INGENIUM

Chemical Engineering • Civil Engineering • Electrical Engineering • Mechanical Engineering

Benedictine College School of Engineering Newsletter

Volume 8. Issue 1, Summer 2024

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Ingenium: noun, from Latin meaning natural talent or disposition.

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A Message from the Chair

Dr. Darrin Muggli

Hello again from the School of Engineering (SoE). I know you've been pining away, waiting for the newsletter to arrive, so today is a happy day. A lot has happened this year, and most of it has been good. Overall, the School of Engineering continues to grow, and we have a bumper crop of incoming freshman this year. So much so, that we had to open a 4th section of Intro to Engineering.

In April, we found out that we will be awarded one million dollars for engineering equipment. We are excited to buy some new laboratory equipment after the funds become available sometime this summer. We hope that all this new equipment will stay dry. You may have heard that Westerman flooded last winter when some pipe fittings burst. The building was quite a mess for a few weeks, but most of it was on the second and third floors. This is just one more bit of evidence that God prefers engineers to physics and biology majors.

Dr. Peter Merkle retired this year, and we will miss him. Filling his shoes won't be easy as he was a very dedicated faculty member. Thus, we have not yet found a replacement for him, and we are preparing to enter the fall semester short-handed in civil engineering.

Due to the growth of the mechanical engineering major, Benedictine approved our request to add another ME faculty member. We completed our search this summer and are excited to welcome Bridget Schabron to the SoE. Bridget holds degrees in mechanical engineering (BS), biomedical engineering (MS), and creative writing (MFA). She has been working as a Systems Engineer for Vantage MedTech in Lenexa, KS since 2019.

As for me, I am still teaching mostly the same courses, although Dr. Patrick O'Malley and I have been team-teaching a new one-credit course called Optimal Work. The course teaches people how to be more efficient while also bringing more meaning and enjoyment to their work. It is particularly beneficial for those who wish to sanctify their work. So far, the course has significantly helped students work better and manage their stress. I encourage you to check out the website at www.optimalwork.com. Let me know if you would like to try out the program as we have a couple of unused licenses that will be available until the fall semester starts.

The last major change for me is that I have rotated out of the chair position as of August. Over the past few years, Dean Shankman has been replacing department heads with over 10 years of experience and this summer, my number came up. I am very grateful to all the wonderful faculty, staff, and students who have made my 15 years as chair a great experience. I am excited that Dr. O'Malley is our new chair as he will do an outstanding job, and I am looking forward to doing more teaching.

As always, we would love to have you stop by the school anytime and visit (or respond to the alumni news survey, send an email, call, etc.).

Dr. Merkle Retires

By Peter Merkle

Dr. Merkle

To begin, I wish to thank everyone for the surprise retirement flashmob and the many thoughtful cards and gifts. Please know all are greatly appreciated!

So far, retirement here on the farm has been a lot more work than I expected. Grandchildren are a blessing, and we have enjoyed many outings to the playground, the lake, and the zoo. It seems like yesterday my own children were so young, and I find myself thinking about the mystery of time. It is the most valuable resource we are given, we cannot make more of it, and it is so easy to let it pass without attention to the message in each moment.

Regarding the passing on of wisdom, perhaps the next person to retire will be able to help out with that. What I can share for students is what I know to be true from my experiences teaching college for twelve years: before you manage your time, orient yourself to your goals. Make sure they are YOUR goals, and not what you think someone else wants for you, or what you SHOULD do. Pay attention to what you enjoy doing in academics, what you do well, what you are curious about, where you invest your free time. Your path forward may only be visible one step at a time, but trust yourself as you decide your route to academic success. Pray about it! Get used to failing a test once in a while, and be proud to fail honestly, that is, with effort and diligence, be happy to come up short. In this way your weak points are known, to be made strong.

With your goals set, make time management and skill development a priority. Without adequate sleep on a regular basis, good nutrition, exercise, and healthy social time, academic success will elude you, as your stress levels and general health will suffer. Make good use of professor office hours and advising time. Most importantly, understand that unexpected things are going to happen in your life that will make your academic progress very difficult at times, and seem even almost impossible. When such things happen, and they will, remember you are part of the Raven community, and I am quite sure that help for any difficulty will be there for the asking. Ask for help when you need it!

As far as specific plans for retirement, I am enjoying not having to have any plans, after 47 years of having to make many plans, and hear God laugh. I hope there will be surfing, though, and time well spent with children and grandchildren.

Go Ravens!

Professor Schabron Joins Mechanical Engineering Faculty

By Bridget Schabron

Bridget Schabron is joining the School of Engineering faculty this fall to teach mechanical engineering. For the past five years, Bridget has worked on medical devices for a small company in Lenexa, KS. She has also worked as a LabVIEW developer in the Oil and Gas industry in Texas, and as a staff engineer at the University of Wyoming. She has a Master's Degree in Biomedical Engineering from Wichita State University; a Master's of Fine Arts in Creative Writing, Editing, and Publishing from Sam Houston State University; and a Bachelor's of Mechanical Engineering from the University of Wyoming.

In her free time, Bridget enjoys painting, writing, and attending Bible Study. Always an avid learner and comfortable in the academic world, Bridget is excited to step back into academics yet again—this time as an assistant professor! She is excited to introduce students to the biomedical field and help them improve their technical writing skills.

Professor Schabron

News

Engineering Capstone Project Changing Lives

By John Modlin

Andrew Doyle, a physical therapist with the Leavenworth, Kansas School District, recently reported the dramatic impact a recent mechanical engineer capstone project had on the life of a student.

The 2022-23 "Wheelie Boyz" team of Marco Kouatly, Peter Malone, Sam Barnes, and Gabriel Virnig (all ME 2023) designed and built a power wheelchair trainer for the District. The trainer helps cognitively-impaired students learn to control a powered-wheelchair, providing the students with greater independence. A student learns to use simple controls while sitting in their own regular wheelchair, which is strapped to the trainer. A teacher or therapist also has remote control of the trainer via a tethered control box.

Marco demonstrates power wheelchair trainer.

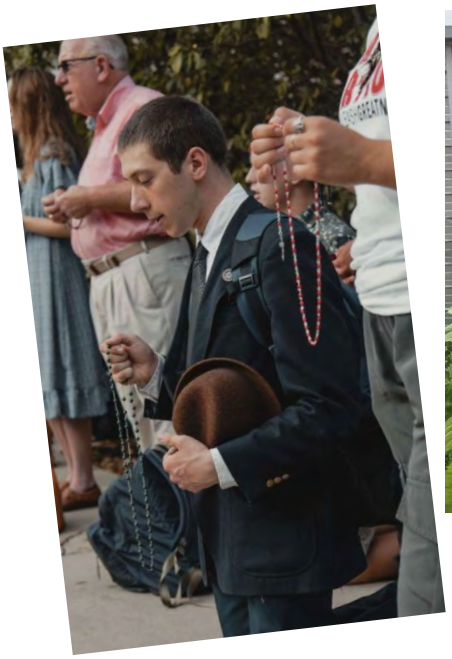
Mr. Doyle reported that "The student has a significant cognitive impairment and was considered to have the cognitive functioning of a [very young child]. The student is currently in the 18-21 program, and though many attempts had been made over the years to learn effectively using a switch for communication, etc., he had not mastered any switches.'

