

6th Annual



MONTANA TECH'S DESIGN SHOWCASE

Listen. Inquire. Learn.

APRIL 27, 2017

Montana Tech's Techxpo is a premier event showcasing research and design expertise by our students and faculty members. The School of Mines and Engineering, College of Letters, Sciences & Professional Studies, and Highlands College students and faculty will demonstrate applied knowledge to some of the world's most challenging problems. Thank you for attending. We hope you listen, inquire, and learn from the nation's finest students and faculty.

SCHEDULE OF EVENTS

- 1:00 p.m. Student Check-in
- 1:30 p.m. Opening Remarks
- 1:45 p.m. Judging Begins
- 1:45–6:00 p.m. Open Viewing of Booths & Posters
- 4:30–6:00 p.m. Awards Ceremony/Reception

POSTERS & BOOTHS

CIVIL ENGINEERING

- 101 **Design-Build DBIA and ASC Competition**
Sam Larson, Alexx Williams, Chance Sparrow, Emily Coobs, Tyler Airth, Brandon Karnath
- 102 **ASC Commercial Bid Team**
Spencer VanWichen, Kaden Bedwell, Perry Raymond, Halley Jalbert, Tyler Lott, Neil McCarthy
- 103 **Concrete Solutions**
Tyler Stremcha, Pete Lind, Josie Stinson, Ty Tousignant, Zeb Bloom, Kabri Emerson
- 104 **Sustainable Building and LEED**
Dalton Brookie, Cy Williams, James Cutler, Zach Frey, Dustin Farren, Matt Mullaney
- 105 **Mouth of the Columbia River - Jetty A Rehabilitation**
Carlos Martinez, Jacob Nistler, Kenneth Hunter, Shandy Holm, Kendra Jackson, Katherine Schuler

BIOLOGICAL SCIENCES

- 106 **A Screening of Deer Mouse Blood Samples for Colorado Tick Fever Virus**
Kelsey Schmidt, Zachary Hart, Riley Hellinger, Quinn Cunneen
- 107 **Basic Water Quality Analysis of Blacktail Creek using Macroinvertebrates**
Ryan Koch
- 108 **The Relationship between Site Contamination and Native Plant Success in Butte, MT: Implications for Future Restoration**
Jared Trilling
- 109 **Molecular Analysis of Adapted Soil Microbiota to Identify the Role of Mycorrhiza in a Mining Impacted Landscape**
Anna Nugent

- 110 **Using CRISPR Technology to Knock out Signal Transducer and Activator of Transcription (STAT) Genes**
Luke Domanico, Lydia Dupuis
- 111 **Phagocytosis of Cytokine-expressing Leishmania Tarentolae Activate Human Monocytic Cells**
Winter Kemppainen, Teal Taylor
- 112 **Targeted Genomic Analysis of Soil Microbes along Treads and Risers of Periglacial Ground in Glacier National Park, Montana**
Macy Ricketts
- 113 **Restoration Management Database**
Joao Nascimento

MECHANICAL ENGINEERING

- 114 **Filament Winding Mandrel Extractor**
Riley McNabb, Nicholas VanHelden
- 115 **Polyethylene Terephthalate Extrusion**
Weston Dishman, Pace Funsch, Ethan Redfern, Michael Balaguy
- 116 **Generating Antimicrobial Surfaces with Electrospinning**
Sowmya Sudhakar
- 117 **Montana Tech SAE Baja (located in lobby)**
Spencer Ready, Morgan Warrington, Andrew Dracek, Parker Sobry, Triston Firth, Erik Loran, Chris Crawford, Chad Gibson, Craig Brown, Matthew Halladay, Kristofer Kuelper
- 118 **Transportation of Lab Machinery**
Hussain Alqahtani, Jabr.N Albuainain, Jabr.A Albuainain, Yasser Almousa
- 119 **Enhanced Nanocomposites**
Emily Kooistra-Manning, Keaton Corbitt
- 120 **Movement of an Incompressible Fluid in a Three-Dimensional Space**
Tanner Iszler
- 121 **NASA Robotic Mining Competition Robot**
Nicholas Lace, Raymond LaTray, Dominic Bizak, Kyle Smith, Fahad Alkhaldi
- 122 **Maxwell: The Bridge between Newton and Einstein**
Christopher Liebel
- 123 **Fabrication of Aligned Fibers on Nonconductive Substrates**
Zach Burckhard
- 124 **Bicycle Power Generator**
Khaled Albalawi, Fahad Alhajri, Raja Alhajri, Abdulrahman Alhajri
- 125 **Incompressible Flow: Shaping the World Around You**
Lucas Reif

