GEOLOGICAL & MINING ENGINEERING & SCIENCES
DEMONSTRATION DAY | WEDNESDAY, MAY 2, 2018 | 8a.m. - 1p.m | Dow610

SENIOR DESIGN
Schedule of Events in Dow 610
Continental Breakfast: 7:45 a.m. - 8:00 a.m.

Presentations:
8:00 a.m. - Monday Gold Mine Group “The Monday Mine Feasibility Study”
9:00 a.m. - Thursday Gold Mine Group “The Thursday Mine Feasibility Study”
10:00 a.m. - GeoTech Group “Stability Analysis on Clay Slopes Impacting US Highway 45 near Military Hill”
11:00 a.m. - Ground Water Project “Keweenaw Bay Indian Community (KBIC) Fish Hatchery Well Rehabilitation”
12:00 p.m. - Golden Eagle Mine Group “Capstone Engineering Project to Design a Mining Operation for the Golden Eagle Deposit”
12:30 p.m. - Mine Enterprise
1:00 p.m. - Following presentations a pizza lunch will be served

The Monday Mine Feasibility Study
A feasibility study of a Carlin Type Gold Deposit in Nevada. This study determines whether a gold mine is profitable based on drill core data and using a Merrill-Crowe processing method. The life of the mine is completely planned out from construction to reclamation. Members pictured left to right: Andrew Dubay, Patrick Sargent, Ryan Klida, Taylor Pitilk, Zach Westphal.

The Thursday Mine Feasibility Study
A study of a Carlin Type Gold Deposit in Nevada. The purpose of this study is to determine if a gold mine would be economically feasible using an open pit mining method and utilizing bioleaching for gold extraction. The scope of the project will include all mining practices from the modeling of the ore body based on drill hole data to mine closure. Members pictured left to right: Jordan Erickson, Graham Hubbard, Andrew Moore, Michael Schienke, Joel Sovinski.

Stability Analysis on Clay Slopes Impacting US Highway 45 near Military Hill
Multiple slideslides are occurring along US Highway 45 near Rockland, MI. The first portion of this investigation included a geotechnical stability evaluation and mitigation design recommendation. This was carried out on a particular slope of concern which exhibits slow movement, erosion, and encroachment on the road surface. The second portion of the project was concerned with the greater Ontonagon River system; many large failures are present along the river. An investigation was undertaken to spatially characterize the river valley to future slides, including identifying the major triggering factors, creating a statistical susceptibility map, and designing practical erosion control measures. Group members pictured left to right: Luke Weidner, Leah Meek, Tasha Cook, Kirsten DePrekel, Megan Sprague.

Keweenaw Bay Indian Community (KBIC) Fish Hatchery Well Rehabilitation
Our capstone project dealt with the rehabilitation of production wells on the grounds of the KBIC fish hatchery located in L’Anse, MI. Due to precipitation of minerals on well screens the water yield has significantly decreased. Our task was to determine a realistic and effective solution to restore the pumping capacity of the production wells. The common practice is a liquid acid treatment, but there are concerns that the acid could negatively affect the fish. To gain confidence that the acid treatment would be a safe method, conceptual models and in situ tests were done to mimic the use of the acid solution. Members pictured left to right: Demadra Planaj, Brendan Ruppen, Kyle Walker.

Capstone Engineering Project to Design a Mining Operation for the Golden Eagle Deposit
The overall project goals are to develop detailed plans for an underground mine to extract the gold deposit. Plans will include updated resource models, preliminary plans for materials handling and mineral processing, consideration of technical aspects for mine permits (including acid rock drainage), and stability analysis tailing-pile slopes. The updated resource models will incorporate new data on the deposit mineralogy. Ore and host rock will be studied to understand the petrology and petrogenesis of the deposit. The petrogenesis might aid in siting the locations of new drill holes to characterize the deposit. Members pictured left to right: Jacob Kacywnski, Katie Kring, Katie Thayer, Tyler Maisers, Andrew Dyke, Anthony Teschel.

Mine Enterprise
The team is working on a project with NASA to extract water from gypsum mined on Mars. Understanding the geology of Mars is extremely important to the project, therefore the geology team is investigating different factors about Mars geology which could significantly affect the gypsum payload process. By acknowledging the most prominent issues pertaining to Mars geology, the teams will be able to adjust the payload system to adapt to what can be expected on Mars. One method the geology team has implemented is the use of an Excel spreadsheet that utilizes certain Mars geology factors, collected from a database called JMARS, along with the known mission and payload parameters to create a model for things such as cycle times, excavation rates, and sizing out the rover’s tank for either water or rock. As the specifications and inputs change, the model will output the most values for varying rover speeds and distances so any user can determine the most efficient way to proceed. Going forward the geology team looks to conduct sieve analyses of the gypsum particles collected from the wastewater testing to gain a better understanding of the particle size distribution which will aid in the separator process. Members pictured left to right: Rob Shilinovitz, Noah Marlin, Melanie Zondag.