'Enter the power wheelchair trainer designed and built by Benedictine College [School of] Engineering. We started working with him using the power wheelchair trainer in January and he has now mastered activating and releasing buttons to go forward and turn left. He was then able to generalize those skills during the power chair trial today and so now he is on his way to the FREEDOM of independent mobility. This is not something that I or anyone would have thought possible before the power wheelchair trainer that ... you helped make happen. It is truly life changing technology!"

This is the second student success story reported by Mr. Doyle. The previous story appeared in the 2023 *Ingenium*.

Featured Photos

Photography by various members of the Benedictine community



Engineers pray!

Sunflower in greenhouse for Water Quality Class in dead of winter

Dr. Downs working on Spooky Science!

MEs in the Engineering Lounge

Fall Career Fair

News

Board of Industrial & Academic Advisors

By Sophia Caughron

We love our School of Engineering here at Benedictine College! The engineering program draws many students to our school---students who want to study engineering at a strong Catholic college. One of the vital elements of the engineering program's success is the Board of Industrial and Academic Advisors (BIAA).

The Board is composed of engineering professionals from around the country who serve five-year terms. The Board is divided into several committees, each focusing on an area vital to the success of the engineering program. Committees include: ABET accreditation, alumni outreach, recruiting, and on-campus experience. Committees may meet four times each year, while the entire board meets once a year, on Presentation Day in April. This allows board members to attend Junior and Senior Design presentations. At their annual meeting, board members review updates presented by faculty members, and then break into committees. The Board recommends action items to the School of Engineering. The BIAA also helps prepare for renewal of ABET accreditation, and was a primary force in the successful effort to achieve ABET accreditation for all four of our engineering disciplines.

The Board provides an outside perspective on the School of Engineering. This proves helpful in many circumstances, such as in evaluating how well Benedictine's engineering program prepares students for jobs after college. Board members are able to observe qualities of our engineering graduates compared to others and provide feedback. This feedback can be incorporated into the engineering program to help our students be successful. BIAA members love Benedictine's Catholic identity, and recognizes that it often makes our engineering alumni stand out, especially in ethical situations. The Board of Industrial and Academic Advisors works to ensure that a Benedictine College engineer is synonymous with a good engineer.

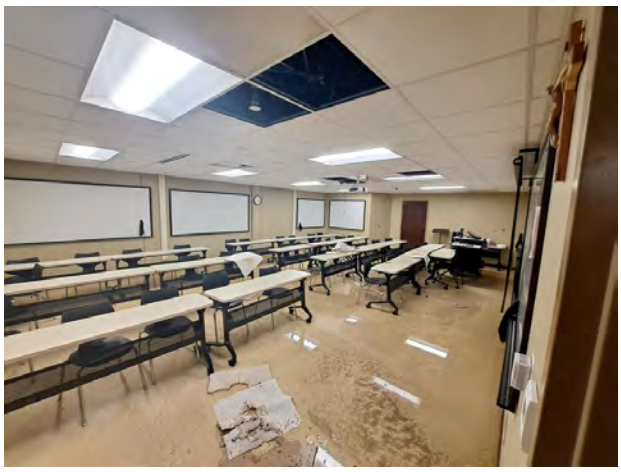
Our new chair of engineering, Dr. O'Malley, comments: "I've enjoyed seeing the BIAA develop over the years, especially as our program has matured to the point where we have a significant number of Benedictine Engineering alumni now serving on the board. Their feedback to us from the different areas of engineering practice is valuable to our program and I'm looking forward to receiving their advice in the years to come."

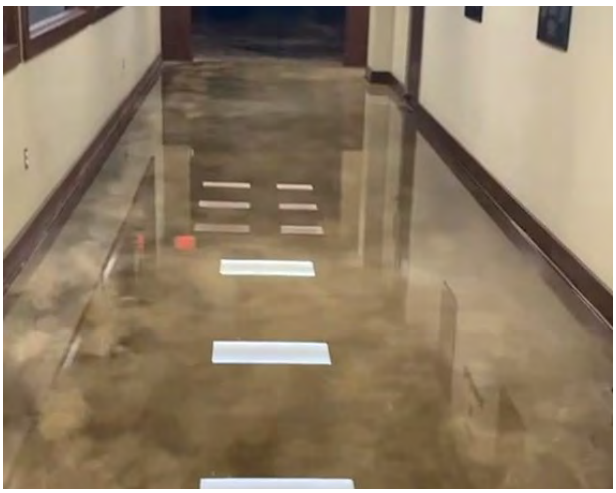
(Continued bottom of page 7)

Two Floods in Two Days

By: Charles Sprouse

The "spring" 2024 semester started icy cold, with temperatures fluctuating between -13°F and 11°F from January 13th to 16th. In the afternoon of Tuesday the 16th, I returned from a 4:00 p.m. meeting to find Dcn. Pat Hirl urgently building a makeshift water barrier at my office door, while also feverishly wet-vacuuming gallons and gallons of water. As I looked inside my office, water was pouring just to my left, and all along the back wall! Ceiling tiles were caving in and trash cans were being used to capture the rain shower. It was an indoor deluge that claimed many papers and books, including fluids books (the irony, and tragedy)! Fortunately, Dr. Andrew Downs and the Biology faculty were eventually able to stop the water flow from a large pipe fitting failure.





Little did we know that was only Act #1, as the very next night (January 17th) there were pipe failures in the entryway to Westerman Hall on the third floor, in the sprinkler and heating systems, which rushed water down on Biology faculty offices and engineering classrooms, displacing all class meetings from Westerman over the following days.

Current BIAA members are:

Nick Suhr '16 (Chair)
Robert Ochs (Vice hair)
Claire Komives
Brad Johnson
Kate Davison 2018
Eric Schultz 1997
Morgan Hoffman 2017
Robert Boucher
Ed Trompeter
Michael Klein 2018
Math Myjak 2021
Michael Pochop

Student Activities

Concrete Canoe: Will it Float?

By Sophia Caughron

The 2023-24 Benedictine College Concrete Canoe Team has been rejuvenated after being inactive for five years. The team consists of 15 first-year members majoring in Civil or Mechanical engineering. The team has constructed a 17-foot concrete canoe to be presented at the April 2024 ASCE Mid-America Symposium in Rolla, Missouri. This year's canoe theme was Hrafn, the Nordic translation of the word Raven, giving the overall canoe project a Viking theme. The team has worked hard all year to design the hull, develop, and test concrete mixes, create a mold, and hand construct the concrete canoe. Multiple teams were made to achieve tasks like building a 22-foot metal transport, writing a report, creating a visual display, and participating in paddle practices. The team traveled to Rolla, Missouri, April 18th and competed against 12 universities at the Mid-America Student Symposium. The men's teams placed first in the slalom race and second in the sprint. The team also ranked second in racing points and second in technical presentation. Benedictine College placed 5th overall at the student symposium and is ready to compete next year at Lincoln, Nebraska for the 2025 Concrete Canoe Symposium.

Concrete Canoe Foam Mold

Moving the Finished Canoe

Canoe and Presentation at Rolla

Rowing Teams at Rolla

Student Activities

Library Construction Site Visit

By Sophia Caughron

On Friday, March 22nd, 2024, a group of civil engineering students donned hardhats, reflective vests, and safety glasses in the Westerman civil engineering lab, in preparation for an afternoon visit to the construction site of Benedictine College's new library (completion estimated in December 2025). Under the guidance of Dr. Scott Newbolds and Dr. Deacon Patrick Hirl, the students briefly met with the construction supervisor from Straub Construction Company, Inc., and then watched as concrete was poured for one of the library's basement walls. Looking down at the excavated site, students could see the concrete footings serving as the foundation for these walls.

