

# *First-Year Engineering CoRe Experience*

*2022-2023 Annual Report*



*The CoRe Experience is Committed to “Building The Whole Engineer”.*



First-Year Engineering  
CoRe Experience  
MICHIGAN STATE UNIVERSITY



# Letter from Director Timothy Hinds



CoRe Director Timothy Hinds presents at FYEE 2022, held at Michigan State University

June 15, 2023

**A Different Fall Experience:** The Fall 2022 class included 1732 engineering freshmen. This was the largest incoming class of students in our 134 year history. In addition, most of our courses returned to in-person delivery with some transitioning to hybrid format. It was great to have an active and vibrant community again with students, faculty and staff back on campus. We are preparing for an exciting Fall 2023 semester as we expect to welcome a similar or slightly larger class of new Spartan engineers for next year.

**Student Welcome at Colloquium:** For Fall 2022, we returned to our traditional Annual Engineering Colloquium held at the Breslin Center to welcome incoming engineering students. Our guest speaker was electrical engineering alum Tony Grant, the CEO/CFO of Northern United Brewing Company. Also joining us was alum and former long-time CoRe peer leader Nicholas DiTommaso who is now a team lead at Epic Systems. Both had inspiring advice for students on pursuing their passions. Additional messages were presented by Men’s Head Basketball Coach Tom Izzo, Sergeant Jessica Mitchell of the MSU Police Department, Engineering Dean Leo Kempel, Engineering Assistant Dean Amanda Idema, Chemical Engineering Associate Chair S. Patrick Walton, CoRe Co-Curricular Director Carmellia Davis-King and me. Students were also treated to a performance by the MSU Cheer Team and a surprise visit by Sparty. Thanks go out to all who participated to make this a successful event.

**Continued Partnership:** We are pleased to announce Consumers Energy has renewed their partnership with CoRe for another three years. Consumers is our longest-tenured partner and we are looking forward to working with them with their commitment to support our program through 2026.

**Expanded Tutoring:** During the past academic year, Core expanded its tutoring program to include pre-calculus math courses. Added were six college algebra and trigonometry classes. These are in addition to the seven chemistry, physics, calculus and differential equations courses for which we offer nightly tutoring in our new Wonders Hall facility.

**Peace Engineering Initiative:** We continued our strong relationship with the MSU Residential College in the Arts and Humanities (RCAH) Program on Sustainability in Costa Rica and our joint four-course sequence in Peace Engineering. The courses consist of designing solutions for Costa Rican community partners in EGR 100: Introduction to Engineering Design; learning the post-conflict reconciliation process in RCAH 202 Peacebuilding through Art, Humanities, Social Sciences and Engineering; working directly with communities in Costa Rica in RCAH 203 Transculturation through the Ages: Designing for Peace; and collaborating with RCAH 326 Topics in Community Engagement: Design for the Common Good where RCAH students team with the EGR 100 design students to develop solutions for community projects. In 2022-23, 154 students participated in this program.

**Design Justice Minor:** The strong collaboration between CoRe and RCAH with the courses listed above has led to the creation of a minor in design justice. The minor prepares students to address the challenges of global conflict, globalization, climate change and sustainability to bring practical contributions to peace building. We offer experiential learning opportunities in community-engaged design projects, education abroad programs and collaborations with organizations working to find just solutions to complex design problems at home, at work, in community and around the globe. We are proud to note our minor is the first at a Big 10 institution.



Left: MSU students assist Girls for Success Students with STEM solar oven project



Left: RCAH Program on Sustainability in Costa Rica director Vincent Delgado (l) and CoRe director Timothy Hinds (r) with MSU and Girls for Success students and teacher displaying the garden boxes they built as part of a STEM workshop on sustainability.



