



# 2026 Project Day

April 11, 2026  
9:00 am - 2:00 pm  
Education Building



FACULTY OF  
**ENGINEERING &  
APPLIED SCIENCE**

# Welcome to PROJECT DAY 2026!

The Faculty of Engineering and Applied Science is proud to present **PROJECT DAY 2026!**

This conference-style event includes concurrent sessions where 4th year Engineering students present their final year design projects, and a Trade Show & Poster Session where projects will be on display.

The Trade Show & Poster Session gives you the opportunity to speak to students directly about the projects that interest you and/or your organization.

To learn more about each project, feel free to attend any presentation.

The University of Regina is situated on the territories of the nêhiyawak, Anihšînāpēk, Dakota, Lakota, and Nakoda, and the homeland of the Métis/Michif Nation.

The University of Regina is on Treaty 4 lands with a presence in Treaty 6.

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*“Don't aim for success if you want it; just do what you love and believe in, and it will come naturally.”*

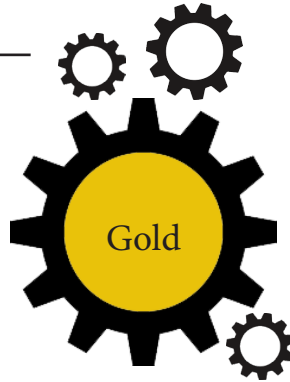
*- David Frost*

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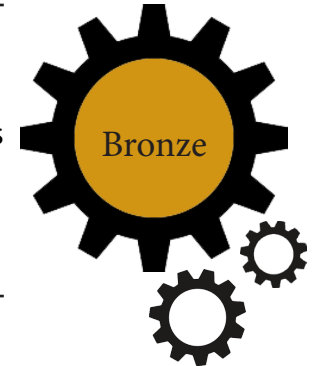


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The Faculty of Engineering would like to extend sincere gratitude to our sponsors for sponsoring Project Day. This important student event would not be the success it is without the continued support of the engineering community in Southern Saskatchewan. Our sponsors support us through project mentoring, project evaluation during the day, and through direct financial support. Thank you to our generous sponsors.



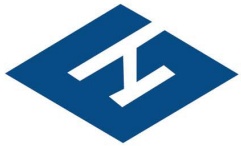
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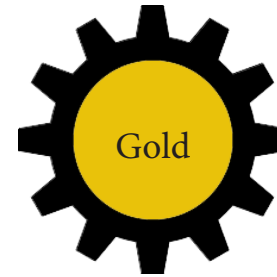


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- Sponsors
- Industry Evaluators
- Student Volunteers

Thank You from the Dean of  
Engineering & Applied Science!

## Electronic Systems Engineering

### ESE 1: BEAMS (Battery and Energy Analytics Monitoring System)



Eric Vass



Jessica Padullon



Quinnten Lorenz

The University has a microgrid system that utilizes solar generation and a Battery Energy Storage System (BESS) to supply power to multiple electrical loads, including an electric vehicle (EV) charger for staff use. Currently, the charger has only a small indicator light, making it difficult to determine availability from a distance, and system statuses are not easily visible without visiting the site or accessing the main control system. To address these problems, we developed the Battery and Energy Analytics Monitoring System (BEAMS) in collaboration with the University and under the supervision of Dr. Al-Anbagi and Doug Wagner. BEAMS determines EV charger availability by measuring the power output from the solar inverter and BESS, indicating a green light when charging is available and a red light when it is not. BEAMS also monitors the system for various status conditions and provides remote monitoring through a handheld pager that displays system status, power information, and fault notifications, allowing operators to assess conditions without travelling to the site.

## Electronic Systems Engineering

### ESE 2: Industrial Scale Extrusion (3D) Printing



Tyler Hood



Amin Hassan

This project involves the design, development, and programming of an electrical/control system for an industrial-scale extrusion-based 3D printer. The system integrates comprehensive electrical and motion control capabilities to manage multiple motors, heater, fans, and auxiliary components essential for large-format additive manufacturing.

