

22nd Annual Berea Undergraduate Research and Internship Symposium

October 21, 2022

Sponsored by Division I



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Oral Research Session A – Room 356

Moderator – Dawn Anderson

- 2:30 PM Hannah Jackson, "Determining the effect of BBOX1 in ovarian cancer," University of Chicago, Chicago, Illinois - Abir Mukherjee, PhD
- 2:50 PM Finn Mahoney, "A fundamental role of chloride in collagen IV stability enabling animal evolution," Vanderbilt University Medical Center (Nashville, TN) - Dr. Billy Hudson
- 3:10 PM Stella (Connor) Bublitz, "Forestry Internship," Berea, KY - Glenn Dandeneau
- 3:30 PM Hayle Mack, "Telemedicine: Hypertension," Baltimore Maryland; John Hopkins - Dr. Meghan Hoffman ; Dr. Panagis Galiatsatos
- 3:50 PM Alexandria Thomas, "Pediatrics," Nuby Pediatrics; Denton, TX - Dawn Anderson
- 4:10 PM Elaine Doyle, "Dye Garden Internship," Berea College Student Craft, Berea College, Kentucky – Erin Miller
- 4:30 PM Leeroy Mabvuta and Younos Gad, "Social media's influence on E-cigarette use in Adolescents," John Hopkins University, Baltimore, MD - Dr. Panagis Galiatsatos
- 4:50 PM Godwin Emeka-Ibe, "Drive to Thrive," Vanderbilt University Medical Center, Nashville, TN - Dr. Kimberly Vinson

Oral Research Session B – Room 355

Moderator – Mary Robert Garrett

- 2:30 PM Moira Halbauer, "Socioeconomic Disparities in Health Care," Mayo Clinic - Dr. Yu Shi
- 2:50 PM Christopher Anderson, "Astronomical Object Counter," Computer Science Department Berea College, Berea, Kentucky - Deanna Wilborne
- 3:10 PM Megan Woolverton and Emiliano Torres-Vera, "Radishes in Augmented Reality: Creating Digital Installations for the Winterthur Museum," Berea College - Daniel Feinberg and Scott Heggen
- 3:30 PM Leke Bytyqi, "Confirmation of miR-210-3p Association with mRNA IGF1 and IGF2," Vanderbilt University Medical Center - Karen M Joos

- 3:50 PM Dongsoo Lee, "Therapeutic Potential of Kir4.1/5.1 Channels Based on Its Modulation of Na⁺/Cl⁻ Cotransporter in the Kidney," Vanderbilt University Medical Center, Nashville, TN - Samantha McClenahan
- 4:10 PM Oscar Hanson, "Discoidin Domain Receptor 1 phosphorylates adaptor protein p66Shc promoting mitochondrial oxidative stress," Vanderbilt University Medical Center - Aspirnaut/Rashmi Shrestha

Oral Research Session C – Room 406

Moderator – Troy Messina

- 2:30 PM Alex Meadors, "Developing and Testing Methods of Producing Electrodes for Bionics," West Virginia University, in Morgantown, WV - Loren Rieth
- 2:50 PM Carter Luketich, "Flow Rate of Granular Materials from Tilted Container," Berea College, Berea KY - Ryan Kozlowski
- 3:10 PM Isabel Marquez, "Development of High Throughput TIRF Microscope," UK and Berea College Campus - Troy Messina
- 3:30 PM Leopoldo Tapia-Aracayo, "Strain Engineering in 2D Materials Using Surface Acoustic Waves," Penn State, State College, PA - Smitha Rashid, Morteza Kayyalha
- 3:50 PM Michael Mecham, "Geophysical Analysis of a Small-Scale Root System," Pacific Northwest National Laboratory, Richland, Washington - Adam Mangel
- 4:10 PM Emily Dillingham, "Binary Love Relations of the Inspiral of Heavy Neutron Stars," University of Illinois at Urbana-Champaign, Urbana, IL - Jacquelyn Noronha-Hostler
- 4:30 PM Brenda Davila, "Geo- inspired Technology," Georgia Tech - REU research