Left: Assistant Dean for Undergraduate Studies inspires students at Engineering Colloquium



Left: First-Year Engineering students participate enthusiastically at Engineering Colloquium



Left: MSU men’s basketball coach Tom Izzo inspires students at Engineering Colloquium



Left: CoRe Personnel David Wolff and Aimee Reynolds actively organize the FYEE 2022 Conference at MSU



Left: Presenters at FYEE 2022 Conference at MSU



First-Year Engineering CoRe Experience Video (<https://www.youtube.com/watch?v=XGDQU-Ridyo>)

**Central America Design Projects:** There were two EGR 100 design projects in Fall 2022. The first project had 20 students developing a cell phone application to give tourists to Costa Rica access to produce grown using sustainable practices by small-scale, local farmers. The project sponsor was Asociacion Valle Escondido Regenerativa (AVER) in Monteverde. AVER, who operate from the Valle Escondido Nature Reserve Hotel & Farm, is concerned with raising awareness of sustainable practices.

The second Fall 2022 project involved 58 EGR 100 students designing a social services building for Asociación de Desarrollo Integral Indígena Bribri (ADITIBRI) who administer the Bribri Indigenous Territory in Costa Rica and advocate for Bribri citizens and their needs. The services they provide are housed in a development in the rural community of Suretka, the capitol of the Bribri territory, in the Talamanca province. The project had the student teams designing the functional aspects of the building while incorporating Bribri symbolism and architecture.

“Our mission is to ensure the success of first-year students as they progress to the next year.”





Top: Participants at FYEE 2022 at MSU



**In Spring 2023**, 48 EGR 100 students designed an installation to display art projects created by local youth for Centro Cultural RioChante, a cultural organization in Monteverde, Costa Rica. This is part of a collaboration with RioChante and MSU RCAH titled [un]Liberated Imaginaries – a public art project addressing youth self-harm challenges in the region related to land enclosure and the appropriation of (in) formal common land for privatization, tourism and/or speculation. The art to be displayed began with a December 2022 MSU Education Abroad experience where I traveled to Monteverde with eight RCAH 203 students to pilot this project with nine local youth at RioChante.

**Groundbreaking on Student Designs:** In March, I traveled to Costa Rica with RCAH Dean Dylan Miner and College of Engineering Senior Associate Dean Thomas Voice to join RCAH Program on Sustainability in Costa Rica Director Vincent Delgado in two groundbreaking ceremonies. One was for the ADITIBRI social services building in Suretka mentioned above. The other was for a new school facility for the Niñas para el Exito (Girls for Success) program located in Hone Creek. This program makes use of after-school programming, experiential education, field trips and other curricula to improve the educational and life prospects of local indigenous girls ages 6-12. EGR 100 students created designs for the school in Spring 2022. To learn more about this activity, please follow the link: <https://www.egr.msu.edu/news/2023/05/19/tim-hinds-and-msu-improving-lives-half-world-away>

Bottom: Ninas para el Exito School Groundbreaking in Hone Creek



**CoRe Personnel:** As is our normal process, we were again busy sharing lessons learned through attending conferences and presenting papers at national professional gatherings. One of these was the American Society for Engineering Education (ASEE) conference held in Minneapolis last June. Another was the First-Year Engineering Experience (FYEE) conference hosted by CoRe here on MSU campus at the end of July where we welcomed 100 attendees from 61 institutions and organizations from across the country. Presentations, workshops and panel discussions were held at the Kellogg Hotel & Conference Center as well as in our new Wonders Hall classrooms and labs.

**As we head into Fall**, I look forward to another successful academic year together, living, learning, advising, teaching, networking and sharing. I am incredibly grateful for the determination, inclusivity, and tenacity everyone has shown during this past year. I thank you all for your continued support and commitment to our mission to help first-year engineering students succeed.

**Together We Will. Spartans Will.**

Timothy Hinds  
Director, First-Year Engineering CoRe Experience  
College of Engineering, Michigan State University  
[www.egr.msu.edu/core](http://www.egr.msu.edu/core)