## Electronic Systems Engineering

### ESE 3: AgriWAN



Emily Frostad



Robel Tinsiew



Dade Grymaloski

Our team is partnering with Saskatchewan farm-tech company, FarmSimple Solutions, to redesign their existing HerdHand agriculture monitoring product from a cellular architecture to a LoRaWAN-based end device, AgriWAN. The current product faces challenges including high operational costs associated with cellular and limited modularity of the end device. AgriWAN utilizes LoRaWAN's ultra-low power communication protocol and transmission within the unlicensed spectrum to reduce operating costs and extend battery life. The device is powered by a solar energy harvesting system with battery storage. AgriWAN will communicate to a central gateway in a star topology to enable long-range data transmission suitable for Saskatchewan farmers. Environmental data collected from the device can be viewed on FarmSimple's app. The end device will monitor water flow rate, internal device temperature, ambient temperature, water level, and battery voltage while withstanding Saskatchewan weather conditions.

## Electronic Systems Engineering

### ESE 4: Poppy Humanoid Robot



Osasenaga Uhumwangho



Ammar Malek



David Kalu-Umeh

In partnership with Southeast College and the Southeast Techhub in Estevan, the project focused on enhancing the humanoid robot, named Poppy. Poppy was transformed into an interactive teaching and outreach platform. Sensors, lightweight AI, expressions and movement were integrated to enable Poppy to perceive, process, and respond through motion, voice, and visual expressions, making her a valuable tool for fostering interest in STEM.

## Energy Systems Engineering

### ERSE 1: Quality Assurance and Safety Testing of Nuclear Reactor Isolation Valves



Michael Palsich

Canada's nuclear industry is growing for the first time in more than 30 years. New reactors are being planned and built. This presents opportunities for new, local suppliers to enter the nuclear energy market. In order to certify components for use in a specific reactor type, they must be tested under conditions that simulate the intended environment. This includes simulating water chemistry, temperature, pressure, flow rate, and phase. To do so, the University of Regina is planning to install a test loop to simulate reactor conditions, including a segment for testing valves or other small components. This test loop will serve as part of the broader small modular reactor safety and licensing center. Of particular interest are isolation valves serving as part of the auxiliary reactor safety systems to mitigate loss of coolant accidents. Local to Regina, there are suppliers who already carry valves certified for use in pressurized water reactors. The small modular reactors planned for construction in Saskatchewan are boiling water reactors. If the suitability of existing valves can be tested for boiling water reactor conditions, and if the valves are able to stand up to those conditions, the suppliers of those valves gain the opportunity to enter a new market. Before the segment intended to test valves and small components is built, simulation will be conducted to verify material choices and their ability to tolerate intended conditions. Simulation will be conducted using the CAESAR II software package. This software allows the analysis of different pipe stresses resulting from temperature, pressure, and piping geometry.

## Energy Systems Engineering

### ERSE 2: Wind Turbine System Design to Optimize Grid Integration of Wind Energy



Delaiya O'Donnell-Dutchak

To meet rising global energy demand and to achieve Canada's net-zero target, it is essential to increase the share of sustainable energy sources within the energy mix. Wind energy has become a growing source of carbon-free electricity in Canada, with 19 GW total capacity currently installed, and projections for an additional 31 GW to be installed by 2050. Wind is inherently intermittent as it experiences natural variations in speed and direction due to pressure differences caused by uneven atmospheric heating, topography variations, and Earth's rotation. The natural intermittency of wind poses a challenge of energy supply and demand imbalance, which concerns optimal wind power production and utilization. To address this issue, energy storage systems can be implemented to balance intermittency and ensure overall grid stability and reliability. This project focuses on designing an optimized wind turbine system for a sited location. The location is chosen based on an analysis of mean wind speed, environmental impact, and social and regulatory factors. The wind turbine system is then optimized for the sited location through a sensitivity analysis focused on turbine models and associated specifications, energy storage systems, including battery and fuel cell storage systems, related costs, and potential revenue produced by the system.

