



NORTHERN ARIZONA UNIVERSITY

College of Engineering, Forestry & Natural Sciences

Undergraduate Research and Design Symposium – Oral Presentations

Welcome to the College’s Undergraduate Research and Design Symposium (UGRADS) Oral Presentations. We have reached the 20th year of oral presentations showcasing our civil, computer, electrical, environmental and mechanical engineering capstone projects and the 9th year of oral presentations showcasing our Environmental Sciences and Environmental Studies capstone projects. Projects featuring the varied intellectual accomplishments that result from undergraduate research throughout the college are also displayed in the Skydome.

We are grateful for the support of those who make all this possible – the sponsors of student projects, the staff that assist with the logistics, the dedicated faculty members who mentor the students, the alumni and friends who come to judge and to interact with the students, and the generous donors. Special thanks go to W.L. Gore & Associates, sponsor of this year’s luncheon. Most important of all, we congratulate the students whose work is highlighted today.

Quick Overview

Program(s)	Building	Room	Start	End	Page
Electrical and Mechanical Engineering	du Bois Center, main floor	Agassiz	8:30am	3:40pm	3
Mechanical Engineering	du Bois Center, main floor	Fremont	8:30am	3:40pm	4
Environmental Sciences and Environmental Studies	du Bois Center, main floor	Meadows	8:10am	5:20pm	5, 6
Civil and Environmental Engineering	du Bois Center, main floor	Southwest	8:30am	4:05pm	7
Computer Science and Electrical Engineering	du Bois Center 2 nd floor	Room A	8:30am	4:05pm	8

Poster Presentations in the Skydome from 9:00am until 4:00pm

Luncheon & Keynote Address – 11:45am-1:15pm, du Bois Ballroom

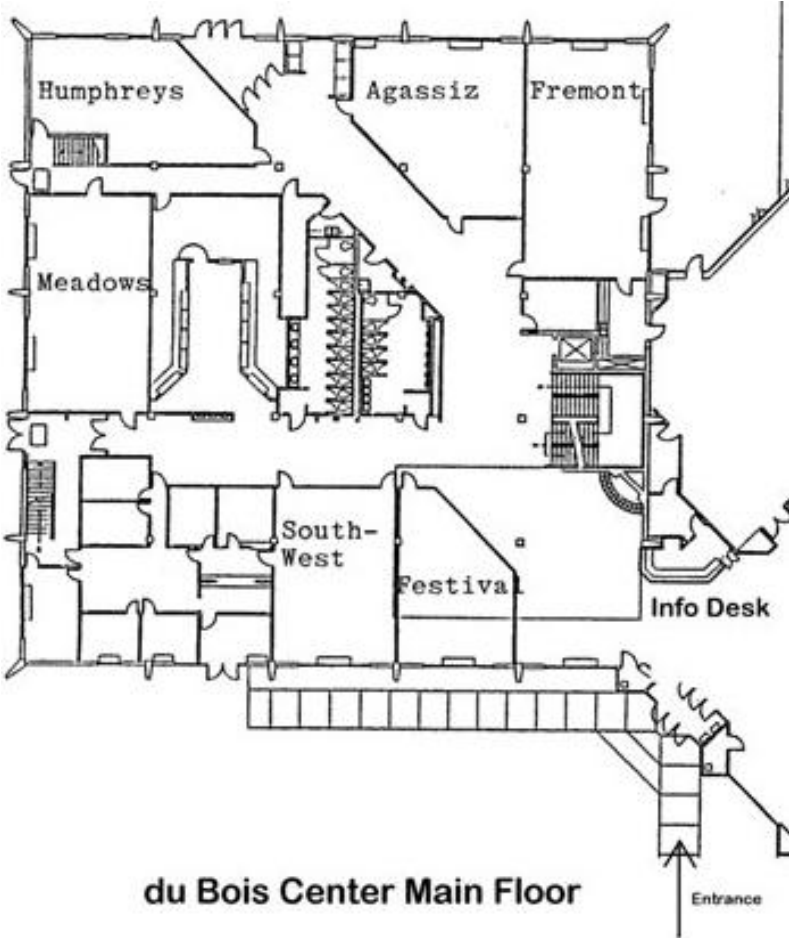
Please join us for lunch if you are a poster or oral presenter, family member, judge, sponsor, alumni, mentor, faculty, staff or advisory council member.

