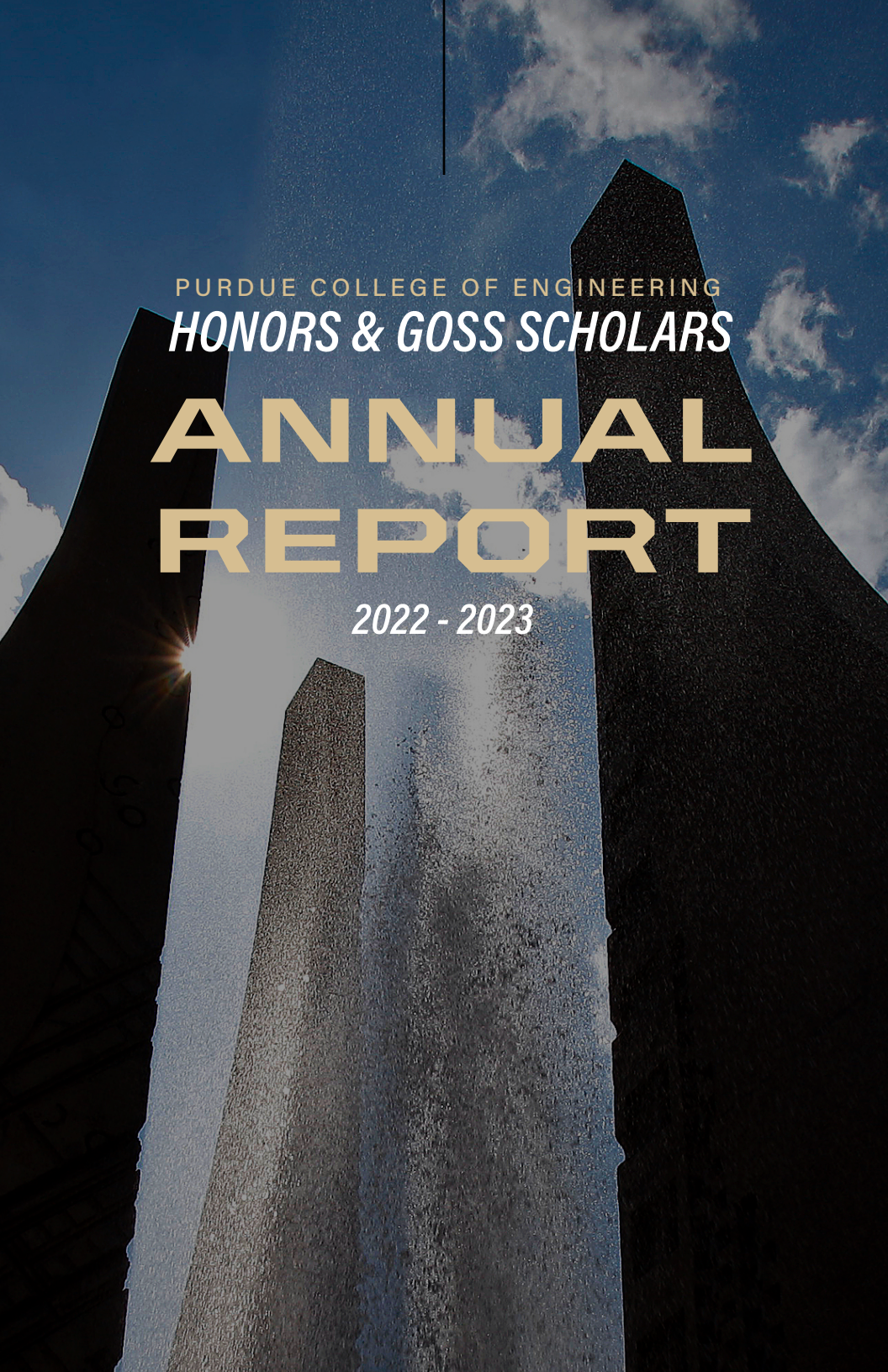


PURDUE COLLEGE OF ENGINEERING

HONORS & GOSS SCHOLARS

ANNUAL REPORT

2022 - 2023

WELCOME

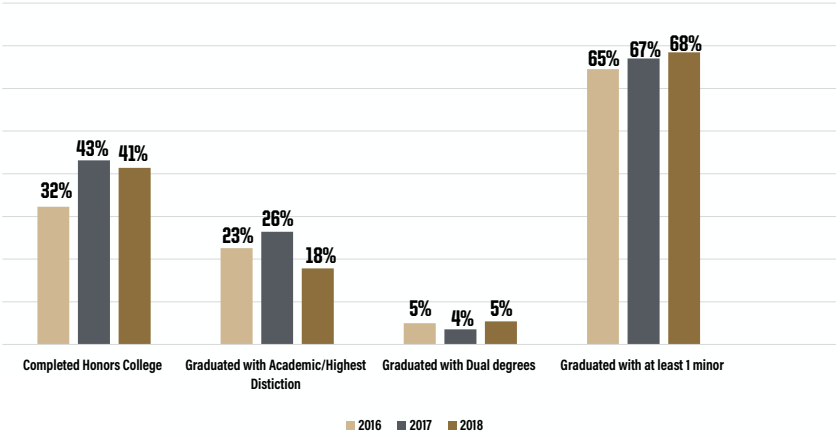
FROM DR. JACQUELINE LINNES

As a Purdue student 20+ years ago, I changed my major (CODO'd) into the College of Engineering during my sophomore year a result of taking an Engineering Honors Course – Zero-Gravity Flight Experiment. I originally joined the program that is now Exploratory Studies with no particular plans to become an engineer (creative writer, science teacher, and medical doctor were top of my list at the time). However, after taking this honors course with hands-on experimenting, designing and prototyping, and the opportunity to test our solutions on the NASA microgravity "Vomit Comet" and experience the weightlessness of astronauts at Johnson Space Center in Houston, TX, I was completely hooked. I knew that becoming an engineer would allow me to combine my passions in creativity and design with technical expertise in math and science to solve critical