- 126 **Incompressible Flow: A Better Understanding of Nature**
Xiaotian Zhu
- 127 **Automatic Wall Rendering Machine**
Abdulrahman Alshuhail, Seed Aldossry, Mosleh Aldossary, Ali Almarri
- 128 **Melt Electrospinning via Rapid Prototype Machines**
Anthony Ottolini-Messuri

PROFESSIONAL & TECHNICAL COMMUNICATION

- 129 **Website - Gamer's Café**
Paul Shea
- 130 **GeoWrite - A Digital Geographic Notebook App**
Jonathan Dupuis
- 131 **Technical Communication Minimizes Insurance Fraud**
Karli King
- 132 **College Student Mental Health Education**
Lyndsay Alt
- 133 **Rhetorical Analysis of the Pathos Appeal in Documentary Films**
Corey Baker
- 134 **Beyond Road Signs**
Malea Dunne
- 135 **Rhetorical and Semiotic Analysis of the 1956 Betty Crocker Cookbook**
Barbara Cass
- 136 **Stronghold Defensive Firearms Training**
Alex Perry

ENVIRONMENTAL ENGINEERING

- 137 **Improving Evaporation Rates in Contaminated Water Bodies with Carbon Foam Structure**
Emma Wooldridge, Madison Cyr, Matthew Kilsdonk, Shyla Allred
- 138 **Passive Solar Distillation of ARD Water**
Marcus Holland, Seth Garrity, Hannah Ruble, Alison Lunde, Katherine Zodrow
- 139 **A Holistic Approach to the Reduction of Fugitive Dust Emissions from a Tailings Storage Facility**
Abby Indreland, Ian Muller, Kolby Sukut, Ryan Cochran, Jesse Bryant
- 140 **Acid Rock Drainage Treatment using Membrane Distillation: Impacts of Chemical-Free Pretreatment on Scale Formation, Pore Wetting, and Product Water Quality**
Eric Hull

STATISTICS

- 141 **Regression on Feeder Cattle EPDs**
Brockton Butcher

MATHEMATICAL SCIENCES

- 142 **Essentially Normal Composition Operators on the Hardy Space**
Jeffrey Preston

- 143 **Dehn's Word Problem in Group Theory**
Tyler Taylor
- 144 **Modeling Traffic Flow using Burger's Equation**
Jeffrey Preston
- 145 **The Plane Crystallographic Groups**
Michael Fryer, Haimdah Haimdah, Jeffrey Preston, Tyler Taylor
- 146 **Boundary-value Problems in Electrostatics**
Chau Duc Minh Ha
- 147 **Finite-Difference Modeling of 2-D Acoustic Wave Equation**
Chau Duc Minh Ha

OCCUPATIONAL SAFETY & HEALTH

- 148 **Noise Monitoring of Underground Jackleg Drills**
Travis Oakason, Ryan Stemple

INDUSTRIAL HYGIENE

- 149 **An Assessment of ftir Method for Crystalline Silica Analysis**
Siobhan Wock
- 150 **A Pilot Study Examining the Effect of Head Protection Weight on Muscle Loading in the Cervical Spine**
Sophie Hegg

MINING ENGINEERING

- 151 **Characterization of Granite & Subsequent Ground Control Management Plan at Orphan Boy Mine - Butte, Montana**
Emily Rose
- 152 **Mining Department's SME Club**
Lucas McQuinn, Victoria Carlyle, Arthur Kukowski, Jess Scanlan, Thomas Camm

MATERIALS SCIENCE PhD

- 153 **Electrical Characterization of Novel Hybrid Perovskite Solar Cell Material**
John P. Murphy

METALLURGICAL & MATERIALS ENGINEERING

- 154 **Fundamental Adsorption Studies of Rare Earth Elements with Novel Collectors: Computer Modeling and Laboratory Investigations**
Marc Freddy Sime
- 155 **Surface Sulfonation of Electrospun Polystyrene Fibers**
Molly Brockway
- 156 **Synthesis and Characterization of the Hydroxamic Acid N, 3-dihydroxy-2-naphthamide and Its Copper (II) Complex - An Investigation on Keto/Enol Forms**
Ben Suslavich
- 157 **Zeta Potential and Froth Flotation Performance of Novel Collectors for Rare Earth Minerals**
Aleesha Marie Aasved
- 158 **Residence Time Distribution and Optimization of Separation Performance of a Crossflow Separator**
John Hansen-Carlson