## Energy Systems Engineering

### ERSE 3: Synergetic mechanisms and production performances of Hot Water-Supercritical CO<sub>2</sub> Floods in Heavy Oil Reservoirs



ZhenYu Zhang

This project investigates enhanced oil recovery in heavy oil reservoirs with high viscosity and poor mobility. Traditional thermal recovery methods face limitations such as high energy consumption and heat loss in deep or thin reservoirs. Supercritical CO<sub>2</sub> flooding is considered a promising alternative due to its ability to reduce oil viscosity and improve recovery efficiency. In this study, numerical simulation models were developed to evaluate hot water flooding, CO<sub>2</sub> flooding, and their combined application.

## Environmental Systems Engineering

### EVSE 1: Erosion Management Design for the Tailings Storage Pond at the Mosaic Belle Plaine Potash Mine



Madison French



Joshua Engel



Meena Alaghband

Tailings storage ponds are crucial earth structures in potash mining operations, yet they are highly susceptible to erosion caused by natural factors like wind, wave action, and precipitation. At the Mosaic Belle Plaine mine, limited erosion protection exists along the tailings pond embankment, leaving other uncovered areas prone to weathering. These areas face a risk of slope instability or failure, environmental contamination, and compromised site safety if left unprotected. This project aims to develop an effective, reliable, cost-efficient, and environmentally sustainable erosion management design for the tailings storage pond. The proposed design focuses on riprap-based erosion control supported by geotechnical slope stability analyses. Utilizing GeoStudio modelling software the embankment stability is simulated under varying riprap material surcharge loads. The factor of safety of each alternative is determined using the model outputs, which is considered in a weighted decision matrix that also evaluates effectiveness, site safety, project cost, and environmental considerations. The final outcome of this project includes a recommended riprap erosion control material, supporting slope stability analysis results, and a detailed cost estimate for project implementation. The proposed design will improve embankment resilience, reduce risk of erosion-related failure, and support environmental and operational sustainability of the Belle Plaine potash mine.

## Environmental Systems Engineering

### EVSE 2: Flood Risk Reduction For The Ring Road and Ross Avenue Intersection Using Water Inflow and Outflow Data



Yosan Ghebrehiwot



Adedapo Onatola-Morakinyo



Levi Reddekop



Syed Zulfiqar

This project examines why the Ring Road and Ross Avenue underpass in Regina continues to flood during major rainstorms and what practical solutions could reduce the problem. The underpass sits in a low area. The surrounding industrial and commercial zones have large paved surfaces that send water toward it very quickly. During recent storms in 2022 and 2025, the existing storm sewer pipes and lift station were unable to move water out fast enough. This led to road closures and safety concerns. To understand how and why this happens, we gathered rainfall records, storm sewer data, soil information, and details about the road layout. We used the SWMM modelling software to compare how much water flows into the underpass during heavy storms with how much the drainage system can actually carry away. This helped us identify the main limitations and estimate how quickly flooding begins under different conditions. Based on the analysis, we evaluated a few options, including upsizing pipes, adding detention storage, and improving inlet capacity to slow runoff before it reaches the low point. We also considered construction safety, environmental impacts, and how future climate conditions may affect rainfall intensity. The goal of this project is to recommend a reliable and cost effective strategy that reduces flooding, improves public safety, and strengthens Regina's stormwater system for the long term.

## Environmental Systems Engineering

### EVSE 3: Design of a Remediation Solution for Brine-Impacted Soils at an Industrial Site



April Gette

Carson Leischner

Mason Lakustiak

Alexandra Lenz

Historical brine releases at a Saskatchewan industrial facility have resulted in significant soil and groundwater contamination, characterized by elevated salinity and electrical conductivity. The contamination is believed to have originated during site development, when brine waste was discharged directly onto the ground surface without containment. These impacts have degraded site conditions to the extent that vegetation cannot be sustained, limiting ecological function and future land use. This project evaluates hybrid remediation strategies, including gypsum flushing, targeted soil amendments, and phytoremediation, to restore soil functionality while balancing cost effectiveness, sustainability, and long-term recovery. The methodology integrates field investigation, laboratory testing, controlled remediation trials, and computational modelling. Site investigations were used to define the extent and severity of contamination, and baseline soil properties were characterized to inform treatment design. Pilot scale remediation was conducted using contaminated site soil to assess treatment sequencing and effectiveness, followed by phytoremediation plant growth trials to evaluate vegetation establishment and salt uptake. Furthermore, groundwater flow and contaminant transport modeling using MODFLOW was used to support the design of the leachate collection system. Key deliverables include the selection of an optimal hybrid remediation strategy and the design of a preliminary leachate collection system, including an interceptor trench, perforated drainage network, pumping and treatment design, and a controlled surface water application system for flushing. Ultimately, this project develops an engineered remediation design for this brine-impacted industrial site, with the intent of creating a remediation framework that is transferable to similar sites operated by the client.