Many thanks to W. L. Gore, Inc. for providing today’s lunch

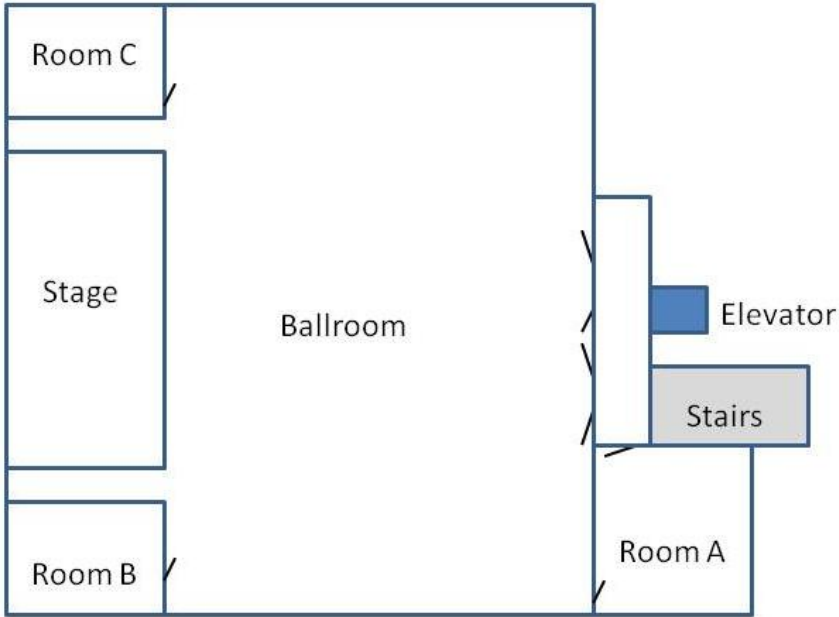
Chasing Dr. Doolittle

By Dr. Con Slobodchikoff

du Bois Center Facility Maps



du Bois Center Main Floor



du Bois Center Second Floor

Electrical & Mechanical Engineering Oral Presentations – Agassiz Room

Session 1 – Dr. Constantin Ciocanel, Moderator

- 8:30am – *40-Quart Cooler Design* by Federico Martolini, Dominic Albano, Danny Miller, Bander Almazroua and Dirk Prather
- 8:55am – *Alternative Power Source for Dental Hygiene Device* by Jiaqi Xie, Francisco Heath, Ningbiao Jiang, Nizar Almansouri and Jin Niu
- 9:20am – *Design of Material Testing Fixture* by Matt Garcia, Jeremy Mountain, Qian Tong, Hui Yao, and Randy Jackson

Session 2 – Dr. Niranjana Venkatraman, Moderator

- 9:50am – *Transformer Condition Assessment* by Richard Barnes, Kenny Elgin, Scott Lederhos, Andy Morin and Kyle Wiedeman
- 10:15am – *Reduction of Harmonic Distortion in Off-Grid Power Systems* by Ahmed Habib, Jacob Lamb and Zach Ulibarri
- 10:40am – *Insulin Dosimeter for Pets Using Apple® Products* by Sam Bloomfield, Kyle Crockett, Garrison Pope, Adam Raterink and Joel Ressel
- 11:05am – *Urban Electric Vehicle for Efficient Green Transportation* by Stephen Aranda, Derek Benallie, Aniza Brown, Justin Cummings, Brendan George and Michael Young

11:45am – 1:30pm - Lunch and Keynote Address – Ballroom

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Session 3 – Dr. Kathleen Corak, Moderator

- 1:30pm – *Elk Ridge Ski Area: Poma Lift Stick* by Kristin Coady, Liam Andrus, Amy Cook, Yaohui Wang and Megan Cawley
- 1:55pm – *An Improved Foot and Ankle Prosthetic Design* by Matthew Anderson, Chris McLaughlin, Matthew Petney, Edwin Tenney, and Audrey Ford
- 2:20pm – *Separation Connector Improvement* by Koll Christianson, Zheng Lian, Shaun Shultz and Luis Herrera