societal problems. Purdue Engineering was where I wanted to be, and I could not have found this passion without the opportunities provided by the Engineering Honors Program.

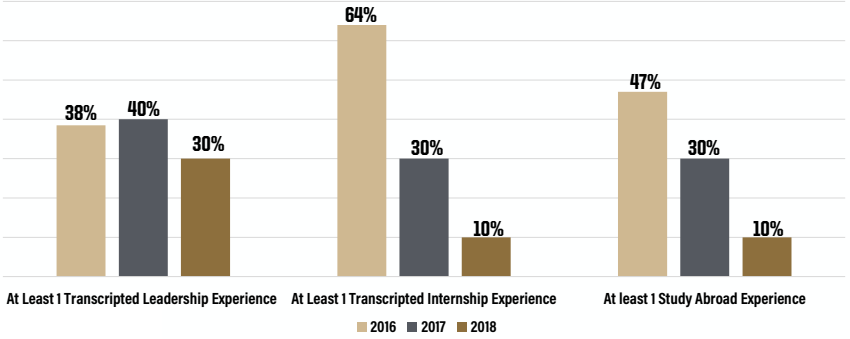
Years later, as the Marta E. Gross Associate Professor of Biomedical Engineering, I have the distinct pleasure to be faculty here at Purdue and the Director of the very program that I benefited from; I now get to work with the next generation of aspiring engineers. Our Goss Scholars are top students in Purdue's College of Engineering and many are also enrolled in the John Martinson Honors College. Goss Scholars bring an intense desire to take their engineering degree above and beyond by engaging in interdisciplinary academics, leadership development, community & global engagement, and undergraduate research. I hope that each of our Goss Scholars has this same inspirational experience where they are challenged, nurtured, and strengthened to cultivate their best selves in service to improving societies biggest challenges.

