
# 2023 Program

## 09. 26. 2023
## 2-3pm

## CoorsTek Atrium

**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.**

MINES 150 | 1874-2024 UNDERGRADUATE RESEARCH SYMPOSIUM

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MINES @150 | 1874-2024 UNDERGRADUATE RESEARCH SYMPOSIUM

# WELCOME

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

**Author**: Stephanie Morrall, Chemical and Biological Engineering
**Mentor**: Suzannah Beeler
**Mentor**: Kevin Cash

## 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**

**Author**: Lucas Baker,
Junior, Chemistry
**Mentor**: Annalise Maughan
**Mentor**: Phillip Yox

## 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

**Mentor**: Molly O'Halloran

**#18 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

**#19 Ray Tracing with Rust**

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

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

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

## MECHANICAL ENGINEERING

**#21 The Effect of Humidity on the Cathode Adherence in Fuel Cells**

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

**#22 Effects of Gas Flow on Mechanical Properties of Additively Manufactured Lattices**

**Author**: Liam Adler-Pollock, Junior, Mechanical Engineering
**Mentor**: Joy Gockel
**Mentor**: Clay Perbix

**#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

# PHYSICS

**#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/**

MINES 150 | 1874-2024 UNDERGRADUATE RESEARCH SYMPOSIUM

# List of Student Presenters

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# Thank You to Our Mentors

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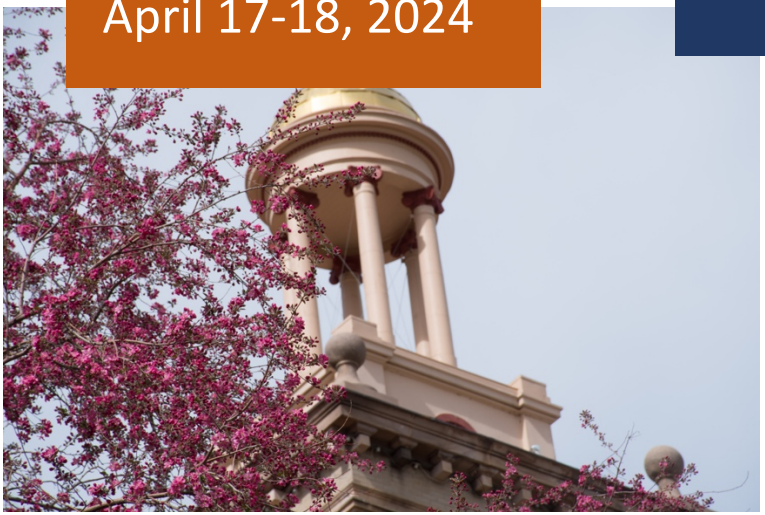
SAVE THE DATE

# See you at the SPRING UNDERGRADUATE RESEARCH SYMPOSIUM!

April 17-18, 2024



mines.edu/undergraduate-research

COLORADO SCHOOL OF MINES

Undergraduate Research Scholars

University Honors & Scholars