Session 4 – Dr. Heidi Feigenbaum, Moderator

- 2:50pm – *Small-Scale Solar Irradiance Measuring Device* by Nick Jurik, Timothy Tormey, Joseph Cavaretta, John Hills, Peter Journell and Allison Venezia
- 3:15pm - *Combined Heat and Power System* by Ronald Stepanek, Cory Donavon, Jason Dikes, Joseph Mudd, Nathan Duray and Ryan Christie

Mechanical Engineering Oral Presentations – Fremont Room

Session 1 – Dr. John Tester, Moderator

- 8:30am – *Alternative Power Source to Draw Underground Water* by Nathan Heckathorne, Grant Masters, Patrick Schimmelbauer, Emerson Jones and Beau Drumright
- 8:55am – *Nestle Purina Dryer Efficiency Improvements* by Daniel Andenmatten, Brandon Hoffman, Chris Simpson, Pengfei Wu and Nathan Kish
- 9:20am – *Harnessing Wind Energy with Recyclable Materials* by Katherine Carroll, Margo Dufek, Leanne Willey and Andrew McCarthy

Session 2 – Dr. Eck Doerry, Moderator

- 9:50am – *Portable Rain Room* by Dane Eccles, Crispin Herrera, Charles Manchen, Bryce Smith, Marcus Tallman and Blake Willmes
- 10:15am – *Release Lanyard Redesign* by Andrew Baker, Timothy Haynes, Styson Koide, Carly Siewerth, Christopher Temme and David Lofgreen
- 10:40am – *Solar Autoclave for Rural Area* by Blake Lawrence, Eric Brettner, Adam Compton, Yuchen Liu and Kyle Godwin
- 11:05am – *Christmas Ornament Display Structure* by Miles Roux, Dolores Gallardo and Ryan Palmer

11:45am – 1:30pm - Lunch and Keynote Address – Ballroom

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Session 3 – Dr. Brent Nelson, Moderator

- 1:30pm – *Automated Mirror Cover for Naval Prototype Optical Interferometer* by Leland Doyle, Salazar Grey, Katherine Hewey, Paul Owen, Rogelio Blanco and Miles Dehlin
- 1:55pm – *Quick Change Electrical Connection* by Nick Schafer, Michael Donelson, Aaron Hansen, Erin Grenko and Lauren Campbell
- 2:20pm – *The Wright Stuff Aircraft Design* by Brandon Perez, Aaron Lostutter, Jacob Vincent, and Zev Vallance, and Adam Nelessen

Session 4 – Dr. John Tester, Moderator

- 2:50pm – *Supermileage: Frame, Fairing, and Steering* by Sabrina Brown, Sean Danton, Ben Reinert, Dylan Pratt and Callie Adair
- 3:15pm – *Supermileage: Engine and Drivetrain* by Brian Davis, Antoine Panther, Todd Naify and Alexander Townsley

Environmental Sciences and Environmental Studies Oral Presentations – Meadows Room

8:10am – Dr. Diana Elder - Welcoming Comments on Morning Session

8:20am – *Enumerating Sockeye Smolt in the Chilkoot River, Haines, Alaska* by Will Hickman

8:30am – *KARES Educational Garden* by Dean Buttacavoli

8:40am – *Community Outreach with Friends of Flagstaff* by Kevin Kirchmeier

8:50am – *Hydroclimatic Variability Inferred from Subannual Sediment Pulses in Lake Linnevatnet, Svalbard* by Dion Obermeyer

9:00 am – *Community Sustainability and Non-Profit Organizations* by Betty Lou Booz

9:10am – *How Do YOU Define Sustainability?* by Brett Smith

9:20am – *Sustainable Landscape Maintenance Internship* by Emily Gaddo

9:30am – *Friends of Flagstaff – Outreach Internship* by Christian Booz

9:40am – *Makauwahi Cave Research Internship* by Mary Coulombe

9:50am – 10:00am BREAK

10:00am – *Sustainable Landscape Project* by Rob Helmkamp

10:10am – *Putting Flagstaff Sustainability Plans in Context* by Eric Nolan

10:20am – *Restoring Wolves to the Southwest* by Jacquelyn Davis

10:30am – *Farm to Fork on Northern Arizona University Campus* by Jessica Eliason