SOFTWARE ENGINEERING

- 159 **Show Robbie 2**
Jesse Lieberg, Logan Warner

GEOLOGICAL ENGINEERING

- 160 **Supergene Mineralization of the Continental Pit, Butte, Montana**
Kyle Eastman
- 161 **Stratigraphy and Sedimentology of the Black Lion Conglomerate, East Pioneer Mountains, Beaverhead County, Southwest Montana**
Vincent Spinazola
- 162 **Geochemistry and Mineralogy of Apex Deposit, Golden Sunlight Mine, Montana**
Hamadou Gnanou
- 163 **Reduction of Arsenite and Sulfate by Elemental Copper, Nickel and Cobalt: Implications to the Formation of Arsenide Minerals in Low Temperature Hydrothermal Deposits**
Nicholas Allin
- 164 **Characterization of the Peak Strength of Rough Rock Joints using Limited Displacement Multi-Stage Direct Shear Tests (Anders Alternative)**
Brent Sordo, Michael Petro
- 165 **Benefits of using Photogrammetry for Characterizing Underground Conditions**
Elizabeth Russell
- 166 **Investigation of Correlation between Ultrasonic Wave Velocity and Unconfined Compressive Strength of Coarse-Grained Igneous Rocks**
Maranda Ratcliff, Liana Galayda, Alexandra Corlett, Brent Sordo
- 167 **Performance of Fiber Optic Sensing Technologies for Distributed Monitoring of Ground Deformation and Temperature in an Underground Facility**
Calvin Kammerer

DRAFTING TECHNOLOGY

- 168 **Innovations in 3D Scanning**
Jeremy Hankel
- 169 **Opposed Piston Engine**
Neil Johnson
- 170 **TanDEM-X**
Matt Hutson

SOCIAL JUSTICE

- 171 **Qualitative Approach with Discovery about Academic Motivation in Single-parent Students**
Ravyn Scott

SOCIOLOGY/ PSYCHOLOGY

- 172 **Psychological and Sociological Predictors for Healthy Cell Phone Use among College Students**
Virginia Wait, Robert Shelton

SOCIOLOGY

- 173 **Prosocial Behavior and Empathy among College Students**
Robert Shelton

- 174 **Social Groups, Social Polarization, and Social Bias among College Students**
Tristan Aguilar

GERONTOLOGY

- 175 **Elders and Undergraduate Researchers Journal with Words and Art**
Aaron Bowers, Robert Shelton, Haley Thompson, Jason Cross, Chantell Azure
- 176 **Qualitative Analysis: Seniors Share Technology Preferences and Interest to Learn**
Kristine Jordan, Ravyn Scott, Shelley Booth, Joshua Ericson, Mary Catherine Hamm, Brian Strutzel

CONSTRUCTION TECHNOLOGY

- 177 **Preconstruction: Design-Build Vehicle Maintenance Facility**
Kelsey Lee

GEOCHEMISTRY/CHEMISTRY

- 178 **Utilizing Azides and Alkynes to Treat Parkinson's Disease by Inhibiting the Formation of Lewy Bodies**
Baili Connors
- 179 **Naturally Occurring Acid Rock Drainage in Southwest Montana**
Margaret Doolittle
- 180 **Gleobacter Cyanobacteria**
Cynthia Cree
- 181 **Water Chemistry of a Hot Spring Outflow Abundant in Microbial Mats**
Jordan Foster
- 182 **Mudpots - A Water-Rock Story**
Georgia Dahlquist
- 183 **Laboratory Exploring Geobiochemical Engineering and Natural Dynamics**
Shanna Law, Cynthia Cree, Mallory Nelson, Renee Schmidt, James Foltz, Jordan Foster, Georgia Dahlquist
- 184 **Microbial Effects on Hydrothermal Water Chemistry, Rabbit Creek, Yellowstone National Park**
Shanna Law
- 185 **Geochemical Inhibitors of Photosynthesis: A Case Study of Figure 8 Spring**
Mallory Nelson
- 186 **Dual Stage Sulfate Reducing Bioreactors**
James Foltz
- 187 **Water-Rock Microbial Interactions in Flooded Underground Mines, Butte, MT, USA**
Renee Schmidt
- 188 **Synthesis and Evaluation of Novel Ruthenium and Anticancer Complexes**
Kelsey Brown

ELECTRICAL ENGINEERING

- 189 **Raspberry Pi HMI and Control System for anA Electromagnetic Water Filter**
Thad Haines, Frank Joyce

- 190 **PMU Testing and Characterization**
Joel Perigo
- 191 **S.C.A.D.A. using PI**
Xanthius Christenson
- 192 **Oscillations**
Ruichao Xie
- 193 **Sure Shot**
Jessica Boatwright, Cole Noctor, Greg Noctor
- 194 **Touchless Thermal Respiratory Monitor**
Jonathan Schulz
- 195 **Educational LED Board**
Ashtyn Aumueller, Tyana Rasmusan, Nathan Ericksen
- 196 **Rural Broadband Mobile Communications: Spectrum Occupancy and Propagation Models in Western Montana**
Erin Wiles
- 197 **Feasibility Study of Long-range Wi-Fi for Low Density Regions on the VHF Band**
Abhimanyu Nath
- 198 **VFD Motor Control**
Clayton Eskridge, Mitchell Postlethwaite
- 199 **Development of Autonomous Water Sampler for Hazardous Environments (located in lobby)**
Abdullah Alangari, Tyler Fricks, Patrick Cote, Clyde Ellertson
- 200 **Validation of Saturation Tolerant Data Processing Algorithm for the Impedance Measurement Box**
Boston Ranney