Oral Research Session D – Room 357

Moderator – Andrea Woodward

- 2:30 PM Shawn Jamison, Beverly Musompo, and Isaac Rukundo, "The New Opportunity School for Women: Evaluating 35 Years of Impact in Appalachia," Berea, KY - Dr. Andrea Woodward
- 2:50 PM Abby Campbell, "Cardiac Bypass Graft Surgery and Recovery," Cardinal Hill Rehabilitation Hospital, Lexington, Ky - Dr. Valari Jones

- 3:10 PM Erin Sainsbury, "Treating Anxiety Without Medication," MAHEC, Asheville, NC - Dr. Linda Wray
- 3:30 PM Ruth Ikpe, "Cytokine activity of tumor treated with PDT +/- Immunotherapy after surgery," University of Pennsylvania (Department of Radiation Oncology) - Dr. Theresa Busch and Dr. Gwendolyn Cramer
- 3:50 PM Gabrielle Scott, Lakot Lakang, Tia Bunton, "Developing a PCA-Informed Chinese language podcast for true beginners," Berea College, Berea, Kentucky - Jianfen Wang
- 4:10 PM Hajar (Grace) Faiz, "The Clinical Challenges of: MRSA, Neuropathy, & The Risk for Wound Infection," Reno, Nevada - Dr. Linda Wray

Oral Internship Session A – Room 307

Moderator – Louisa Summers

- 2:30 PM Savannah Smith, "Physician Assistant/Oncology Internship," Covenant Oncology and Hematology: Frankfort, KY - Julia McIntosh PA-C
- 2:45 PM Catherine Harris, "Summer 2022 Internship: Orthosports and Associates," Birmingham, Alabama - Louisa Summers
- 3:00 PM Christopher Boils, "My internship experience at the YMCA," C.M. Gatton Beaumont YMCA, Beaumont, Lexington KY - Nikki Hartley
- 3:15 PM Attallah Moore, "Summer at the Pittsburgh Wildlife Rehabilitation Center," Humane Animal Rescue Wildlife Rehabilitation Center, Pittsburgh, Pennsylvania - Colleen Dougherty
- 3:30 PM Laura Erickson, "Utilizing Machine Learning to Grade COVID-19 in the Lungs," University of Louisville Bioimaging Lab, Louisville, KY - Ahmed Sharafeldeen
- 3:45 PM Mara Flaherty, "King's Eye Care : 2022 Optometry Internship," King's Eye Care, Berea, KY - Dr. Chris Adams
- 4:00 PM Aimee Liesse Ninahaza, "Hereditary Hemorrhagic Telangiectasia," Medicine for the Greater Good, Johns Hopkins Bayview Medical Center, Baltimore, Maryland - Dr. Panagis Galiatsatos
- 4:15 PM Edie Jo Wakin, "American Chestnut Conservation Project 2022," Berea College Forestry, Berea KY - Christopher Adams
- 4:30 PM Aaron Largen, "Wildlife Rehab," Southwest Virginia Wildlife Center of Roanoke, Roanoke, Virginia - Christopher Adams