10:40am – *Kind Vines Sustainability Report* by Lindsey Nicks

10:50am – *Assessing Water Rights for National Forest Springs* by Ian Hanf

11:00am – *Integrating Art and Science Methodologies: Creating Artifacts that Re-evaluate Ecosystem Relationships* by Nolan Bade

11:10am – *Friends of Flagstaff Future Internship* by Karri Contreras

11:20am – *Internship at Phoenix Comicon* by Elliot Hosch

11:30am – *Microorganisms in Vermicompost Tea* by Eileen Meinel

11:40am - Diana Elder - Concluding Comments on Morning Session

11:45am – 1:30pm - Lunch and Keynote Address – Ballroom

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Environmental Sciences & Studies Oral Presentations – Meadows Room

1:30pm – Dr. R. Scott Anderson - Welcoming Comments on Afternoon Session

1:35pm – *Sea Turtle Migration Study in Uruguay* by Bryn Merrell

1:45pm – *Summer Internship with Arizona Game and Fish* by James Murray

1:55pm – *Los Angeles County Public Health Internship, Drinking Water Program* by Uche Okquokei

2:05pm – *Erwinia tracheiphilas; a Biological Control of Canada Thistle (Cirsium arvense)* by Patricia Rees

2:15pm – *2700 Years of History of Coastal Sage Scrub, Southern California* by Johnathan Rice

2:25pm– *Measuring Habitat Loss in Southwestern Nicaragua* by Bo Stevens

2:35pm– *Promoting Sustainability Through Recycled Crafts: Engaging Children in Community* by Hannah Stitzer

2:45pm– *Experience as a Program Analysis Intern for the US Department of Energy* by Kyle Thorton

2:55pm– *Understanding Communication Channels in Non-Profit Organizations: Interning with Willow Bend Environmental Center* by Jasmine Terrazas

3:05pm– *Experiences in Southeast Alaska: Ecosystems and Policy* by Helena Van Winkle

3:15pm– 3:25pm BREAK

3:25pm– *Soil Science in Northern Arizona* by Daniel Vernon

3:45pm– *Nature Education in Southeast Alaska* by Kiersten Wilbur

3:55pm– *Sustainable Landscape Maintenance Project on the NAU Campus* by Sean Canterbury

4:05pm– *Community Supported Agriculture: the Need for More Public Exposure* by Jennifer Cody

4:15pm– *Environmental Compliance at Nellis Air Force Base, Nevada* by Zach Daley

4:25pm– *Morphological and Behavioral Differences between a Fish Population from a Wastewater Effluent Pond Compared to a Reference Lake* by Kevin D. Daniels

4:35pm– *Interactions of Rabies Host Species* by Elise Dillingham

4:45pm– *Defining Personality: Observations of *Phoenicopterus ruber ruber** by Olivia Drummond

4:55pm – *Project Assessment of Structures Certified by the Coconino County Sustainable Building Program* by Molly Groyer

5:05pm – *Comparison of Soil Microbial Communities of Native and Non-Native Grasses* by Sarah Hamilton

5:15pm – Scott Anderson - Concluding Comments on Afternoon Session

Civil & Environmental Engineering Oral Presentations - Southwest Room

Session 1 – Dr. Ed Smaglik, Moderator

- 8:30am – *Evaluation of New Bridge for the Flagstaff Urban Trail in Picture Canyon* by Courtney Biggar, Stephanie Atchison and Kevin Lasky
- 8:55am – *Complete Civil Engineering Site Plan and Design for a Proposed Hualapai Museum* by Ian Braun, Jorge Hernandez, Andrew Halley and Haikal bin Maamor
- 9:20am – *Hazard Evaluation of an Abandoned Dam in the Kaibab National Forest* by Paul Garrett, Wen Cui and Diwei Chen