CivE Students Visit Library Construction Site

Posing with Total Station in Background

Learning about Piles

They learned that many helical piles had been drilled into the ground beneath these footings to provide support for the weight of the future library, and that the walls would be poured in nine sections. The professors were very helpful in answering questions about the materials and equipment on site, discussing the design-build delivery method used in this project, and explaining techniques for various parts of the construction. Overall, it was refreshing and educational to take a short break from book learning and see the physical reality of an engineering design.

Undergraduate Research:

Cow Manure Rheology

Edited by John Modlin

Olivia and James presenting research on Discovery Day

The dairy industry is working to reduce the amount of methane released into the environment by using anaerobic digesters to generate and collect methane generated by cow manure and using it as renewable source of natural gas. Doing so requires the pumping of tons of manure. As any good engineer knows, to size a pump or a pipe, you need to know the viscosity of the fluid. Unfortunately, manure slurry has some unique fluid properties (i.e. non-Newtonian), very different from water. There is a lack of information about flow properties of manure slurries.

Montrose Water and Sustainability Services (MWSS) funded undergraduate research by Mechanical Engineering students Olivia Hill and James Atkinson during the 2023-2024 school year to characterize the rheological properties of cow manure slurries. (Rheology is the study of the flow of non-Newtonian fluids.) Working under the direction of Dr. Katharine Strandquist and Dr. Patrick Hirl, the students tested the properties of cow manure from different dairy farms and with varying dilutions and temperatures. (It was dirty work!)

The empirical models drawn from this study will allow engineers to more effectively design pumps and equipment for this growing industry, reducing the need to oversize equipment, thus lowering capital and operating costs.

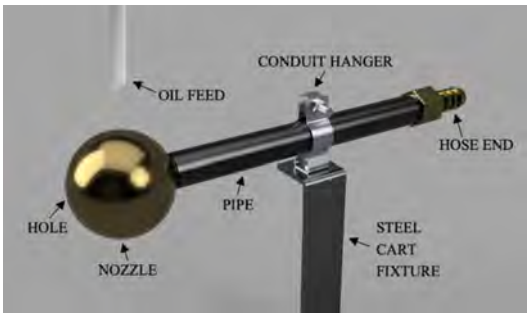
The project was completed during the summer of 2024.

Junior Design

Mechanical Junior Design Projects

Babington Burner

Augustine Blosser, Ryan Fricker, Isaac LeMark, Gabriel Guzman



This burner was designed by the Art Department's casting furnace. During operation the furnace will heat up to over 1,220°F, hot enough to melt aluminum. The nozzle has a 0.01-inch hole and works by atomizing a film of oil that flows over it from the oil feed. The hose end connects to a 30-psi compressed air source. The expected heat output is 40,000 BTU/hour using 1/3 gallon of waste vegetable oil an hour.

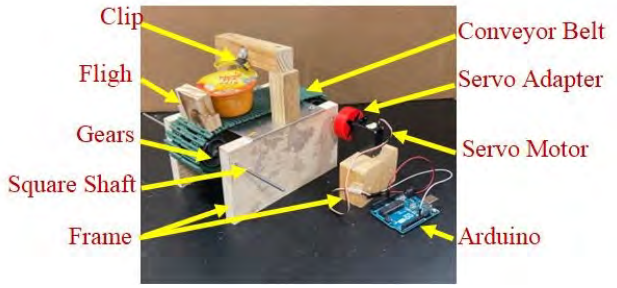
Fuel System for Metal Casting Furnace

Nick Eisman, Aaron Stanley, Matthew Feldkamp

The purpose of this project was to create a fuel supply system to move oil from a drum to an outlet using a gravity fed system and heated oil to decrease viscosity. For safety, the oil drum was located approximately four feet away from the furnace cart and all other parts within 1.5 feet of the furnace were designed to be metal due to heat of the furnace.

Automatic Wet Cat Food Dispenser

Michael Herbic, Kenneth Lathrum, Anna McDonald, Ben Willits

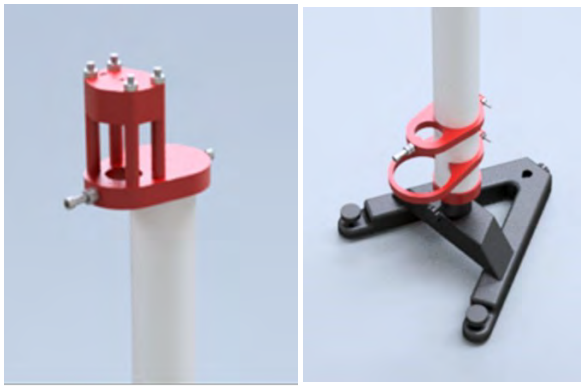


This device opens and serves Meow Mix wet cat food with a peel top plastic lid. A clip attaches the cat food lid to the frame, a conveyor belt with a flight attached pushes the cat food forward opening the container. The Final design will hold eight containers and open two per day.

Mechanical Junior Design Projects

Free Fall Apparatus

Jonah Bergman, Domenico Ricciardi, Benjamin Roper, James Atkinson



This lab apparatus was designed for the Benedictine College Physics and Astronomy Department. It is used to measure the acceleration due to gravity. The device creates an indication on a paper strip by creating a spark between the falling object and a ground wire every 1/60th of a second. This design is more portable than previous designs.

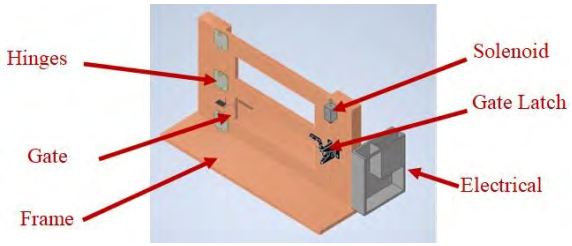
Longboard Braking System

Thomas Campbell, Daryl Easterling, Benjamin Houlihan, Jacob Vaughan

This project developed a longboard braking system. This design allows the rider to rest their foot without braking, then, with a simple pivot of the foot, actuate the brake by pressing the pedal down. The brake pedal and the brake are connected by a cable that runs underneath the rear truck. When the rider releases the brake pedal, a sprung hinge returns the brake to original location.

Barn Fire Escape

Maximilian Al-Ali, Karolek Suchocki, Benjamin Sylvain, Grace Dondlinger



The purpose of this project was to design and build a small-scale prototype of a temperature-activated barn door opener that would open to allow animals to exit in case of a barn fire. The mechanism includes a temperature sensor, an Arduino controller, and a solenoid to open the door. The system opened the gate latch when the sensed temperature exceeds 125°F.

Junior Design

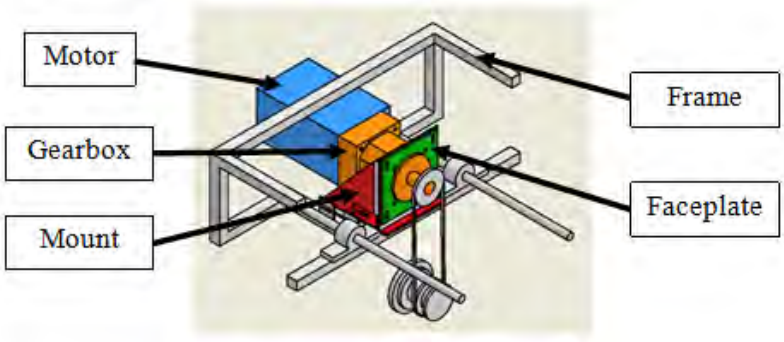
Mechanical Junior Design Projects

Pedal Party Vehicle

Elias Ford, Zachary Johnson, George Spaniol, Hannah Nelson

Faculty and students test drive the improved Leavenworth Pedal Party vehicle. Students Hannah Nelson, Elias Ford, Zach Johnson, and George Spaniol designed performance improvements to the vehicle for their Junior Design project. The project was sponsored by Mr. Patrick VanKirk. This was one of seven Junior Design projects this year.