Oral Internship Session B – Room 457

Moderator – Sara Cornett

- 2:30 PM Gavin Leahy, "Building Rapport with Patients," Chandler Hospital - UK Healthcare. Lexington, Kentucky - Lindsay Cox
- 2:45 PM Allie Powers, "Caring for a ALS Patient in the ICU," Ballad Health Norton, VA - Eliza Peters RN
- 3:00 PM Destiny Hall-Combs, "Dental Hygienist Internship," Family Dentistry, Whitesburg, Kentucky - Dr. Kevin Roark
- 3:15 PM Alyssa Davis, "Zoo and Rescue Internship and Chronic Wasting Disease Research Paper," Little Ponderosa Zoo and Rescue Clinton, Tennessee - Dr. Scudder-Davis
- 3:30 PM Nyeisha Watkins, "Wildlife Rehabilitation," Back to the Wild: Castalia, Ohio - Gabrielle Coley
- 3:45 PM Hugo Arce-Santamaria, "Family Practice Internship," Munfordville, Ky - Dr. Anderson
- 4:00 PM Shaddae Green, "Music and Memory: An analysis of music therapy as non-pharmacological treatment for Alzheimer's Disease," Cardinal Hill Rehabilitation Hospital, 2050 Versailles Rd, Lexington, KY, 40504 - Valari Jones
- 4:15 PM Molly Parsons, "West Virginia Healthright Internship," Charleston, WV - Dr. Ron Rosen
- 4:30 PM Ximena Sanchez, "Summer 2023 Internship," Matthew Free Clinic, Charlotte, NC – Amy Carr

Posters – MAC Atrium

Poster Session from 3:00 PM to 5:00 PM

Odd-numbered posters for the first hour and even-numbered for the second hour

- Poster 1 Laritzza Hernandez, "Testing growth kinetics and tumor take rate of human prostate cancer cell line PC3 in male SRG rats," Hera BioLabs, Lexington, KY - Diane Begemann
- Poster 2 Odassey Cavanaugh, "Tennessee Avenue Animal Hospital Internship," Tennessee Avenue Animal Hospital, Cincinnati, OH - Jacki Gephart, Dr. Laura Arington
- Poster 3 Fiza Yousufi & Matthew Trigg, "The Algorithmic Structure of Social Media & Its Influence on Social Justice Activism," Berea, KY - Jacqueline Boggs
- Poster 4 Jakob M Bister, "Graceful Tree Conjecture: Rainbow Labelings," Berea College, Berea, Kentucky - Dr. Bouchat and Dr. Barnard
- Poster 5 Kaimera Greear, "Graceful Cacti," Berea College - Drs. Barnard & Bouchat
- Poster 6 Nelson David Xunic Cuá, "Paths And How To Count Them," Berea, KY - Drs. Barnard and Bouchat
- Poster 7 Orion Musselman, "Graceful Label Swaps," Berea College - Drs. Bouchat and Barnard
- Poster 8 Clark Oliphant, "Immersive learning experience in a regeneration biology lab," University of Kentucky - Dr. Ashley Seifert
- Poster 9 Zoe Moore, "Clinical Internship At Copper Ridge Surgical Center," Copper Ridge Surgery Center, Traverse City, Michigan - Brian Wisniewski and Marcy Hermann
- Poster 10 Gertrude C. Mbewe, "COMMUNITY BLOOD PRESSURE SCREENING FOR HYPERTENSION CONTROL," Baltimore, MD Johns Hopkins Bayview Medical Center Medicine for the greater good program - Panagis Galiatsatos, M.D., M.H.S.
- Poster 11 Christopher Anderson, "Astronomical Object Counter Algorithm," Computer Science Department Berea College, Berea, Kentucky - Deanna Wilborne
- Poster 12 Ndizeye Tshesquis, Nancy Landeros, Blade Hicks, "Learning Through Replication: Family Altar," Berea College, Berea, Kentucky - Jasmine Jones