FACTS AND FIGURES

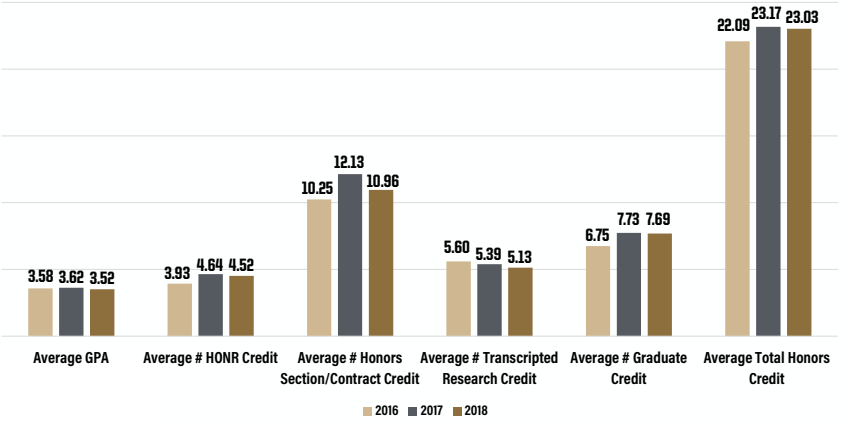
ACADEMIC ACHIEVEMENT BY COHORT*



EXPERIENTIAL ACHIEVEMENT BY COHORT*



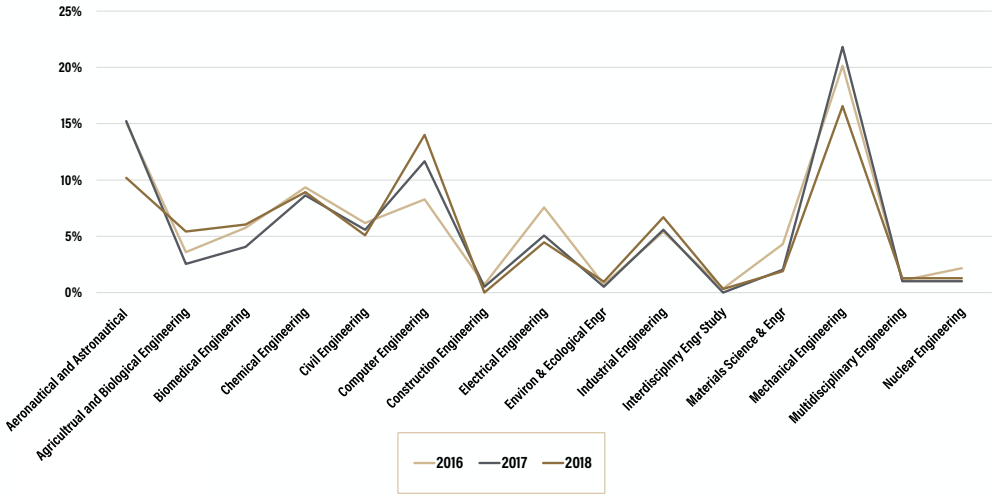
STUDENT SUCCESS METRICS*



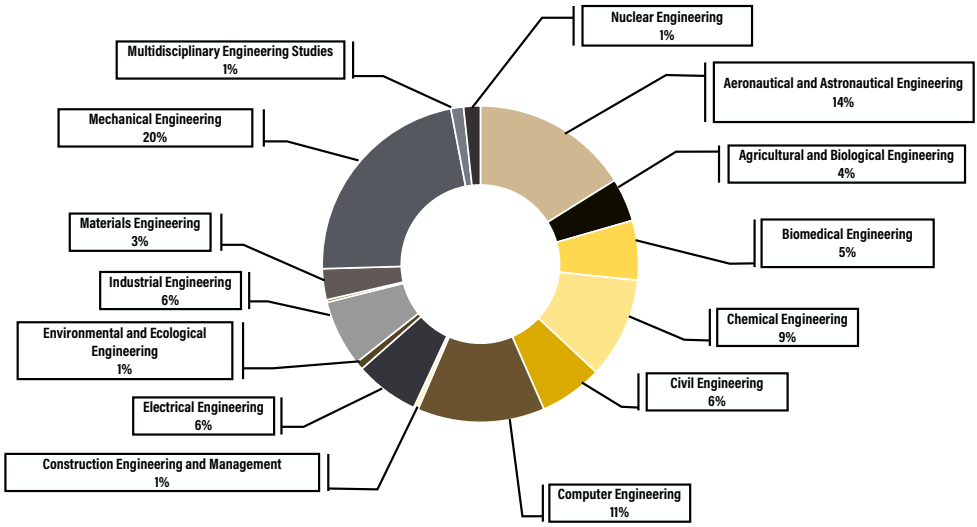
*UNOFFICIAL DATA

FACTS AND FIGURES

PERCENT OF GRADUATES BY DISIPLINE 2016 - 2018 COHORTS

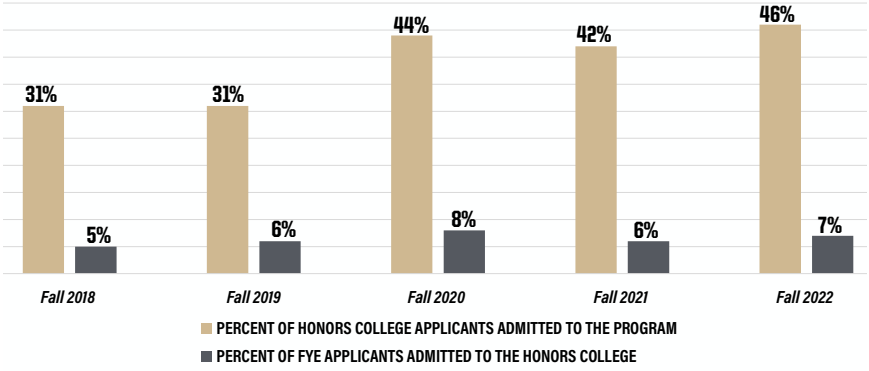


AVERAGE PERCENT OF GRADUATES BY DISCIPLINE 2016 - 2018 COHORTS

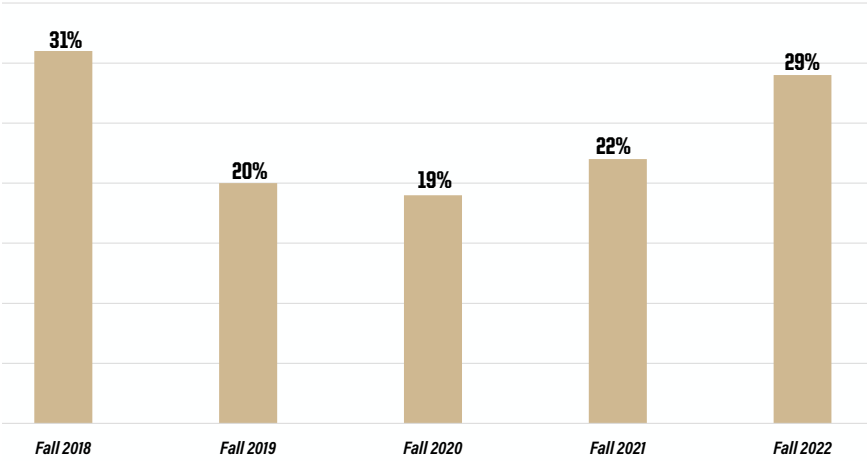


FACTS AND FIGURES

COLLEGE OF ENGINEERING HONORS PROGRAM SELECTIVITY



COLLEGE OF ENGINEERING HONORS PROGRAM YIELD



TRANSFORMATIVE

EDUCATIONAL EXPERIENCES

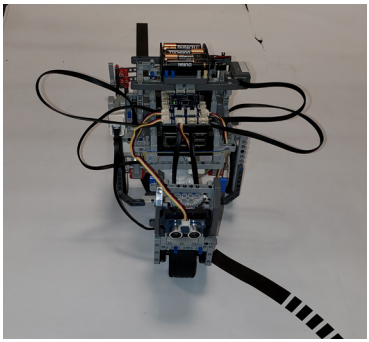
ENGR 16100 PROJECTS

PROJECT 1

In the first engineering design challenge, teams are tasked with creating a catapult from common household materials. The catapult is scored based on its accuracy (hitting a target), effectiveness in throwing a long distance, and efficiency of design materials. Students learn basic physics principles, along with aspects of the engineering design process (particularly challenges associated with conflicting design goals) and professional communication, and reporting.

PROJECT 2

The second project focuses on mathematical models of physical systems. Student teams are tasked with creating a green energy storage system using hydroelectric power to fill and empty a reservoir and provide power on demand. Students research hydroelectric facilities and explore features of real-world design. Learning builds on physics and design principles used in Project 1 and adds Python programming concepts. Students are asked to produce a written report but also develop critical oral communication skills with a presentation.



