Mitigation Strategies within the Paris Agreement Framework
Elizabeth Morris . . . . .	Lisa Long . . . . .	Dead Shot
Kelsey Morrison . . . . .	Michael Stefanik . . . . .	Sub-anesthetic injections of ketamine have no significant impact on memory in male Sprague Dawley rats
Shelby Ottum . . . . .	Krystina Sarff . . . . .	The Effects of Youth Team and Individual Sport Participation on Self-Esteem Development
Theresa Rumoro . . . . .	Nnamdi Nwanze . . . . .	Exploring the Relationship Between Overdose Fatalities and Correctional Funding using Data Mining Techniques
Nathan Schwartzkopf. . . . .	Nicole Rivera . . . . .	Exploring Interactions Between Museums and Theme Parks
Grace Shelly. . . . .	Nicole Rivera . . . . .	A Look Into the Accessibility of Special Education in Rural Schools
Julia Siston . . . . .	Kim Milano . . . . .	The Intake of Omega-3 Fatty Acids and Depression in College Athletes
Tahbata Zuniga Diaz. . . . .	Suzanne Chod . . . . .	When You Were Enough: The carefully crafted creation and legacy of the first Female President

## RICHTER INDEPENDENT STUDY FELLOWSHIP RECIPIENTS

<i>Student</i>	<i>Thesis Title</i>
Maren Anderson . . . . .	The Pandemic in Highland Maya Perspective: Phase II
James Fetzer. . . . .	The Pandemic in Highland Maya Perspective: Phase II
Tejaswini Baskar Joshi . . . . .	Sustainable Coffee Farming in Guatemala
Ian LaPat. . . . .	Sustainable Coffee Farming in Guatemala
Ian LaPat. . . . .	Validating the use of filter paper as a non-invasive hormone monitoring technique in <i>L. tasmaniensis</i>

*\*Denotes presenters*



# SCHOLAR ALL-AMERICANS

## Men's Soccer 2023

CSC Academic All-American: Aidan Westerberg  
USC Scholar All-American: Aidan Westerberg  
Jack Swartz Academic All-Conference Honoree: Aidan Westerberg

## Women's Soccer 2023

USC Scholar All-American: Sarah Andrey, Elle Sutter  
Jack Swartz Academic All-Conference Honoree: Elle Sutter  
CSC Academic All-American: Elle Sutter

## Women's Triathlon 2023

CTCA Scholar All-Americans: Natalie Grolmes, Hailey Poe, Scarlett Schuth

## Football 2023

CSC Academic All-Americans: BJ Adamchik, Luke Lehnen, Jeske Maples  
NCAA Elite 90 Award recipient: Bobby Behmer

## Men's Cross Country 2023

USTFCCCA Team Academic Award  
USTFCCCA All-Academic: Drew Guimond, Matt Jett, Jacob Kluckhohn, James McGlashon, Braden Nicholson, Connor Riss, Max Svienty, BJ Sorg

## Women's Cross Country 2023

USTFCCCA Team Academic Award  
USTFCCCA All-Academic: Lily Anderson, Julia Benes, Nicole Brandy

## Women's Volleyball 2023

AVCA Team Academic Award

## Men's Wrestling 2023 - 2023

NWCA Scholar All-American: Robert Precin

## Women's Wrestling 2022 - 2023

NWCA Scholar Team Champions  
NWCA Scholar All-Americans: Yele Aycock, Kendall Bostelman, Dakota Drew, London Houston, Tiera Jimerson, Amani Jones, Yelena Makoyed, Shelby Ottum, Malea Palahniuk, Sydney Park, Sydney Petzinger, Kendra Ryan, Sara Sterner, Halle White, Amaya Yoshizumi

## Men's Swimming and Diving 2022 - 2023

CSCAA Scholar All-America Team

## Women's Swimming and Diving 2022 - 2023

CSCAA Scholar All-America Team

## Men's Tennis 2022 - 2023

ITA Division III Scholar Athletes: Matthew Crossland, Jacob Mersch, Ethan Sherman, Javier Suarez Balsera

## Women's Tennis 2022 - 2023

ITA Division III Scholar Team  
ITA Division III Scholar Athletes: Liveta Ezerskis, Anna Fox, Laura Fox, Kayla McSweeney, Nina Patience, Kaeli Smashey

