Undergraduate Research Scholars and University Honors and Scholars Programs (UHSP) presents the second annual Fall Undergraduate Research Symposium showcasing undergraduate research from all disciplines across Mines.
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LIST OF STUDENT PRESENTERS

THANK YOU TO OUR MENTORS
It is with great pleasure the Office of Undergraduate Research Scholars and the University Honors & Scholars Programs invites you to the second annual Fall Undergraduate Research Symposium.

The Fall Undergraduate Research Symposium showcases the research of Summer Undergraduate Research Fellows (SURF), in addition to the work of other undergraduate students who conducted research over the summer. This unique opportunity gives emerging researchers the chance to mingle with peers, share their hard work with a larger audience, and build their portfolio.

This year’s undergraduate research symposium was made possible by the generous support of Dr. Joe W. Gray ’68.

We hope you enjoy the opportunity to connect with Mines undergraduate students and learn a bit more about the crucial research being undertaken by these emerging researchers.

Undergraduate Research Scholars
University Honors & Scholars Programs
TECHNICAL PROGRAM

CHEMICAL AND BIOLOGICAL ENGINEERING

#1 Effects of Transition Metal Oxides Catalysts on Water Electrolysis utilizing a Triblock Copolymer Anion Exchange Membrane

Author: Marco Salgado, Sophomore, Chemical and Biological Engineering
Mentor: Andrew Herring
Mentor: Chul-Oong Kim

#2 Metabolic Flux Changes in Estrogen Treated Platelets

Author: Aiden Graeber, Junior, Chemistry
Mentor: Nanette Boyle
Mentor: Sami Siska

#3 Self-Assembly Behavior of Asymmetric Homopolymer-Core-Shell Hybrid Block Bottlebrush Copolymers

Author: Claire Nelson, Senior, Chemistry
Mentor: Ramya Kumar
Mentor: Mahesh Mahanthappa

#4 Coiled Coil Classification Using Neural Networks

Author: Carla Ellefsen, Junior, Computer Science
Mentor: Alex Pak

#5 Quantifying Flow Regimes in Pipelines

Author: Catherine Carmosino, Junior, Quantitative Biological Engineering
Mentor: Amadeu Sum

#6 Alginate/Chitosan hydrogels with Sustained Release of MAPK14-Targeting siRNA Knock Down Osteogenesis of hMSCs In Vitro

Author: Praise Olusoji, Senior, Quantitative Biological Engineering
Mentor: Melissa Krebs
Mentor: Bikram Adhikari

#7 Data Driven Approach to Nanobody Therapeutics

Author: Mukund Gurumurthi, Sophomore, Quantitative Biological Engineering
Mentor: Alex Pak

#8 Particle Size Effects on Cationic Polyplex Transfection Efficiency

Author: Caleb McGrath, Senior, Quantitative Biological Engineering
Mentor: Ramya Kumar
Mentor: Ram Prasad Sekar
Mentor: Jessica Lawson

#9 Impacts of Static Magnetic Fields on E. coli Growth

Author: Kyra Frank, Junior, Quantitative Biological Engineering
CHEMISTRY

#10 Mutagenesis of Second Sphere Residues in Nitrile Hydratase

Author: Kylie Knutson, Junior, Chemical and Biological Engineering
Mentor: Callie Miller
Mentor: Richard Holz

#11 Investigating the SUF-like pathway in S. aureus

Author: Katelyn Aasman, Sophomore, Chemical and Biological Engineering
Mentor: Richard Holz

#12 Organic Synthesis of Plastics and Glasses used in Nuclear Materials Detection

Author: Grant Bell, Senior, Chemistry
Mentor: Alan Sellinger

#13 Synthesis of Alloy PdAu on MSN For Light-induced Hydrogen Gas Production

Author: Elsa Scherzinger, Junior, Chemistry
Mentor: Brian Trewyn

#14 Synthesis, Structure, and Conductivity of Alloyed thio-LISICONS
CIVIL AND ENVIRONMENTAL ENGINEERING

#15 Nucleophilic Substitution Reactions in Hydrothermal Degradation of Per- and Polyfluoroalkyl Substances

Author: Sean Brooks, Sophomore, Chemical and Biological Engineering
Mentor: Timothy Strathmann
Mentor: Shilai Hao

#16 Microbes and Sulfur in a Cave and Karst Ecosystem

Author: Sasha Robinson, Junior, Quantitative Biological Engineering
Mentor: John Spear

GEOLOGY AND GEOLOGICAL ENGINEERING

#17 It's Getting Hot in Here: Fluvial Response to Climate Change During the Early Paleogene

Author: Maya Maes-Johnson, Senior, Applied Mathematics and Statistics
Mentor: Piret Plink-Bjorklund
Reconstructing the Proglacial Geomorphological Context of Mima Mounds in the Puget Lowland, Washington

Author: Isaac Pope, Senior, Geology and Geological Engineering
Mentor: Danica Roth