PROJECT 3

The final project in the fall is likely the biggest challenge students will have faced in their educational journey. Teams are tasked with building and analyzing the performance of a Mars rover system that is able to navigate various obstacles and terrain. Students use Python coding and robotics to design, iterate, and test their rover over the course of several weeks in the fall semester. The project aims to build even further on programming and physics concepts learned in class but also adds the most complex design process of the semester. Professional communication is again demonstrated through the development of a technical report and oral presentation.

TRANSFORMATIVE

EDUCATIONAL EXPERIENCES

ENGR 16200 PROJECTS

PROJECT 1

In the first engineering design challenge of the spring, students work in teams to build an egg-drop protection system that is subject to multiple design considerations. The system is then evaluated based on physics concepts learned in the first semester as well as cost-efficiency of the design. The students reengage with physics principles learned in the prior semester as well as begin connecting with their new teams for the semester.

PROJECT 2

The second project focuses on the design of a device to reduce air pollution in urban environments. Teams are tasked with creating a mathematical model using physics concepts introduced in the spring and using MATLAB to build the model. The project continues to solidify learning objectives around computer programming, advanced physics principles, and the design process, and includes written and oral reports.

PROJECT 3

The capstone of the two-semester sequence is a disaster recovery robot that autonomously navigates difficult terrain in the wake of a natural disaster. This project requires teams to use new techniques such as feedback control to develop a more advanced robot in order to navigate and map a path through an unknown environment, avoid hazards, and drop off supplies to stranded survivors. The project requires students to complete both written and oral reports, finalizing the two-semester sequence of material in programming, physics, design, and technical communication.

STUDENT SPOTLIGHTS

REGINA EMELI

Regina Emeli, a senior in industrial engineering, has charted an unconventional path through her four years at Purdue. As part of the Goss Scholars Do More in 4 program, Regina has explored career opportunities, and engaged with student organizations. She is looking forward to traveling to Sweden, Denmark and Finland with a Study Abroad program this May. And she has completed all of this in 4 years.

During her four years at Purdue, Regina has been active as a member of the National Society of Black Engineers and she mentored new beginning engineering students during the 2022 Engineering Academic Boot Camp.

Thanks to a Do More in 4 Scholarship through the Goss Scholars Program, Regina will be traveling abroad with the Biomedical Modeling for Global Health in Scandinavia program this spring.

ANNELISE NAUMAN

Annelise Nauman is a junior studying Biological Engineering with conecentrations in cellular and biomolecular engineering and a minor in biotechnology and global engineering studies.

Annelise is involved in various extra cirriculars and student organizations such as an Engineering Honors Ambassador, The vice president of growth for GEARE ambassadors and a member of Women in Engineering.

Annelise has a passion to help people and wants to use her knowledge and skills from biological engineering to design products and treatments for others. Her previous internship allowed her to work closely with the deveolpmnet of vaccines and she hopes to continue this work in her future.

STUDENT SPOTLIGHTS

KYLE HEATON

Kyle Heaton is a sophomore studying biomedical engineering with a minor in mathematics.

Kyle's goal for his time at Purdue is to get involved in as many extracurriculars and student organizations as he can and is a part of Engineering Honors Ambassadors, the president of Relay for Life ACS, an Honors College Undergraduate Student recruiter, a Boiler Gold Rush Team Supervisor and a member of the Biomedical Engineering Society.

After he graduates, Kyle plans to attend medical school.

ESSEY WONDAFERAHU

Essey Wondaferahu is a sophomore studying Aeronautical and Astronautical Engineering. One of Essey's goals when coming to Purdue was to participate in a Co-op program and had the opportunity to complete his first session of a program through ATA Engineering working on structural analysis of aircraft during his fall 2022 semester and will finish the program summer of 2023.

Essey has also had the opportunity to study abroad in Greece and, through the VIP program, participate in a project for an Airforce laboratory building drones that could be used for search and rescue. Essey plans to specialize in either aerodynamics or structural analysis for his future career, and possibly pursue graduate school after receiving his undergraduate degree.