The purpose of this project was to enable a fully-loaded Pedal Party vehicle to travel up a 10% grade hill without pedal assistance. To achieve this goal, the motor was replaced with a new 4-horsepower motor. A mount was designed and manufactured to fit the selected motor and gearbox.



Civil & Chemical Capstone Projects

Site Development for Dairy Milk Substitute Production Facility

Jacob Laures, Client: MGP, Inc.

Jacob Laures

Once a new manufacturing process is designed, building it on an available site can be a significant challenge. In collaboration with the Chemical Engineering senior design project, "Dairy Milk Substitute Production Facility," an MGP, Inc. site was selected for construction of this project. The site was surveyed, and a building layout was developed based on process requirements and site logistics. A grading plan with soil excavation and placement quantities was developed. Building and process foundation design were completed, and drawings developed. Finally, a transportation plan was developed for the site with site paving and stripping plans.

Process Design and Feasibility Analysis of HFCS-55 Production Facility

Joe Boever, Gianna Muggli, Therese Pivarunas

Lt to Rt: Joe, Gianna , Therese

High Fructose Corn Syrup (HFCS) is a common sweetener composed of fructose and dextrose sugars. The soft drinks, baked goods, and canned goods industries utilize HFCS because it is sweeter, more soluble, and cheaper than sucrose. HFCS-55 (55 wt% fructose) is the most common type of HFCS. With an annual growth rate of 4.7%, the market for HFCS increases as food and bever-

Chemical & Electrical Capstone

age industries grow across the world.

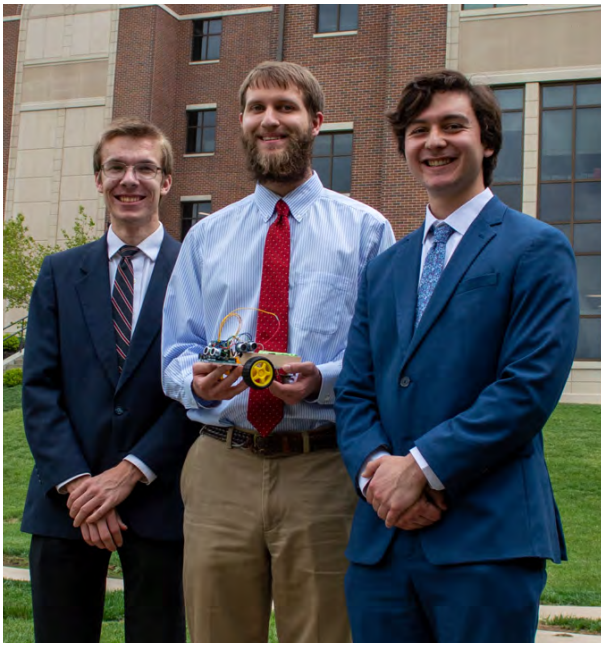
This project designed a process to produce HFCS-55 from corn starch using the enzymes α-amylase, glucoamylase, and glucose isomerase. The process is low risk as it uses mild operating temperatures, pressures, and conventional equipment. The process is economically feasible with a positive net present value (NPV) and a capital investment of about $120 MM.

Electrical Engineering

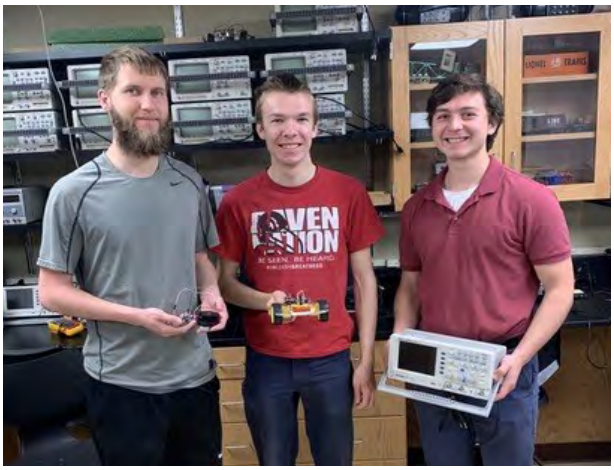
IR-Directed Navigating Robot

IEEE Region 5 Competition

Michael Sanchez, Jack Vanderzanden, Daniel Haunert



Technology is advancing more rapidly in the direction of fully automated devices. Following the requirements and constraints of the IEEE Region 5 competition, the 2023-2024 Electrical Engineering Senior Design Team designed and built a robot to accomplish the specified objectives. The robot will be fully autonomous with the ability to wirelessly charge, navigate using infrared light,



Left to Right: Daniel, Jack, Michael

and follow a predetermined pathway between chargers located on a wall. Optimizing power efficiency was a key design objective, since it is powered from supercapacitors.

Mechanical Capstone Projects

Baja Frame and Integration

Client: Benedictine College

Frank Griesbauer, Doug Vestrat, Nico Bendele, Jacob Clipperton

Top, Lt to Rt: Doug, Frank, Bot: Nico, Jacob

The 2024 Baja team completed a comprehensive redesign of the frame of the Benedictine College SAE Baja vehicle, focusing on three key aspects: lightweight construction, restructured steering, and improved cockpit ergonomics. Using Docol tubing for the main frame components, the team achieved a lightweight frame that will improve the vehicle's performance. The restructured steering system ensures greater stability and control over uneven terrain, while the redesigned cockpit offers improved seating position and adjustable controls for enhanced driver comfort.

Jib Deployment Mechanisms

Client: Custom Truck One Source

Max Palmer, Steven Graham, Sam Anderson, Roman Becher

Lt-Rt: Roman, Max, Sam, Steven

CTOS faces challenges with its current crane jib installation process, utilizing four cumbersome and manually-installed pins. To streamline operations and improve safety, the design team proposed two innovative solutions: Spring-Loaded Pins, which automatically align when the jib and boom are in place with a push-push mechanism, and the Janney Coupler, which operates similar to a train car coupler. These solutions simplify alignment, enhance operator-friendliness, and ensure secure installation. The process involves retracting the boom to connecting the first two pins by triggering the spring-loaded pins or engaging Janney couplers, then securing the remaining two pins using a come-along.

Mechanical Capstone Projects

Steven & Max checking out jib connections at CTOS

CTOS can further develop these concepts to improve its crane jib installation process, improving both efficiency and safety.

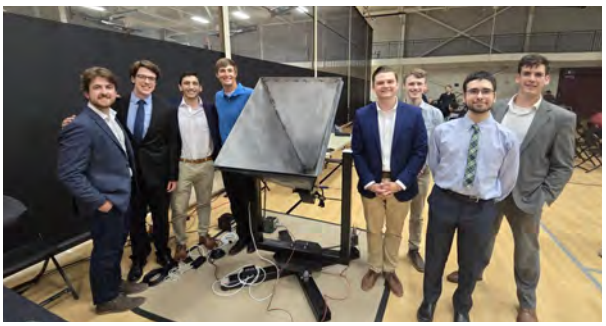
“"Our goal was to revolutionize the installation process, making it safer and more efficient,” says Roman Becher.