GEOPHYSICAL ENGINEERING

- 201 **Sinkhole Characterization**
Ngoc Ha
- 202 **Comparing Disturbed Acoustic Sensing to 3-Component Geophones**
Nik Nesladek
- 203 **Bedrock Setting and Hydrogeological Properties of the Lower Reaches of Lolo Creek, Montana, using Near-surface Geophysics**
Akpofure Orubu

BIOMEDICAL ENGINEERING

- 204 **Iron-Dropped Apatite Nanoparticles Delivered via Electrospun Fiber Mesh for Maximized Bacterial Killing by Bacteriophage**
Jessica Gregory

LIBERAL STUDIES

- 205 **Portrayal of Gender in 2015 Gaming**
Lucas Stout, Melanie Wendt

GENERAL ENGINEERING

- 206 **Coaxial Melt Electrospinning**
Nathan Sutton

BUSINESS & INFORMATION TECHNOLOGY

- 207 **The Impact of Enterprise Systems on Mergers and Acquisitions in the Oil and Gas Industry**
Erik Mason, Ashley Thompson, Chen Yang

PETROLEUM ENGINEERING

- 208 **Future Development of the Eagle Ford Shale Play within Lavaca County, Texas**
Kyle Shepherd, Pierce Pendleton, Lee Fleming, Mackenzie McGrath, Adam Pederson
- 209 **Treating Produced Water**
Breque Shepard
- 210 **Understanding Devils Basin Production Variability**
Alex Koerner
- 211 **Stark Energy Eagle Ford Project**
Caitlin Heryford, Chris Longly, Jordan Buhl, Usama Maulvi, Nicholas Olson
- 212 **Developing the Eagle Ford in Lavaca County, Texas**
David Beck, Josh Smart, Sheldon Ridenhower, Matt Stafford, Emerson Engstrom, Matt Girard
- 213 **Applying Vibration to Short-term Fracture Conductivity Testing**
Blake Ereaux
- 214 **Eagle Ford in Lavaca County**
Kevin Ockler, Kirbie Wages, Jed Smith, James Joyce, Robbie Harshman
- 215 **Strategic Development of Lavaca County, Texas**
Rachael Wilford, Niel Humphreys, Drake House, Cole Carpenter, Ryan Parson
- 216 **Wells Gone Wild: A New Perspective of the Eagle Ford**
Joseph Krupa, Matthew Malin, Kaleb Roy, Sarah Hambridge, Tom Ferriter
- 217 **Eagleford Field Development**
Ryan Ahlstrom, Mitchell Washington, Dion Webster, Durian Eves, Teresa Gregori, Ahmed Abdullah
- 218 **Petroleum Senior Design**
Kevin Basnaw, Ryan Basnaw, Cory Shroyer, Dylan Porter, Garret Ventres
- 219 **Development of Eagle Ford by Five Amigo Oil & Gas**
Beau Pearson, Skyler Kansala, Kolby Kansala, Bradd Utt, Siwen Liu
- 220 **Radial Flow in Petroleum Engineering**
Jacob Hobbes
- 221 **Reservoir Modeling of Wall Creek Member of Frontier Formation, Powder River Basin, Wyoming**
Tuan Tran Le
- 222 **Hydraulic Fracture Modeling**
Ben Doleshal
- 223 **The Effect of Mineral Composition on Shale Oil Recovery**
Andrew Fakhry

The Montana Tech National Student Awards Committee offers congratulations to Montana Tech Student National Award Recipients:

Montana Tech Goldwater Award recipients include:

Molly Brockway (2016)
Macy Ricketts (2015, Honorable Mention),
Ryan Hensleigh (2014, Honorable Mention),
Jordan Leone (2014, Honorable Mention),
Joe Mitzel (2013), **Robert Hark** (2012),
Chris Dienes (2007), **Calley Jones** (2000), and
Ariane Erickson (2011, Honorable Mention)

Rhodes Scholarship finalists:

Casey Clark (2011) and **Jack Stratton** (2009)

Microsoft Scholarship:

Hathem Memmi (2014)

NAIA Dr. Leroy Walker Champions of Character Award:

Katheryn Tabaracci (2015) **Joe Mitzel** (2013)
and **Ivan Slijivar** (2011)

National Health Service Corps and Paul Ambrose Scholar:

Cory Sonneman (2013)

14th Annual Montana Athletes in Service Award:

Katheryn Tabaracci (2014)