PROJECT HIGHLIGHT

The College of Engineering Honors & Goss Scholars engineering design course sequence of ENGR 16100 and 16200 is a transformative experience. Students are paired in teams of 4 at the beginning of each semester, based on individual skills and experiences in topics such as computer aided design (CAD), computer programming, robotics, physics, and communication. Working collaboratively, teams apply theoretical and conceptual materials they learn in class to complete 3 major projects through the course of each semester. Teams work through design challenges and relatively straightforward projects to begin the team development process.

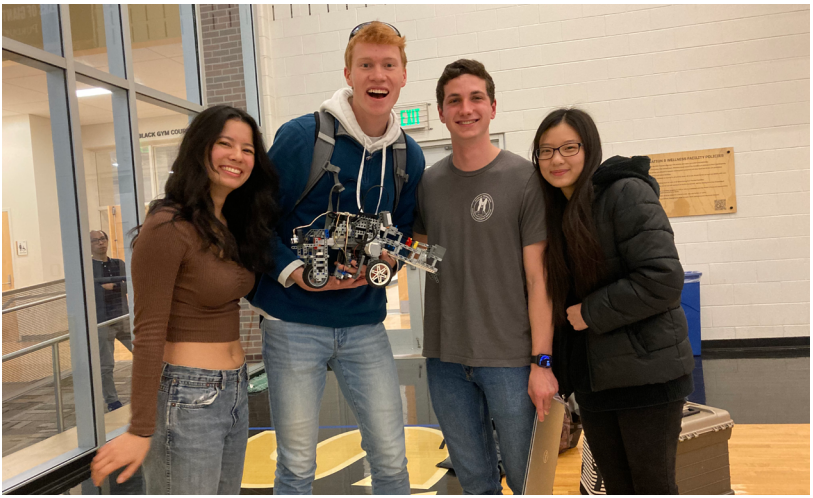
While collaborating on these initial challenges, Ryan Jordan, Simone Moulton, Dagan Knight and Jennifer Yang, who named their team the "No-Breakfast Club" due to the early 7:30 am start to their class, learned about teamwork simultaneously with theoretical and technical content in engineering design, and the team members found that they thoroughly enjoyed working together. They shared that they all felt that every team member contributed, and they grew closer as the semester progressed and developed a deepening friendship and partnership that they each value. While most groups find the experience of working with a team enjoyable, and many lasting friendships begin in ENGR 16100 and 16200, the No-Breakfast Club agreed early on to meet in person rather than virtually to make their connection more meaningful.

"Other groups would meet online and use a collaborative document for their projects, but we always met in person." says Simone when asked about how their team dynamic unfolded.

In the first semester, the largest project, which is assigned in the first month of classes, was to build and analyze the performance of a Mars rover system that navigates various obstacles and terrain. For the No-Breakfast Club, the project first seemed insurmountable. However, as their team developed, they realized that collectively they could complete each task using the talents they each brought to the group. Ryan, transitioning now into computer engineering, had previous coding experience in Python. Jennifer, who plans on transitioning into mechanical engineering, was in robotics club in high school and had extensive knowledge in this and code analysis. Simone, who is planning to pursue aeronautical and astronautical engineering, found interest in testing, and would test the various ideas and models. Dagan, who plans to pursue chemical engineering, was excited to explore design as he was the first to propose one of the most unique features of their project, using three wheels instead of four.

The group faced challenges like issues with the line finder the night before they had an assessment, unequal weight distribution causing the rover to do wheelies and an unstable turning system which lead to the tricycle driving method improvment they used in their final prototype.

By the end of the semester, their rover could do all the functions necessary in the outline project guide they received back in September. They coded a “dance mode” after the conclusion of their project to celebrate a successful project demo. The heartbreaking part of their success is that all groups are required to take apart their robots at the end of the semester because the parts are reused. The group agreed that this was the hardest part as they spend so much time with their rover it was hard to see it go. Not only the rover, but the group itself found the end of the semester bitter-sweet