## Environmental Systems Engineering

### EVSE 4: Design of a Modular Polymer Storage, Make-Down, and Automated Dosing System for the Saskatoon Water Treatment Plant



Bryabella Bula

Pearl Kawoozo

Sania Sami

In Spring 2025, the Saskatoon Water Treatment Plants Permit to Operate was amended with 90 days notice to include a maximum Total Suspended Solids (TSS) limit of 400 mg/L, requiring rapid process adjustments to maintain compliance. An interim polymer dosing system was implemented; however, it was minimally optimized, highly operator-dependent, and lacked long-term reliability and automation. This project aims to design a modular, off-the-shelf polymer storage, make-down, and automated dosing system that improves dosing accuracy, operational flexibility, and infrastructure resilience. Multiple alternatives, including dry polymer, liquid polymer, and advanced control-based systems, were evaluated using detailed engineering calculations, process flow diagrams (PFDs), and Monte Carlo simulation to assess variability in polymer demand, operational uncertainty, and lifecycle cost risk. Alternatives were compared using a weighted decision matrix incorporating technical, environmental, and economic criteria. The recommended design prioritizes modularity, redundancy, and sustainable chemical management while aligning with municipal procurement and maintenance constraints. By enhancing suspended solids removal, reducing chemical overuse, and improving system reliability, the project advances sustainable water treatment practices and strengthens regulatory compliance and environmental protection.

## Industrial Systems Engineering

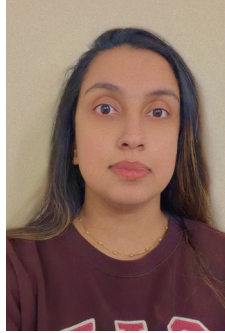
### ISE 1: Tillage Rubber Field Roller Assembly and Disassembly Jig



Morgan Mutschler



Houman Alimardaninaghani

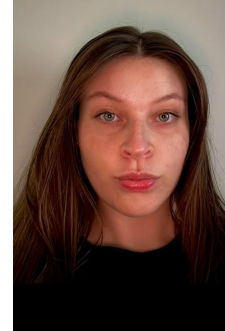


Syeda Fariha Shakil

Degelman Industries LP (Degelman) requested the development of a new jig to simplify the assembly and disassembly of tillage rubber rollers of various sizes and types. This process is required when rollers require service, most often due to damage sustained during use. For assembly operations, Degelman currently uses a hydraulic jig, but it lacks safety provisions and the ability to properly assemble the rollers with appropriate spacing. The current method of disassembling the rollers involves using forklifts, overhead cranes, and physical force, all of which are inefficient and hazardous. In addition to the assembly and disassembly of various rollers, the new design must be operable by one person, be suitable for outdoor storage, integrate with Degelman's hydraulic, electric, or pneumatic systems, and meet Degelman's manufacturing standards. The new jig must ensure the safety of the operators. This design project must include a standard operating procedure that accompanies the final design. The proposed design makes use of hydraulic cylinders for pushing, pulling, and clamping around rubber rings, manual sliding steel fingers for indexing, and a bolted end plate for anchoring rollers. This project will detail the design, methodology, analysis, and operation of the new jig as well as improvements compared to the current process.