Session 2 – Dr. Bridget Bero, Moderator

- 9:50am – *Design and Evaluation of a Composite Cap using Paper Pulp Sludge for the Cinder Lakes Landfill* by Dan Hamill, Gabriel Murray, John Jowers, Nathaniel Lail and Amy Anderson
- 10:15am – *WERC Environmental Education Consortium Student Competition: Solar Distillation System Design* by Chaz Enbody, Ben Shields, Banning Burt, Yang Yang and Yiguo Chen
- 10:40am – *Flow Restoration of Verde River for Native Fish Downstream of the Diamond S Irrigation Diversion* by Jordan Udall, Burnell Jones and Thaddeus Bahl
- 11:05am – *Obstacle Wall Design for the NAU Challenge Course Team 1* by Kelsey Deckert, Stephanie Sarty and Austin Hopper

11:45am – 1:30pm - Lunch and Keynote Address – Ballroom

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Session 3 – Dr. Paul Gremillion, Moderator

- 1:30pm – *Prestressed Concrete Institute Big Beam Design Student Competition Team 1* by Eric Rocha, Jessica Kettelkamp and Danny Washburn
- 1:55pm – *American Society of Civil Engineers Student Competition Steel Bridge Design Team 1* by Calvin Ing, Michael Bechtel and Ryan Mahar
- 2:20pm – *Obstacle Wall Design for the NAU Challenge Course Team 2* by Selina Gilbertson

Session 4 – Dr. Robin Tuchsherer, Moderator

- 2:50pm – *Prestressed Concrete Institute Big Beam Design Student Competition Team 2* by Qi Wang, Shiyu Wang and Junfeng Qian
- 3:15pm – *American Society of Civil Engineers Student Competition Steel Bridge Design Team 2* by Majun Zhou, Clinton Harris and Long Li
- 3:40pm – *American Society of Civil Engineers Student Competition Concrete Canoe Design* by Sara Watts, Kelli Rider, Elise Cheever, Jonathon Brusnahan and Naser Aljaberi

Computer Science & Electrical Engineering Oral Presentations – Room A

Session 1 – Dr. John Georgas, Moderator

- 8:30am – *Radio Inter-Module Communication Testing* by Harper Alfred, Dan Baronosky, Nick Rowe, McKenzie Schmidt and Kurtis Wachs
- 8:55am – *ArchSim: Real-Time Model-based Architectural Simulation* by Davis Zanot, Brandon Phillips, and Michael Austin
- 9:20am – *Localization Functionality for MCM, a Mobile Commerce Application* by Kimberly Oyama, Chihiro Sasaki, Blayne Kennedy, and Daren Rodhouse

Session 2 – Prof. Steven Jacobs, Moderator

- 9:50am – *NAU Fitness Mobile Application* by Abdulaziz Abdulfatah, David Koenig, David Marcus and Kenneth Shaw
- 10:15am – *Project Mjolnir: Plasticity Modeling Software with MATLAB* by Doug Freeman, Luke Tylor and Thomas Wilkins
- 10:40am – *ISIS Pipeline Infrastructure* by Kolby Chien, Isaac Pitterle and Cody Thompson
- 11:05am – *Classroom Attendance Solution Using Facial Detection and Recognition* by Marshall Colton, Paul Doose, Ryan Lessley and Margaret McKever

11:45am – 1:30pm - Lunch and Keynote Address – Ballroom

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Session 3 – Dr. Maggie Hamill, Moderator

- 1:30pm – *Online Scholarship Application* by Colin Gray, Alex Mazzeo, Samuel Olson and Nicole Williams
- 1:55pm – *Group Wrangler: A Web-based Group Management System* by Greg Andolshek, Alex Koch and Michael McCormick
- 2:20pm – *Application of MR Fluid in a Bike Suspension System* by Waleed Alzahrani, Michael Doty, Ryan Olson and Adrian Ortega

Session 4 – Dr. Allison Kipple, Moderator

- 2:50pm – *Geological Data Transmitter* by Joel Jarpe, Tyler Lee, Kaitlyn Patterson and Adam Rogers
- 3:15pm – *BeagleBoard Capstone Redesign* by Maria Espinola-Romero and Robert Reynolds
- 3:40pm – *Ionization Breakdown of Carbon Dioxide Vehicle Emissions* by Michael Fisher, Adam Skinner and Matthew Wray