NEW INSTRUCTIONAL SPACE

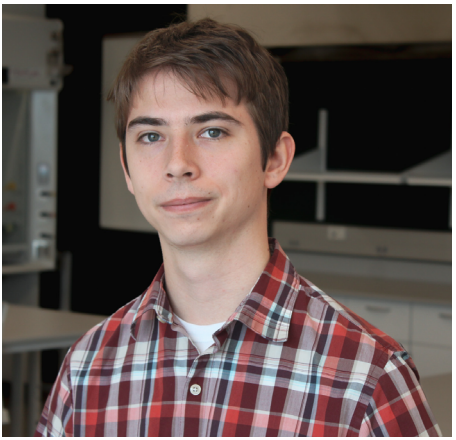
The College of Engineering Honors Program utilizes multiple different state-of-the-art instructional spaces across campus to create convenient, engaging, and inclusive learning environments for all our students and programs. These range from brand new laboratories geared towards specialized upper division courses and diverse topics to instructional spaces in which we teach many of our first-year courses as well as serve various academic support and purposes for our courses and events every semester.

Our newest classroom, located in the new Gateway building, boasts multiple features targeted at creating an engaging classroom environment. The classroom comfortably accommodates 76 students, making it a perfect space for small- to medium-sized classes. It features six large projection screens and group work tables that are engineered for both optimal viewing of class materials and for working in teams. Additionally, it has a beautiful view overlooking the historic Purdue clock tower making it an amazing space to pursue all things engineering.

Our larger classroom, located in the Shreve Residence Hall, also has multiple different aspects that enhance learning for our students, and serves many purposes. The classroom seats up to 88 students and has many of the same amenities as the Gateway space. What sets the Shreve classroom apart is its increased floor space allowing many of our hands-on demonstrations and projects to run throughout the week. Additionally, this classroom is centrally located near the residence halls to host office hours and many after-hours events for our students conveniently close to where they live.

Another of our newer spaces is the wet lab located in the new Gateway building. Currently, we use this classroom for smaller classes outside of our first-year programming including classes for our peer mentors and ambassadors, as well as upper-division seminar classes. The wet lab space contains state-of-the-art benchtop equipment that will see increased use in future semesters as our program expands to include additional academic

ACCOMPLISHED ALUMNI



NATHANIEL MARTIN

Nathaniel Martin graduated with a degree in civil engineering with a concentration in structural engineering in December of 2022. While following the path of the four plus one program, Nathaniel completed his undergraduate degree in three and a half years and is continuing his educational journey at Purdue in a structural engineering master's program hoping to finish with his graduate degree by May of 2024.

Through his continued journey at Purdue, Nathaniel has continued to stay involved with the College of Engineering Honors Program by participating as a peer mentor every semester after first year engineering and continues to be a mentor even in graduate school. He enjoys getting to meet the new budding honors engineering students each year and help them decide on their path to their engineering discipline after the first-year engineering program.

Nathaniel had a positive and informative experience through the program and often tells prospective students, "Is engineering honors hard? Yes. Will you have late nights? Yes. Will you experience failure? Yes, but you learn so much from the experience."

STEP RETURNS

The residential Seminar for Top Engineering Prospects experience will return to campus in July 2023 after a 3 year hiatus due to the COVID-19 pandemic. The STEP program allows prospective students the opportunity to explore the world of engineering through the lens of the College of Engineering Honors Program at Purdue University. Participant applications for the 3 week-long sessions are open now and space is filling quickly.

During their week on campus with the STEP program, students engage in collaborative classroom and project experiences that apply theoretical concepts to real world problems. Participants explore engineering as a multifaceted and collaborative discipline, develop skills, and to use those skills to create and innovate. Teamwork is an essential component of engineering, and STEP students work on a team of 4 throughout the week as they explore and solve challenging problems. Creativity, communication, design, and analytical modeling will be introduced by Purdue faculty, Purdue College of Engineering Honors student interns and guest lecturers. Each team's skills will be put to test with competitive design challenges.

The STEP experience features opportunities for students to explore engineering majors and local industry partners to see engineering professions in action. As a taste of being a Purdue University engineering student, STEP participants also participate in Purdue Traditions, such as fountain runs, trips to the book stores for Purdue gear, and informal tours. We also enjoy a movie night on Slayter Hill, a campus scavenger hunt, and Cosmic Bowling.

STEP is a full and exciting week that stretches students academically, developmentally and interpersonally, and offers a unique opportunity to test drive the Purdue University engineering experience.