GEOPHYSICS

Ray Tracing with Rust

Author: Bryce Irving, Sophomore, Computer Science
Mentor: Bia Villas Boas
Mentor: Guillherme Castelão

The Tuaheni Landslide, offshore New Zealand: Constraining Overpressure and Studying Slope Failure

Author: Jude Lowe, Sophomore, Geophysics
Mentor: Brandon Dugan

MECHANICAL ENGINEERING

The Effect of Humidity on the Cathode Adherence in Fuel Cells

Author: Sabrina Wood, Junior, Chemical and Biological Engineering
Mentor: Neal Sullivan

Effects of Gas Flow on Mechanical Properties of Additively Manufactured Lattices
#23 Mechanical Properties of Additively Manufactured Metals

Author: Andrew Jones, Senior, Mechanical Engineering
Mentor: Joy Gockel

#24 Analyzing Surface Roughness of Laser Powder Bed Fusion Parts

Author: Alex Kleen, Junior, Mechanical Engineering
Mentor: Joy Gockel

#25 Design of a Gantry System for Robotic Tethered Power

Author: Zoe Oshman, Junior, Mechanical Engineering
Mentor: Andrew Petruska

METALLURGICAL AND MATERIALS ENGINEERING

#26 Three-Dimensional Mapping of Strain

Author: Colton Brown, Junior, Metallurgical and Materials Engineering
Mentor: Megan Holtz
#27 Thermodynamics of Oxide Molecular Beam Epitaxy and Substrate Preparation

**Author:** Jack Dorsey, Junior, Metallurgical and Materials Engineering  
**Mentor:** Megan Holtz

**MINING ENGINEERING**

#28 Potential Impacts of Climate Change on Hyperaccumulators in Zambia

**Author:** Max Garza, Senior, Civil and Environmental Engineering  
**Mentor:** Rennie Kaunda

#29 Correlation of Electrical Resistivity Profiles and Soil Properties at Mine Waste Sites

**Author:** Frances LeDuke, Sophomore, Geology and Geological Engineering  
**Mentor:** Rennie Kaunda  
**Mentor:** Samuel Mutiti

**PETROLEUM ENGINEERING**

#30 Effect of Microbial Activities on Underground Gas Storage

**Author:** Wayne Snodgrass, Junior, Petroleum Engineering  
**Author:** Ryan Carbajal, Chemical and Biological Engineering  
**Mentor:** Parisa Bazazi
#31 Particle Size Dependence of the Blocking Temperature of 5-20 nm Magnetite Nanoparticles

**Author:** Tori Wagner, Sophomore, Physics  
**Mentor:** Karine Chesnel

#32 Silicon Clathrates for Quantum Information Applications

**Author:** Audrey Faricy, Junior, Physics  
**Mentor:** Meenakshi Singh

#33 The Human Protein Structure Targetome

**Author:** Armand Ovanessians, Senior, Quantitative Biological Engineering  
**Mentor:** Susanta Sarkar
ABOUT SURF

Summer Undergraduate Research Fellowship

The Summer Undergraduate Research Fellowship (SURF) program at Mines seeks to provide funding for current Mines undergraduate students to participate in concentrated, full-time research under the mentorship of the Mines faculty. This fellowship is open to students of all disciplines. In addition to focusing on an in-depth research project, students will also have the opportunity to attend professional development seminars with the SURF and NSF REU cohort students.

The SURF program aims to promote and support undergraduate students’ scholarly and creative pursuits by providing summer research fellowships. The SURF program champions the goals outlined in the MINES@150 campaign by engaging students in cutting-edge research and innovation at Mines aimed at solving significant challenges facing humanity and thereby shaping the next generation of diverse STEM leaders. This program is open to all current undergraduate students at Mines.

Program Goals

- Provide research opportunities for Mines undergraduate students who are interested in pursuing a career in research.
- Increase access to graduate programs for minoritized students by providing opportunities to experience scholarships.
• Provide professional development opportunities through weekly workshops to help students prepare for post-graduate opportunities.

• Prepare Mines students to be competitive for prestigious research fellowships (e.g. Goldwater, NSF REUs, NSF GRFP, etc.).

Program Details

• Students funded by the SURF program are expected to conduct a total of 300 hours of research during the summer semester (May-Aug). For example, students can choose to conduct 30 hours of research for 1-weeks or 40 hours of research for 7.5 weeks.

• Each SURF student will receive an award of $4,000.

• SURF students are expected to attend the professional development seminars that take place during their proposed research timeline. These seminars are related to career preparation, scientific ethics, abstract writing, giving a scientific talk, and select research talks.

All SURF students will present their work at the end of the summer program and at the Mines Undergraduate Research Conference.

www.mines.edu/undergraduate-research/undergraduate-research-opportunities/surf/
List of Student Presenters

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See you at the SPRING UNDERGRADUATE RESEARCH SYMPOSIUM!

April 17-18, 2024

mines.edu/undergraduate-research