Steven Graham highlights the concepts’ benefits, “Our systems not only improve safety but also boosts productivity by significantly reducing the time during installation and strain to the operators.”

Radio Telescope - Structural Scope

Client: Benedictine College Department of Physics and Astronomy

Michael Price, Nicolas Peña, Shane Koehr, Jacob Schmidt



Lt-Rt: Davis, Joel, Nicolas, Jackson, Michael, John, Jacob, Shane

The objective of this project was to build a radio telescope to be used at Benedictine’s Daglen Observatory, which currently does not have any radio astronomy instruments. This team was responsible for the structural scope of work, including both the telescope’s antenna (“horn”) and the support structure. Dr. Christopher Shingledecker specified that the main requirement is the ability to observe the 21-cm wavelength of photons emitted by neutral hydrogen as it changes state, known as the “21-cm line.” This was the first radio spectral line to be discovered and provides a good introduction to the field of radio astronomy.

The structure must rotate about two axes to accommodate positioning

Mechanical Capstone Projects

components, which are being designed by a second team. To accomplish this, the structure we built has a stationary base with a turntable to allow the antenna frame to rotate. The horn antenna, which is optimized to observe the 21-cm line, is supported by shafts supported by the rotating frame.

The bearing-supported shafts allow the horn to tilt vertically. The combination of frame rotation and horn tilting allow the telescope to point to any location in the sky. Movement in both axes is driven by motors and chain-driven sprockets, designed by the positioning team. The user-interface was designed by a computer science team.

We enjoyed the opportunity to collaborate with multiple teams and disciplines on this project and are excited at the possibility of seeing this telescope one day in use at Benedictine, providing another way to view our universe.

Michael Price: "Teamwork is everything in the field of engineering and it can make or break a project. I am happy that I got to see this project develop from nothing to a final working prototype."

Nicolas Peña: "While it definitely took a lot of work, it was rewarding to see a project through from conceptual design all the way to a working prototype."

Shane Koehr: "Seeing everything come to an end was bittersweet, but I am glad it's over."

Jacob Schmidt: "It's fascinating to see the universe through a different set of eyes. It was exciting to work toward that opportunity for the students at Benedictine College."

Lt-Rt: Nicolas, Michael, Shane, Jacob

Capstones

Mechanical Capstone Projects

Radio Telescope - Positioning and Control System

Client: Benedictine College Department of Physics and Astronomy

Joel Iwanski, John Halberg,

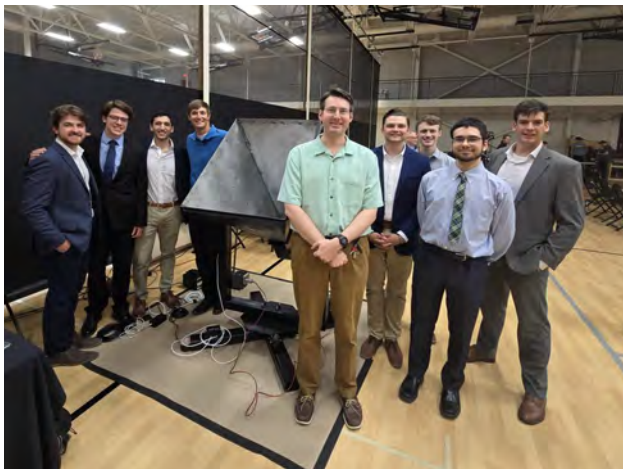
Lt-Rt: Joel, John, Davis, Jackson

Davis Wagner, Jackson Sarver

Radio astronomy has several advantages over typical optical telescope usage, including daytime operation, observation through rain and clouds, and detection of otherwise-invisible objects, such as black holes. The purpose of this project is to expand the research possibilities and to provide hands-on experience with radio astronomy for students at the college.

This project consisted of a three-team effort to construct a radio telescope for the Benedictine College Department of Physics and Astronomy. "If you're confused by the different teams, just think of the telescope like a person," says team member Joel Iwanski. "A structural team is building the bones and skin of the telescope, while a computer science team is making its brain. We're making the muscles, the nervous system, the devices which allow the telescope to move the way we want it to without collapsing."

The positioning team designed the hardware and software behind the telescope's control system. "Seeing our design go from a concept to a product was amazing," said team member Jackson Sarver. The telescope works by rotating around two axes, azimuth, and altitude, via pairs of motors, gearboxes, and pulley systems. A controller and driver interface with the telescope operating program, controlling motor



Radio telescope teams with happy customer, Dr. Chris Shingledecker

Mechanical Capstone Projects

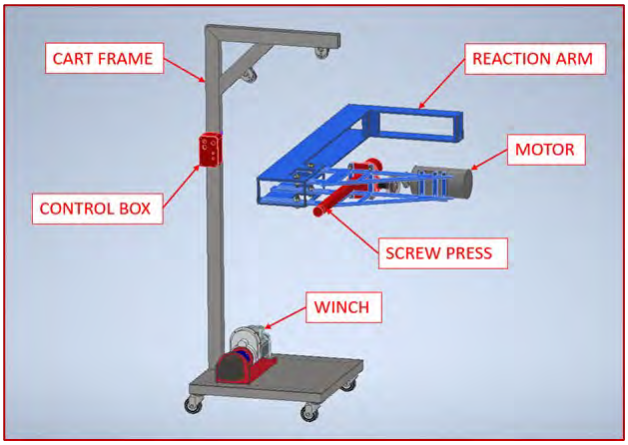
speeds and target locations. Optical encoders monitor the telescope's orientation and link to a feedback control loop for precise positioning. "Interfacing our control system with the operating program allowed us to learn about computer science which was very new to us but interesting and helpful as an engineer," said Davis Wagner.

Pivot Pin Installation

Client: ALTEC Inc., St. Joseph, MO

Carson Kasl, Zachary Schwinn, Gregory Bourget, Peter Keegan

Altec is a leading manufacturer of utility boom trucks. Each of these trucks has multiple articulating joints, which rotate around a pivot pin. Installation of a pivot pin using a dead-blow hammer is time-consuming, strenuous, ergonomically awkward, and potentially unsafe. The pin pusher apparatus can push a pivot pin through the boom of Altec's custom trucks. The device produces up to 10,000 pounds of force to drive the most "stubborn" of pins. It consists of a power screw and a reaction arm suspended by a winch cable, all supported by a steel cart and frame. The goal of the design is to push the pin quickly and reliably, as well as provide users with a hassle-free experience from start to finish.