- Poster 13 Lilians Azabe, "Interpersonal stressor exposure increases craving for cigarettes," University of Pennsylvania(UPenn), Philadelphia, Pennsylvania - Joanne Levy
- Poster 14 Cora S Wright, "Coal Refuse Composition at a Historic Kentucky Coal Processing Plant," Berea College - Holly Peterson
- Poster 15 Katherin E. Socias Baez, "Identifying Key Molecular Interactions between Transmembrane 2-3 Loop and Subunit b of E. coli ATP Synthase," Chemistry Department, Berea College, Berea, Kentucky - Rashmi Shrestha
- Poster 16 David K. Emeka-Ibe, "Functional analyses of a transmembrane 2-3 loop residue of subunit a of E. coli ATP synthase involved in subunit b interaction," Berea College, Berea, Kentucky. - Dr. Rashmi Shrestha
- Poster 17 Amro Abd, "Investigating the role of estrogen receptor β signaling in regulating re-entrainment of activity levels in female mice," University of Kentucky - Dr. Julie Pendergast
- Poster 18 Jennan Lahamer, "Constructing a Fluorescent Plasmid for Tagging Endogenous ITG α 5 Locus in Skin Organoid Dermal Papilla Cells," Cu Anschutz Medical Campus, Denver CO - Chann Han, Igor Kogut, Dennis Roop
- Poster 19 Belen Saavedra, "The Effects of Artificial Light at Night (ALAN) on Honey Bee Sleep Behavior," University of California San Diego - Ashley Kim, Dr. Nieh/Dr. Rosen
- Poster 20 Alicia Rivera, "Efficacy of a Carbonate Drain for Neutralization of Acid Rock Drainage and Removal of Metals in Water," Berea College and Estill County Kentucky - Dr. Holly Peterson
- Poster 21 Oreoluwa Ladele, "Investigating the role of Endoglin (ENG) in cutaneous squamous cell carcinoma (CSCC) progression," Gates Center for Regenerative Medicine, Anschutz Medical Campus, University of Colorado, Aurora, CO. - Dr. Xiying Fan and Dr. Dennis Roop
- Poster 22 Tenzin Wangmo, "Expression and Function of the Phagocytic Receptor, Jedi-1, in the Meninges," Aspirnaut™, Vanderbilt University Medical Center, Nashville, TN - Cierra I. Nelson, Bruce D. Carter
- Poster 23 Dalton Harris, "Analyzing how Age and Perceived Health Rating Impact Meeting ACSM Physical Activity Guidelines," URCCP, Berea, Kentucky - Dr. Louisa Summers
- Poster 24 Maria Martinez, "Global Warming and Trail Usage at Stephenson's Trail," Berea College Berea, KY - Dr. Louisa Summers

- Poster 25 Mallorie Gayhart, "Prediction of Wilm's Tumor Susceptibility to Preoperative Chemotherapy using Artificial Neural Networks," University of Louisville, Louisville Ky - Ayman El-Baz, Ahmed Alksas, Mohamed Shehata
- Poster 26 Erika Arvizu, Hira Karim, "New Palladium Pincer Complexes.," Berea College, Berea, KY - Dr. Anes Kovacevic
- Poster 27 Isabel Dalton, "Crayfish as Predators (Non-Hosts) of the Digenetic Trematode Cercaria, *Proterometra macrostoma*, at North Elkhorn Creek, Kentucky," Berea College - Ron Rosen
- Poster 28 Malloy Collins, "Survey of Parasites Found in the Fat Mucket, *Lampsilis siliquoidea*, at North Elkhorn Creek, Scott County, KY," Berea, KY - Ron Rosen
- Poster 29 Bineta Doucoure, "Photoinduced Crosslinking Patterns of Synthetic and Natural Phenols," Virginia Commonwealth University, Richmond, Virginia - Dr. Heather Lucas
- Poster 30 Ana Thompson, "Binding Site Characterization of MLH1 and c-Abl," University of Kentucky Markey Cancer Center - Dr. Kathleen O'Connor, Dr. Erin Oakley, Dr. Brittany Rice, Dr. Eva Goellner
- Poster 31 Jennifer Diaz Sales, "Confocal Microscopy reveals that SORLA Mediates Tau Endocytosis.," University of Maryland, School of Medicine - Joanna M. Cooper and Dudley K. Strickland
- Poster 32 Mason P. Chandler*, Carlos Andres Antolinez, Monique J. Rivera, "Effect of Sex on the Flight Capacity of *Spissistilus festinus* (Hemiptera: Membracidae)," Cornell University, Geneva, NY - Dr. Monique J. Rivera, Dr. Carlos Andres Antolinez
- Poster 33 Elijah Oshatz, "Flow Granular Materials from Tilted Container," Berea College - Dr. Ryan Kozlowski