## Industrial Systems Engineering

### ISE 2: Optimizing CO2 Dehydration Performance: A Desiccant Replacement Study for SaskPower's CCS Facility



Jenna Kautz



Dylan Rein

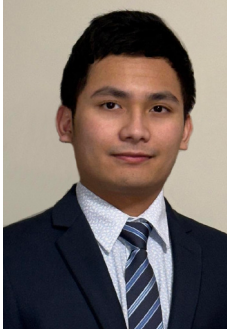


Sarah Schatz

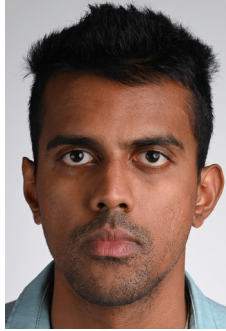
This project provides a technical assessment of the desiccant and its operational performance within the CO<sub>2</sub> dehydrator towers at SaskPower's Boundary Dam Carbon Capture and Storage Facility. The facility has faced early degradation of its current desiccant, BASF F-200 Activated Alumina, necessitating replacements more frequently than the anticipated two-to-three-year service life. The objective of this project was to identify a more reliable and economically viable alternative that is mechanically compatible with the existing dehydration towers and to assess potential factors contributing to the early material failure. Process modeling, technical consultation, and performance evaluations were carried out to compare candidate desiccant materials and optimize the dehydrator tower configuration. The analysis identified a layered arrangement of Sorbead Air R and Sorbead Air WS as the most effective solution, with Sorbead Air WS serving as a protective layer to improve resistance to liquid water exposure and extend overall desiccant life. This configuration enhances operational stability, lowers regeneration energy requirements, reduces system pressure drop, and improves gas flow efficiency. Economic analysis projects a notable reduction in annual operating costs and extends the replacement interval to approximately three years. The study also recommends implementing moisture-based monitoring to improve regeneration control and overall process efficiency. Collectively, the findings demonstrate that the proposed desiccant system offers a technically robust, energy-efficient, and cost-effective improvement for long-term CO<sub>2</sub> dehydration operations at the facility.

## Industrial Systems Engineering

### ISE 3: Performance Improvement of Scrubber Systems Through Piping Network Optimization



Joshua Julve



Pranav Mukesh



Denzel Semey

Product accumulation and blockages in the current piping network have led to insufficient suction pressure at certain levels of the scrubber system at the storage and packing plant. This buildup causes numerous issues such as, product accretion throughout the plant but primarily at the loadout conveyors. The plant employs the use of two scrubber systems. Scrubber 1 is overutilized and scrubber 2 is underutilized. Since the scrubber themselves are not the issue, their piping network will be the main focus. The proposed optimization technique consists of decreasing the angles of the current pipe bends that are causing the accumulation to utilize gravity and the air pressure, adding an internal coating of Xylan 1010 (used to reduce friction, improve wear resistance and mitigate product to pipe adhesion) to the new sections of pipes we will be adding. Additionally, an active line that is connected to scrubber 1 will be blanked and rerouted to scrubber 2 which would allow for better utilization of both scrubbers. Additional design changes will include a section of a pipe that are connected to each storage bins to enhance suction. Given the scope of the project, a simulation is the only means of analyzing the issue at hand and so results will be compared with industry standards and scrubber specifications to ensure a valid outcome.

## Industrial Systems Engineering

### ISE 4: Sinking Winch Design



Maxwell Rae



Brady Streifel



Kamsiyochukwu Obasi

This capstone project details the design of an industrial sinking winch for Thyssen Mining's shaft sinking operations. Engineered to support a 40,000 lbs. line pull, house 5,000 ft of wire rope, and operate at a maximum line speed of 40 ft/min, the winch integrates mechanical, structural, and electrical subsystems while adhering to stringent mining safety standards. The final solution delivers complete 3D CAD (SolidWorks) models, preliminary electrical interfaces for control integration, and comprehensive supporting calculations for hoisting, structural integrity, braking, and the powertrain. Additionally, components including the gearmotor, LeBus shell, bearings, shaft locking assemblies and brake system, were verified and sourced through client-recommended vendors.