Carson assembling Altec pin-pusher cart

Mechanical Capstone Projects

Rotary Drum Vacuum Filter Simulator

Client: Evergy

Calvin Benson, Taylor Goring, Sally Napierkowski, Hannah Schwarz

Lt-Rt: Calvin, Customer Mike Aberer, Sally, Taylor, Hannah

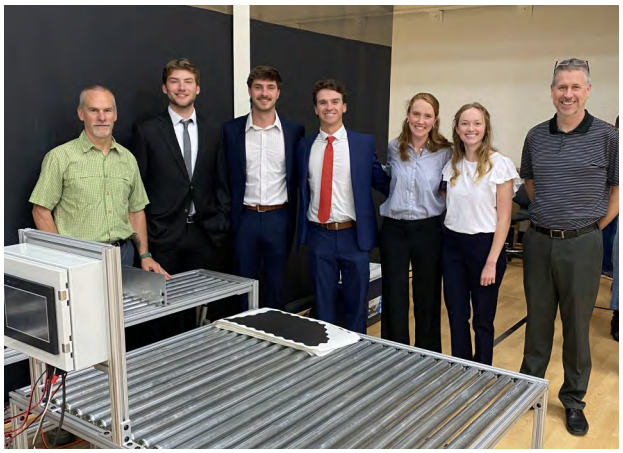
This project's goal was to design and build a tabletop simulator to replicate the function of Evergy's Iatan power plant's rotary drum vacuum filter. This simulator will aid in the testing of various chemical treatments on the filtering characteristics of the plant's flue gas scrubber waste product. The final solution consists of four main components: a vacuum pump system, an actuator and frame, a control system, and an agitator. An electric actuator submerges a vacuum filter head into a slurry sample for a selected duration. The operator uses a control panel to set the test duration and initiate the test, which is controlled by an Arduino controller.

It was rewarding creating a project that can be used in an industry setting to help refine and improve a real process. The hope for this project was that it would be able to help diagnose issues experienced in the power plant, thereby reducing operating costs. One key takeaway from this project was the importance of material selection in the planning phase. The team went through several iterations of designs in which materials were swapped out and gained a lot of experience in properly selecting materials.

Panel Sorter

Client: Henkel

John-Paul Buss, Will Thomas, Isabelle Honigfort, Olivia Hill, Hunter Moffet



Lt-Rt: Customer Dan Jordan, John-Paul, Will, Hunter, Isabelle, Olivia, Customer Ryan Steinhaus

Mechanical Capstone Projects

Henkel Richmond is a manufacturing plant specializing in automotive parts production. The plant was looking to improve the production rate by 15% of one of its extrusion lines through automation. Currently, there is a system in place that detects panels with defects and marks them with yellow paint.

Olivia assembling panel sorter frame.

Our prototype consists of a structure positioned at the end of the existing extrusion line. Photoelectric sensors detect the yellow paint, count panels in the stack, and facilitate timing of the two "trap doors". The first door allows faulty panels to fall into a waste bin, while the suitable panels slide and stack on the second door. This platform lowers once the desired stack count is reached, and the stack is moved onto the roller conveyor where the panels are packaged to ship. Henkel was pleased with the outcome and plans to implement the system into several of their existing extrusion lines.

Henkel Team photo: Olivia, Hunter, John-Paul, Will, Isabelle

As the team bids farewell to Benedictine, they will carry with them the memories of the senior design project they accomplished together, working through many obstacles to complete it.

"I will forever be grateful to the Benedictine College School of Engineering for giving me such a great opportunity for real world experience. This project was intellectually stimulating and equally challenging." - Isabelle Honigfort

"I've never been involved in a team where I will miss being a part of it so much. Being in a group with one of my best friends, who is always up for an adventure, and three amazing, kindhearted men made my senior year experience the best it could possibly be. I honestly could not ask for a better year." - Olivia Hill

"It has been an incredible learning experience and prepared me for work after I graduate!" -Hunter Moffet

Mechanical Capstone Projects

"I have thoroughly enjoyed working with my fellow students and it has been a blessing to have the help of our wonderful engineering professors to aid us throughout this year of accomplishments." - John Paul Buss

Hunter and Will with operator control station (HMI).

Anchor Separator

Client: Progress Rail

Matthew Gardner, Patrick Moraghan, Luke Marquis, Kolbe Dax

Progress Rail produces rail anchor ties that are used to secure rails to ties. During the manufacturing process, these anchors frequently become tangled together, making weight counting and quality assurance difficult. To improve this process, Progress Rail plans to install an overhead scanning system. To use this system, the anchors must be separated and laid flat on an output conveyor after they are manufactured. The goal of this project is to make a prototype rail anchor separator to fulfill this objective.

Nine design concepts were tested, resulting in the selection of the final design, which was developed into a three-part assembly: a vibratory feeder with an entry ramp and pipes; a conveyor system; and two rotating scrapers powered by motors. Anchors enter via the ramp, separate as they move along the vibrating pipes, and are then directed onto a conveyor.

Lt-Rt: Matthew, Kolbe, Luke, Patrick

The two rotating scrapers break up remaining clumps and ensure all anchors lie flat. This process achieves the project's objective of separating clumped anchors and laying them flat on the conveyor, with minimal recycling.

The Rail Anchor Separator prototype is a

Mechanical Capstone Projects

promising beginning for Progress Rail's production line upgrades and provides a strong basis for further development into a full-scale machine for use in their facility.

Kolbe Dax: "This project required a lot of engineering creativity and experimentation; a lot of our design ideas failed before we found something that finally worked."

Patrick Moraghan: "A challenging project that had us do lots of testing and iterations to get the final design right."

Luke Marquis: "We were designing an idea, the execution was secondary to figuring out something that could actually separate rail anchors."

Matthew Gardner: "Through struggles and setbacks we succeeded!"

Relieved MEs—their projects are done!

Max pretending to be a CTOS jib!

Sleep in Heavenly Peace

Downtown Atchison Bed Build

Sleep in Heavenly Peace had another successful year! With the help of hundreds of volunteers, SHP completed six bed builds, constructing 223 beds and surpassing the 1,000 beds-built milestone. With the help of the new SHP trailer, the chapter branched out and held two off-campus build days . One of these events was held in downtown Atchison in conjunction with the "Where Children Sleep" exhibit at the Cultural Center, while the other was in St. Joseph, Missouri, at the new Habitat for Humanity Crisis Response Center. SHP is looking forward to another great year of outreach and service.

Staining and Branding Headboards

Sleep in Heavenly Peace

SHP Bunk Bed at the "Where Children Sleep" Exhibit

Bed Building in the shop

SWE, AIChE, & ASME

Rebecca Madden, Dr. Alexis McKittrick (President of SWE International), Sarah Hanson, and Kalli Hart at Wichita SWE Conference

Society of Women Engineers

In Spring 2021, Benedictine College's Society of Women Engineers (SWE) chapter was founded with the goal of supporting women in the Benedictine School of Engineering. This year, SWE offered two resume building workshops (one in the fall and one in the spring), a professor presentation night, sent some of the board members to the local SWE conference in Wichita, Kansas, and hosted a movie night open to Benedictine students. SWE also hosted numerous study nights for women to meet new people and work on homework in the process.

American Institute of Chemical Engineers

Benedictine's AIChE Chapter kicked off the 2023-2024 academic year with a barbeque hosted by the faculty advisor, Dr. Scott Blonigen. This event allowed underclassmen to meet their peers and learn about the discipline. During the Fall semester, AIChE organized a tour of a cellulose films plant in Topeka. Evan Sutherland (ChE '18) hosted the tour, which provided a glimpse into chemical engineering job opportunities.

American Society of Mechanical Engineers

The American Society of Mechanical Engineers (ASME) had a good year these past two semesters. The chapter began the year with a potluck cookout where officer elections were held and a new, younger leadership was elected. This year, the chapter focused on hosting fewer events, but making the most of the ones it did host and organizing them well to set a standard for future years. ASME organized the School of Engineering's annual Christmas party and hosted a movie night afterwards. The chapter also hosted a Computer-Aided Design (CAD) contest midway through the second semester, aimed at

ASME, KSPE

giving underclassmen experience working with CAD software outside of the classroom. Due to time limitations, the chapter did not host any end-of-year events but finished a solid year, while looking forward to an even better one next year.