Plenary Talk Planetarium (MAC 402) at 5:10 PM

Dr. Nicholas Noinaj

Associate Professor of Biological Sciences
Purdue University, IN

“Targeting Membrane-embedded Molecular Machines to Combat Multi-drug Resistant Pathogens”



Membrane proteins account for ~30% of the bacterial to human proteomes and serve many essential functions within the cell including signaling, nutrient import, waste export, energy production/transduction, and virulence. Given their essential roles in the body, membrane proteins are targets for ~50% of the drugs currently on the market and serve as primary vaccine targets, yet constitute only ~2% percent of all known structures within the Protein Data Bank. Two classes of membrane proteins exist having membrane spanning domains consisting of either alpha-helical or beta-barrel folds. alpha-helical membrane proteins, such as G-protein coupled receptors or ion channels, can be found in almost all membrane types within a cell. However, beta-barrel membrane proteins are only found in the outer membranes of Gram-negative bacteria, mitochondria, and plastids where they often serve vital roles in pathogenesis. In this talk, membrane-embedded molecular machines that are exciting therapeutic targets against multi-drug resistant bacteria will be discussed, including the research pipelines utilized to study their structure and function.

Biography:

Nicholas Noinaj is an Associate Professor in the Department of Biological Sciences at Purdue University, West Lafayette, Indiana, USA. He received dual B.A. degrees in chemistry (Lee Roecker) and mathematics (Jan Pearce) from Berea College, Kentucky, USA, and his Ph.D. in biochemistry (w/ David Rodgers) from the University of Kentucky, Lexington, USA. He did postdoctoral research in the Intramural Research Program at National Institute for Diabetes & Digestive & Kidney Diseases (NIDDK) (w/ Susan Buchanan), part of the National Institutes of Health, Bethesda, Maryland, USA. He subsequently joined the structural biology group at Purdue University in 2014 as an Assistant Professor and was promoted to Associate in 2019. His research focuses on the structural determination of membrane protein folding machineries in pathogenic bacteria and chloroplasts.

In his spare time, Nick enjoys playing and listening to music. He plays several instruments including guitar, bass, and piano. He enjoys photography and cooking, particularly BBQs and smoking his own

meats such as ribs, roasts, and briskets. He enjoys sports and is a die-hard Kentucky Wildcats fan (and now also a Purdue Boilermaker fan!).

Nick's research interests are in understanding how pathogenic Gram-negative bacteria are able to use virulence factors found on their surface to mediate infection. These virulence factors are found in the outer membrane and belong to a class of surface proteins commonly referred to as outer membrane proteins (OMPs). In particular, the Noinaj lab investigates the multi-component complex called BAM, which is responsible for the biogenesis of all OMPs, in hopes of understanding how it is able to fold and insert OMPs into the outer membrane. Additionally, his lab studies the TOC complex, the import machinery found in plastid containing organisms such as those causing malaria. His lab uses a combination of techniques to accomplish their goals including X-ray crystallography, electron microscopy, crosslinking, and various functional assays. The ultimate goal is to use the information from the structural and functional characterization as a starting point for drug discovery and development targeting these pathogens.

Nick currently teaches 'Introduction to X-ray Crystallography' in the spring which is a mix of lecture and lab modules (crystallization, data collection, molecular replacement, experimental phasing, and refinement, validation, and presentation). The course was inspired and designed around the Cold Springs Harbor Laboratory course on 'X-ray Methods in Structural Biology', where he is a 2007 alumni. In the fall, Nick also teaches an incoming freshmen undergraduate lab course entitled 'First Year Research Experience: Phages to Folds', which is an extension of the successful HHMI-funded SEA-PHAGES course. Here, students will learn DNA cloning, protein expression, protein purification, protein characterization, and structural analysis using CD spectroscopy, SEC, and SEC-SAXS. Students will have a real-world research experience their first semester here at Purdue, which we bridge them finding permanent labs for doing undergraduate studies.