## Men's Golf 2022 - 2023

GCAA All-Academic Team Award

## Women's Golf 2022 - 2023

WGCA All-Scholar Team GPA Award  
WGCA All-American Scholars: Mallorie Clifton, Tatiana Cooper, Kaitlin Kendrick, Katelynne Rostis, Sarah Tanny

## Men's Track and Field 2022 - 2023

USTFCCCA All-Academic Team  
USTFCCCA All-Academic: Drew Guimond, Braden Nicholson, Connor Riss, Max Svienty, Logan Tanttu

## Women's Track and Field 2022 - 2023

USTFCCCA All-Academic Team  
USTFCCCA All-Academic: Julia Babinec, Gwen Berenyi, Annie Brandt, Alexandra Draves, Mercedes Jackson, Natalie Johnson, Hannah Jones, Kyla Miller, Cali Minkie, Lindsey Novak  
Jack Swartz Academic All-Conference Honoree: Lindsey Novak

## Men's Volleyball 2023

AVCA Academic Team Award  
Jack Swartz Academic All-Conference Honoree: Jeremy Cardenas

## Baseball 2023

ABCA Team Academic Excellence Award

## Men's Lacrosse 2023

USILA Scholar All-Americans: Jake Allgood, Trenton Herubin, Jack Moran, Nick Rubino

## Women's Lacrosse 2023

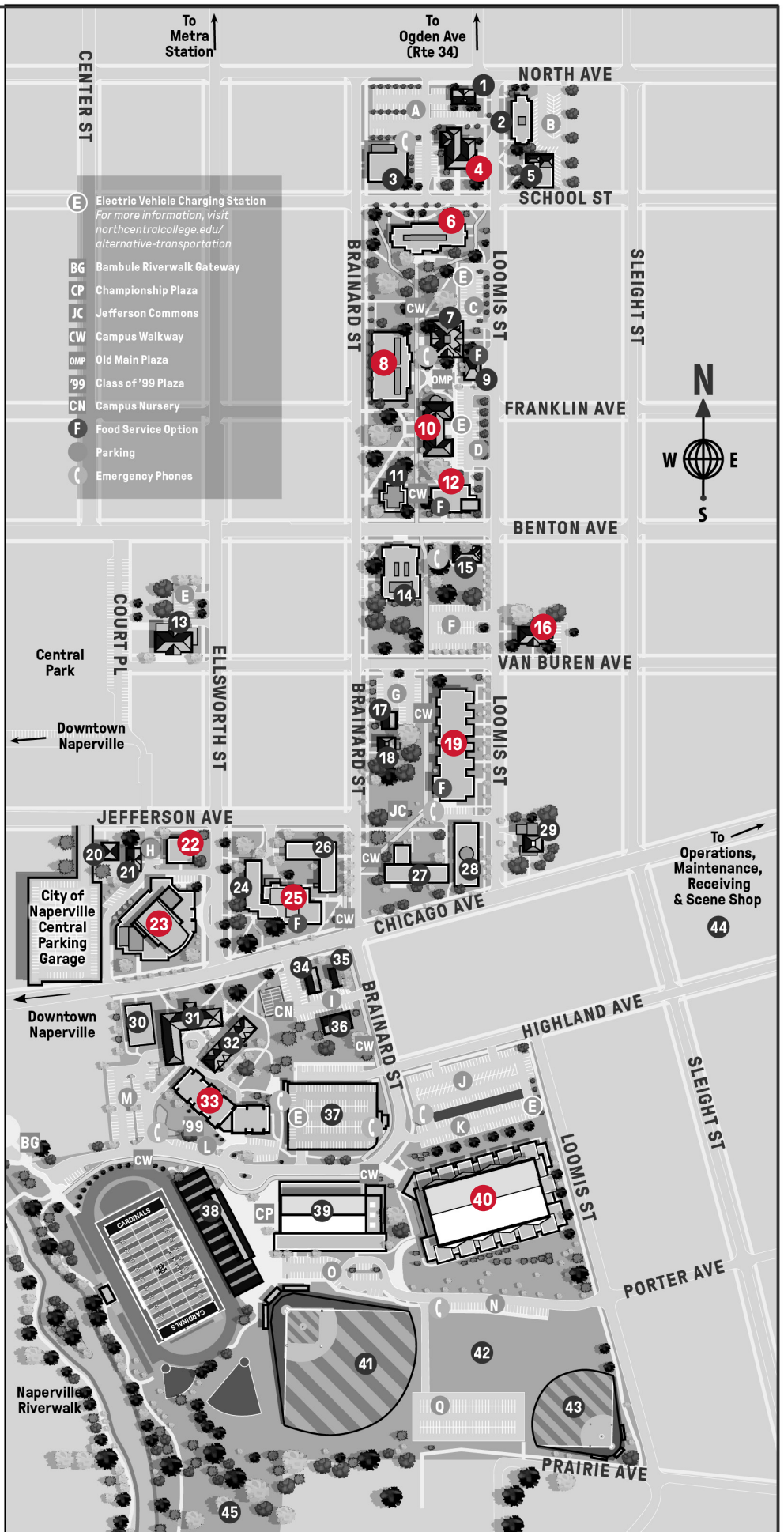
IWLCA Team Academic Honor Squad  
IWLCA Academic Honor Roll: Tanya Czosek, Abbey Triebe, Julia Clarke, Simona Hudakova, Reese McMullen, Abby Tointon