## Industrial Systems Engineering

### ISE 5: Press Brake Bend Line Indication Device



Jackson Exner

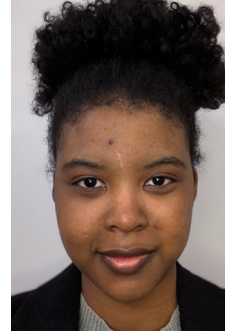


Justin Wagman

CNH Industrial has asked for the development of a method to correctly measure the bend line of a Press Brake to replace the need for a first part check. A first part check is when the operator performs a test bend on a work piece to see where it will be bent, and it is done each time the operator needs to change over to bend a different part type. This is currently a necessary process, but it consumes time and can result in wasted material. This project provides a bend line indication method that does not require the operator to perform a first part check. This reduces the amount of time needed to set up the press brake for each change of part type being pressed and negates the possibility of wasted material. The solution focuses on the use of machine vision using a camera mounted on a frame behind the press. The press brake operator is provided with a clear and accurate bend line, keeping the bends within the desired one millimeter of error.

## Software Systems Engineering

### SSE 1: TasteBud



Shema Dabiri



Ethan Goski



Mazen Elsayed

TasteBud is an application developed to identify and track users' allergenic or intolerant foods via long term pattern recognition. It is a solution created to meet the needs of a substantially increasing population of people who experience allergies and food intolerances on a daily basis. By combining dietary logging of ingredients with symptom tracking and analytical insights, TasteBud helps users detect correlations between consumed foods and related reactions, therefore, enabling more informed dietary decisions and improved health management. Additionally, drawing upon the support of established research, the application provides users with precautionary guidance to help avoid potentially problematic foods based on factors such as cross reactivity.

## Software Systems Engineering

### SSE 2: ClassQuest



Dmytro Stepaniuk



Alvin John Tolentino



Tolani Oke-Steve

ClassQuest is a browser-based classroom gamification platform designed to increase student engagement by transforming academic work into an interactive role-playing experience. Built for upper elementary and middle school classrooms, it allows teachers to convert assignments, quizzes, and exams into structured quests and boss battles that reward effort and progress. Teachers create and manage content through a streamlined dashboard where they can assign activities, control rewards, and monitor class progress in real time. Students complete academic tasks to earn experience points, gold, and health, level up their characters, and unlock cosmetic upgrades. Boss battles represent major assessments where correct answers contribute to collective success, reinforcing accountability while encouraging teamwork. The platform is intentionally structured to maintain teacher authority and ensure that game elements support, rather than replace, curriculum goals. ClassQuest is built to operate within real classroom constraints. It runs on standard web browsers and common school devices, including Chromebooks. Student account setup requires minimal personal information, and role-based access controls separate teacher and student functionality. The platform avoids peer messaging and other social features that could introduce risk or distraction. Data privacy, simplicity of deployment, and clarity of use are core design principles. By combining structured academic control with motivational game mechanics, ClassQuest provides a practical alternative to traditional classroom management tools. It aims to support measurable learning outcomes while increasing participation, and overall classroom energy.

## Software Systems Engineering

### SSE 3: ToolShare



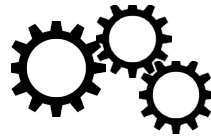
Jay Chandrakant Patel



Isaac Kydd

ToolShare is a web-based platform created to make it easier for universities to share equipment like cameras, microphones and many other lab tools. Many universities already own expensive equipment, but a lot of it sits unused because it is managed separately by different departments. At the same time, students often have trouble finding or accessing the tools they need for their projects. ToolShare brings everything into one simple system so equipment can be found and shared more easily. ToolShare allows students and staff to log in securely, browse available equipment, and book items using a simple calendar system. Users can view their current and past bookings through a personal dashboard. Faculty and lab instructors have access to an admin panel where they can add, update, or remove equipment, as well as manage booking requests. This helps keep equipment information accurate and organized. The system is built using modern web technologies and is designed to be easy to use, secure, and scalable. ToolShare helps universities make better use of existing resources, reduces unnecessary equipment purchases, and supports student learning and innovation. Overall, the project demonstrates how a centralized digital solution can improve efficiency and resource sharing within a university environment.

# Feedback



This is the 27th Annual Project Day.

We would greatly appreciate your feedback on how things went.

Please send an email to [engg@uregina.ca](mailto:engg@uregina.ca) with your feedback

Thank you for helping us ensure next year is even better!

The Project Day Program is sponsored by:



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