Kalen Wojtkun was recently awarded the International Gas Turbine Institute (IGTI) Scholarship from ASME. Per ASME, The institute has a long and proud history of providing scholarships to students who show promise for their future profession in the turbomachinery and turbine engine field. The goal is to attract young talent to the profession and reward their commitment, favoring their upcoming enrollment and active participation.

In describing his application, Kalen said, "In my essays and personal statement to the scholarship committee, I described my desire to build a thermally efficient steam engine and how I was pursuing that goal."

Kansas Society of Professional Engineers

The Kansas Society of Professional Engineers (KSPE) is the state-level division of the National Society of Professional Engineers. This organization is dedicated to promoting and protecting Professional Engineering licensure. Licensure is especially important for civil engineers, who frequently deal with large-scale projects which could have disastrous consequences to public safety should they fail. Professional licensure can also provide a career advantage to engineers of other disciplines by demonstrating their commitment to the profession and ongoing professional development. Our student chapter of the Kansas Society of Professional Engineers had a strong second year. The chapter had three meetings each semester.

At each meeting the chapter provided lunch and a speaker or panel on engineering topics. We hosted an intern panel, a bioengineering professor from University of Kansas, and KSPE president Kerrie Greenfelder in the fall semester. In the spring, we hosted engineers from the engineering firm HDR and American Public Works Association, and ended the semester with a talk on the ethical aspects of the 1981 Kansas City skywalk collapse. Our chapter is always looking for Professional Engineers (P.E.) speakers to visit and speak at our meetings, so if you know someone, send them our way!

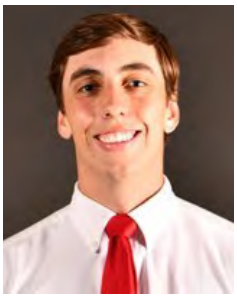
Graduate Photos

Chemical Engineers 2024

Joseph Boever

Grace Nelson

Lucas Carillo Salado



Andrew Baier

Civil Engineers 2024

Philip Joseph

Matthew Cavanaugh

Jacob Laures

Electrical Engineers 2024

Daniel Huanert

Jack Vanderzanden

Michael Sanchez

Graduate Photos

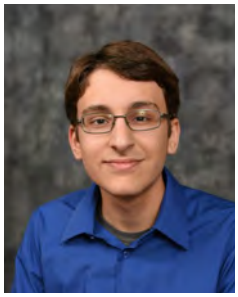
Mechanical Engineers 2024


Samuel Anderson


Samuel Barnes


Nicolas Bendele


Calvin Benson


Gregory Bourget


John-Paul Buss


Jacob Clipperton


Kolbe Dax


Matthew Gardner


Taylor Goring

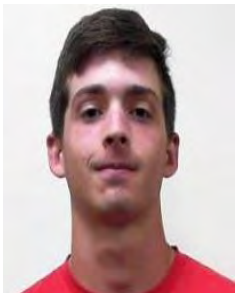

Steven Graham


Frank Griesbauer


John Halburg


Isabelle Honigfort


Joel Iwanski


Carson Kasl


Peter Keegan


Hunter Moffet


Patrick Moraghan


Sally Napierkowski

Graduate Photos

Mechanical Engineers 2024


Olivia Hill


William Rory Opp


Joseph Palmer


Nicolas Pena


Michael Price

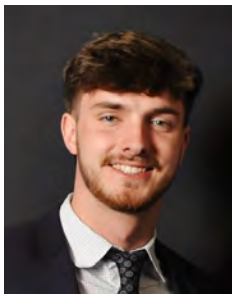

Anthony Rumpza

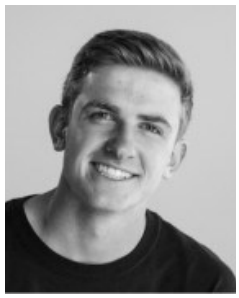

Jackson Sarver


Jacob Schmidt


Hannah Schwarz


Zachary Schwinn


William Thomas


Davis Wagner


Silas Whitehead

2024 Graduates

May 2024

Mechanical Engineering
Gregory Bourget
Hunter Moffet
Samuel Anderson
Frank Griesbauer
Matthew Gardner
Patrick Moraghan
Anthony Rumpza
Samuel Barnes
John-Paul Buss
Calvin Benson
Taylor Goring
Joel Iwanski
Nicolas Pena
Zachary Schwinn
William Thomas
William Rory Opp
Jacob Clipperton
Steven Graham
Carson Kasl
Joseph Palmer

Electrical Engineering
Michael Sanchez
Jack Vanderzanden

Chemical Engineering
Lucas Carillo Salado
Grace Nelson
Joseph Boever
Andrew Baier

Civil Engineering
Jacob Laures
Philip Joseph

December 2024

Mechanical Engineering
Olivia Hill
Isabelle Honigfort
Michael Price
Elizabeth Napierkowski
Nicolas Bendele
Peter Keegan
Hannah Schwarz
Kolbe Dax
Jacob Schmidt
Davis Wagner
John Halberg
Silas Whitehead
Jackson Sarver

Electrical Engineering
Daniel Haunert

Civil Engineering
Matthew Cavanaugh

Awards

St. Patrick Award Outstanding Engineering Student: Taylor Goring

Scholar Athlete Philip Joseph

Outstanding Student Worker Samuel Barnes

Outstanding Electrical Engineer Daniel Huanert

Outstanding Chemical Engineer Joseph Boever

Civil Engineering Students Philip Joseph, and Jacob Laures with Professor Newbolds

Graduate Photos

Mechanical Engineering Graduates and Faculty (Not pictured: Prof. John Modlin)

Electrical Engineering Graduates and Faculty

Best Mechanical Engineering Design Team: Joel Iwanski, John Halberg, Davis Wagner, Jackson Sarver with Professor Sprouse

Best Non-ME Team: Chemical Engineering: Joseph Boever, Gianna Muggli, Therese Pivarunas

St. Joseph Outstanding Student Award
Civil: Matthew Cavanaugh
Electrical: Daniel Haunert
Mechanical: Taylor Goring
Chemical: Joseph Boever

Alumni News

2015 Mechanical Engr

After dual degrees in Math and ME (thru UND), Ryan Bax joined ABB in Jefferson City as a marketing engineer. He soon left and attended seminary for three years, eventually deciding he was not called to be a priest. He then started a new career teaching math and theology, along with coaching basketball, at Helias Catholic High School. He is currently working towards his master's degree in mathematics. He and his wife, Allie, recently greeted their new son, Elijah. Ryan enjoyed learning MATLAB and credits Senior Seminar with helping to eliminate audible crutches (like "um") when he speaks.

Elijah, Ryan, and Allie Bax at Elijah's baptism

2015 Chem/Gen Engr

After working for MGP Ingredients and earning an MBA from UMKC, Monica (Swingle) Brisimitzakis, joined Amazon. She is currently an Integration Operations Manager and manages a factory that builds computer racks for AWS data centers. Senior Design was "a very intense course that prepared me to get comfortable talking to suppliers and gathering estimates which was very common [in my] early career. Now my primary role is managing a contract manufacturer … with a multi-billion-dollar relationship." Monica credits Benedictine College with teaching her skills in process improvement and strategic thinking. She and her husband, Theodore, live in Salt Lake City, Utah.