# NORTH CENTRAL COLLEGE 1861

30 N. Brainard Street • Naperville, IL 60540  
630.637.5100 • northcentralcollege.edu

1. **225 N. Loomis House** [H225]
2. **Kimmel Residence Hall** [KL] 224 N. Loomis St.
3. **Larrance Academic Center** [LAC]  
309 E. School St.
4. **Kiekhofler Hall and Koten Chapel** [KH]  
329 E. School St.
5. **Seybert Hall** [ST] 208 N. Loomis St.
6. **Oesterle Library & Learning Commons** [LIB] 320 E. School St.
7. **Goldspohn Hall** [G] 31 N. Loomis St.
8. **School of Business & Entrepreneurship** [BE]  
40 N. Brainard St.
9. **Rolland Center Boilerhouse Café** [RC]  
29 N. Loomis St.
10. **Old Main** [OM] 30 N. Brainard St.
11. **Carnegie Hall** [C] 10 N. Brainard St.
12. **Harold and Eva White Activities Center** [WAC]  
325 E. Benton Ave.
13. **Meiley-Swallow Hall** [MS] 31 S. Ellsworth St.
14. **Pfeiffer Hall** [PH] 310 E. Benton Ave.
15. **5 S. Loomis St.** [H326/5]
16. **A.A. Smith House** [H28] 28 S. Loomis St.
17. **116 S. Brainard House** [H116]
18. **Hammersmith House** [H120/122]  
120/122 S. Brainard St.
19. **Wentz Science Center** [WSC] 131 S. Loomis St.
20. **40 E. Jefferson House** [H40]
21. **Abe House** [H48] 48 E. Jefferson Ave.
22. **Campus Store** [B100] 100 E. Jefferson Ave.
23. **Wentz Concert Hall/Fine Arts Center** [FAC]  
171 E. Chicago Ave.
24. **Geiger Residence Hall** [GR] 221 E. Chicago Ave.
25. **Kaufman Dining Hall** [K] 221 S. Brainard St.
26. **Rall Residence Hall** [RL] 211 S. Brainard St.
27. **Seager Residence Hall** [SR] 311 E. Chicago Ave.
28. **Schneller Residence Hall** [SSH]  
147 S. Loomis St.
29. **President's House** 409 E. Chicago Ave.
30. **Wentz Center for Health Sciences & Engineering**  
160 E. Chicago Ave.
31. **Patterson Residence Hall** [PRH]  
180 E. Chicago Ave.
32. **Ward Residence Hall** [WH] 192 E. Chicago Ave.
33. **New Hall Residence Hall** [NH]  
451 S. Brainard St.
34. **224 E. Chicago House** [H224]
35. **Oliver Hall** [WONC] 232 E. Chicago Ave.
36. **Edward Everett Rall House** 329 S. Brainard St.
37. **Parking Pavilion** 415 S. Brainard St.
38. **Benedetti-Wehrli Stadium** [STAD]  
455 S. Brainard St.
39. **Merner Field House** [MF] 450 S. Brainard St.
40. **Residence Hall/Recreation Center** [RRC]  
440 S. Brainard St.
41. **Zimmerman Stadium** 467 S. Brainard St.
42. **Athletics Practice Field**
43. **Shanower Family Field** 435 S. Loomis St.
44. **Operations, Maintenance, Receiving & Scene Shop** [M999] 999 E. Chicago Ave.
45. **Riverview Property**







**NORTH CENTRAL  
COLLEGE 1861**