HONORS CONTRACTS
FALL 2022

SUBJECT	COURSE NUMBER	NUMBER OF STUDENTS	INSTRUCTOR
BME	20500	8	Michael Linnes
BME	46000	1	Craig J. Goergen
BME	49500	1	Craig J. Goergen
CE	22200	1	Geoffrey Graff
CEM	20100	1	Geoffrey Graff
CHE	20500	2	Araoluwa Adaramola
ECE	20001	1	Daniel Elliott
ECE	20875	4	Mahsa Ghasemi, Philip Pare, & Rajeev Sahay
ECE	26400	2	Xiaoqian Wang
ECE	30411	1	Michael Melloch
ECE	36200	1	Timothy Rogers
ECE	39595	1	Samuel Midkiff
ENGR	13000	9	Sean Brophy
EPCS	30100	1	Jason Dufair
EPCS	30200	1	Jason Dufair
IE	33500	2	Erhan Karakaya & Nagabhushana Prabhu
IE	34300	1	Mahmudur Rahman
IE	37000	1	Wenzhuo Wu
IE	38600	4	Denny Yu
ME	27000	1	Jim Jones
ME	29000	1	Beth J Hess
ME	30800	10	Carl Wassgren & Steve Wereley
NUCL	20000	1	Rusi Taleyarkhan

HONORS CONTRACTS

SPRING 2023

SUBJECT	COURSE NUMBER	NUMBER OF STUDENTS	INSTRUCTOR
AAE	30100	2	Dengfeng Sun
AAE	43800	4	Li Qiao
BME	20600	3	Michael Linnes
CE	36100	1	Yiheng Feng
CEM	20100	1	Geoff Graff
ECE	20001	2	Michael Hayashi & Byunghoo Jung
ECE	20875	3	Murat Kocaoglu & Qiang Qiu
ECE	30200	1	Saul Gelfand
EPCS	20200	1	Brandon Boor
EPCS	30200	1	Jason Dufair
IE	33500	1	Gesualdo Scutari
IE	37000	2	Ramses Martinez
IE	38600	1	Mark Lehto
ME	26300	7	Francisco Montalvo, Morgan Murphy, & Francisco Montalvo
ME	27000	1	Kejie Zhao
ME	32300	1	Francisco Montalvo
MSE	23000	10	Janelle Wharry

ENGINEERING HONORS & GOSS SCHOLARS

STAFF TAUGHT COURSES

FALL 2022

SUBJECT	COURSE NUMBER	NUMBER OF STUDENTS	INSTRUCTOR
ENGR	10301	9	Sean Brophy
ENGR	16100	175	Timothy Whalen
ENGR	16100	88	Joseph Lyon
ENGR	16100	79	Sean Brophy
ENGR	16100	75	Jacqueline Linnes
ENGR	40400	107	MaKenzie Campbell

SPRING 2023

SUBJECT	COURSE NUMBER	NUMBER OF STUDENTS	INSTRUCTOR
BME	39500	22	Jacqueline Linnes & Mayari Serrano Anazco
ENGR	16200	161	Timothy Whalen
ENGR	16200	162	Joseph Lyon
ENGR	16200	80	Sean Brophy
ENGR	40400	97	MaKenzie Campbell

MEET THE TEAM

KENZIE CAMPBELL
SENIOR ACADEMIC ADVSOR

SUZANNE COOLBAUGH-WALKER
ASSOCIATE DIRECTOR

ZOE CRUM
COMMUNICATIONS SPECIALIST

MELISSA HALE
PROGRAM MANAGER

JACQUELINE LINNES
DIRECTOR

JOSEPH LYON
LECTURER

NIKKI MOSHER
ACADEMIC ADVISOR

SANOAR RAHMAN
VISITING CLINICAL ASSISTANT PROFESSOR

MAYARI SERRANO ANAZCO
VISITING CLINICAL ASSISTANT PROFESSOR

TIMOTHY WHALEN
ASSOCIATE DIRECTOR

RICK WOMACK
LAB MANAGER

BY THE NUMBERS
2016 - 2022

97%

AVERAGE RETENTION AFTER FIRST YEAR

36%

AVERAGE FEMALE NEW BEGINNERS

11%

AVERAGE URM NEW BEGINNERS

330

AVERAGE COHORT

45%

PERCENT GROWTH SINCE 2017

THANK YOU

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