2017 Electrical Engr

Thomas Hogan has worked for Burns & McDonnell since graduation. His biggest project was serving as the lead electrical engineer on a complex glycol recycling facility at Syracuse International Airport in New York, requiring strong technical, communica-

Hogan Wedding Day, April 2023

Alumni News

tion, and project management skills. His well-rounded Benedictine education helped prepare him for this responsibility.

He and his wife, Madison Hemenway Hogan '22, were married in April 2023 and currently reside in Overland Park, Kansas. He received his PE license this year. Two younger siblings are also Ravens, Sarah Hogan Marak '19 and Catherine Hogan '23.

2017 Mechanical Engr

Mario, Clare, Santiago (4 years old), Emilia (2 years old) and Liam (2 months old)

Mario Skertchly, wife Clare, and their children Santiago, Emilia, and Liam live in Lewisville, Texas. Mario is in technical sales with CaptiveAire Systems. He's recently been involved with HVAC systems for pharmaceutical cleanrooms, which are particularly interesting due to their critical nature, including strict limits on temperature, humidity, and filtration levels. Mario credits learning HVAC fundamentals in Thermodynamics for providing his most important technical career preparation, while Senior Design, serving on SGA, and working in the Admission Office helped his teamwork and communication skills.

2020 Chemical Engr

Nicholas Weimann and wife

Nick, Claire, Dominic (2), and Daniel (1mo) Weimann

Claire Friess Weimann '19 live in Dawson, Minnesota with their two sons, Dominic and Daniel. He is a Continuous Improvement Engineer for PURIS Proteins. He has a Six Sigma Green Belt certification and is working towards Black Belt. His Green Belt project involved complex data analysis around their product's sensory characteristics. His favorite BC engineering course

Alumni News

was Food Process Engineering, which led him to seek a career in the food industry. His Senior Design experience put him ahead of his peers in understanding process controls and problem-solving.

2020 Mech Engr

Olivia Obritsch Olimpio married Anthony Olimipo (ChemE '20) on August 5, 2023. Anthony's younger sister, Genevieve, is currently studying mechanical engineering at Benedictine.

Wedding Day

2021 Mechanical Engr

After a short stint with Feminists Choosing Life of New York following graduation, **Grace Rembold** started as a Manufacturing Engineer with QuidelOrtho. Her favorite Benedictine College course was Heat & Mass Transfer "because it's practical in everyday life and made lots of sense!" (classmate opinions may differ) Grace enjoys working remotely, which gives her flexibility to be more involved with her family and community.

Niagara Falls in Nov 2023, when my friend (and fellow alumna) Anna Doyle visited me in NY!

Jane (Pennefather) Poczatek, her husband Kolbe, and daughter Ann live in Manassas, Virginia. She is currently a 1st Lieutenant in the U.S. Marine Corps. Jane's favorite course was "Dynamics with Dr. Patrick O'Malley because he is such an incredible teacher and mentor, he really cares that his students understand the material." She also enjoyed the fun float project for the Atchison Christmas Day parade.

Kolbe, Jane, and Ann Poczatek

Alumni News

Kyle Tomc, his wife Lizzie (Darrow '18) and their baby Arthur live in Eureka, Missouri. After working for White River Marine Group (Bass Pro) and Schenck Process, Kyle is starting as an Associate Product Review Engineer at Boeing. Senior Design with Professor Steve Spencer gave him the most real-world experience and prepared him to work at three great companies. Playing lacrosse at Benedictine taught him how to work with a team and with individuals of different backgrounds. Junior & Senior Design taught him to delegate, design, and test using calculations and FEA.

Myself, my wife Lizzie, and our baby boy Arthur on the golf course

Liam Morel, wife Anna ('21), their son Henry, and new baby live in Wake Forest, North Carolina. After working at CaptiveAire, Liam is currently Director of Engineering at MudMixer, where he works on projects throughout their life cycle, reminding him of his Senior Design experience. He enjoyed System Dynamics & Controls with Dr. O'Malley, seeing how earlier engineering concepts came together in a cohesive way to view and understand the world. He also loved heat and mass transfer with Dr. Darrin Muggli! Attending Benedictine College, running cross-country and track, and Senior Design have been very beneficial to his engineering career.

Anna and I, our 1.5 yr old Henry and our unborn baby!

2022 Mechanical Engr

Harsh Anchan landed his first job with Kasa Controls & Automation through a Benedictine Engineering Job Fair. While with Kasa, he applied root

Title of Article

cause analysis skills from Senior Design to a challenging problem in the Honolulu Airport automation project. He recently returned to his hometown of Dubuque, Iowa, started working for John Deere as a Product Engineer in Engine, Cooling, Drive Train; and married Tatumn Holland Anchan '22, in March. Interestingly, Harsh's Senior Design project was the Baja drive train, where he learned – the hard way - how important it is to spend adequate time in the project design phase before starting manufacturing. He stotes that his BC wrestling experience has been a key component of his job interview success.

Harsh & Tatumn Wedding photo

Anna Doyle is working as a Product Engineer at Lozier in Omaha, Nebraska, where her Benedictine degree sets her apart from engineers from other regional schools. Her favorite course was Systems & Controls. Her most beneficial take away from Senior Design was the project management component. She has been involved with transferring critical equipment from one manufacturing plant to another as part of a plant consolidation project and optimizing product designs to reduce costs. Two younger siblings, Thomas Doyle'24 and Catherine Doyle'27 are also Ravens!

Product Engineer Anna Doyle

Sam Fabozzi is a Manufacturing Engineer for Bobcat North America in Litchfield, Minnesota where he is working on a major project to increase plant production and efficiency. He credits Material Science and Senior Design as providing the most help with his Bobcat responsibilities. His favorite courses were Manufacturing Processes and Design of Machinery. Sam was very active with Sleep in Heavenly Peace, serving

Alumni News

as President, which provided him good leadership experience. Working close to home, he spends weekends with his family, boating and fishing in the summer and snowmobiling in the winter. His younger sister, Rebecca Fabozzi '24 graduated from Benedictine this year.

2023 Mechanical Engr

Matt Maguire is working as a Mechanical/Fire Protection Engineer for Geary Engineering in his hometown of Lincoln, Nebraska. Matt's favorite class was Mechatronics with Dr. John Rogers. He credits skills learned in project management, writing, and engineering analysis with preparing him for his career. The systematic approach to a problem that he learned in course design projects helped him tackle a difficult smoke exhaust system computer model. Matt lived in St. Paul's Outreach Household Program while at Benedictine, which provided many opportunities to practice communication skills. He currently volunteers for the St. Vincent DePaul Society at his parish.

Matt Maguire

2024 Chemical Engr

Catherine Marak recently turned her internship with Frito-Lay into a permanent position, now working as a 2nd shift Supply Chain Leader. She has received safety and quality awards for her work, while completing many quality improvement projects. Her favorite course was Plant Design, followed by Senior Design, both taught by Dr. Scott Blonigen. These courses were the most "real world" and prepared her for any work scenario. Her Benedictine education has helped her solve problems and prepare detailed reports efficiently.

Catherine sees her office name plate for the first time

We want you in the next issue of Ingenium! Scan the QR code to submit.

INGENIUM

School of Engineering Newsletter

Ingenium **signifies intelligence, character, genius — all of which describe Benedictine College engineers. The use of the Latin language shows solidarity with the Church, whose official language is Latin, and with the scientific community, which for many years communicated primarily through Latin.** ***Ingenium*** **is a proud testament to our history and character as engineers and as members of the Benedictine College community.**

Benedictine College School of Engineering
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www.benedictine.edu/engineering