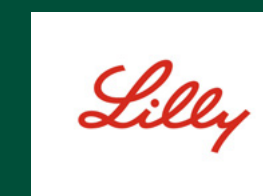
## Theme Partners



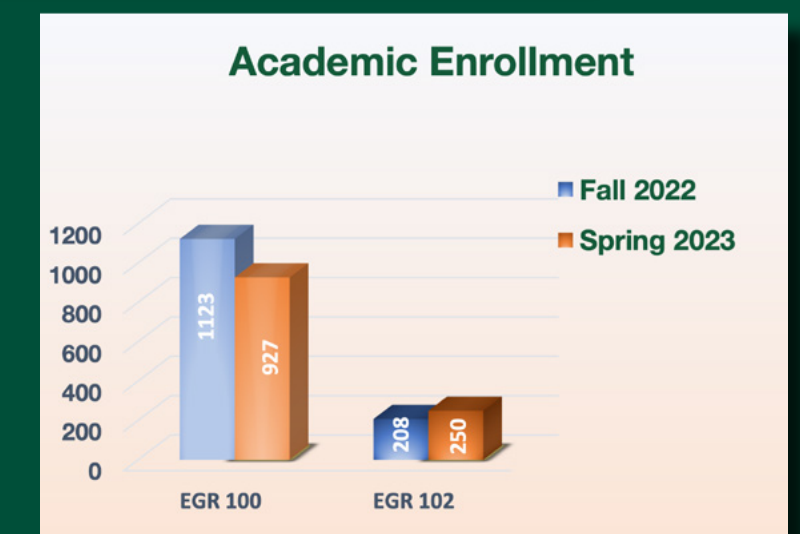
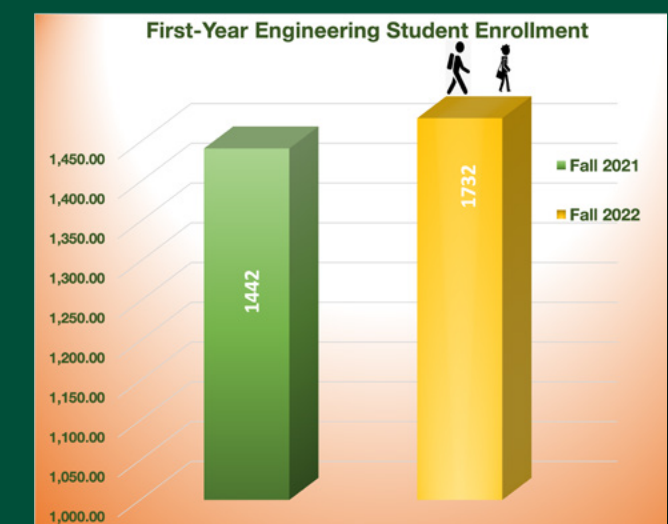
Consumers Energy  
Count on Us

## Project Partners

BorgWarner



## CoRe At-A-Glance

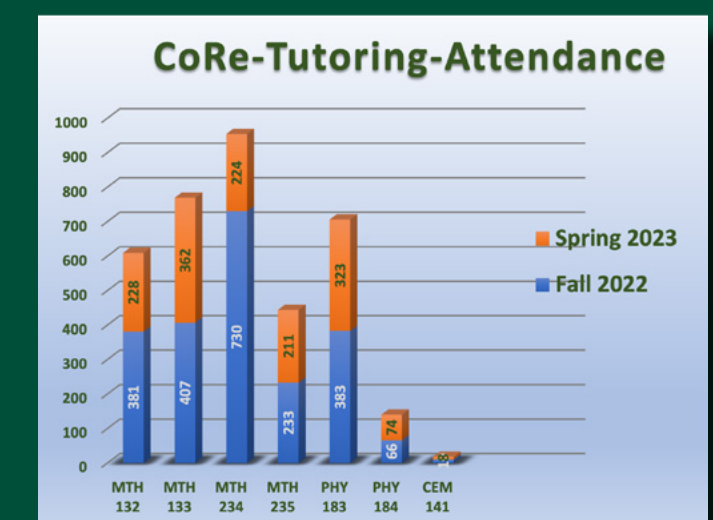


## Academic and Co-Curricular Support Employees, Fall 22 and Spring 23

Graduate Teaching Assistants - 24  
Academic Tutors - 40

Undergraduate Learning Assistants - 55  
Peer and Student Team Leaders - 51

Project and Tech Assistants - 3





# First-Year Engineering Co-Curricular Highlights

**CoRe** is very proud to announce that for the 2022-2023 academic year, students were presented with over 75 academic, professional and social events to attend. Not to mention the *door-to-door check-ins* that also occurred weekly. Throughout the academic year students attended community events created to help them grow as an engineering major, connect with the campus community, and learn more about the professional world of engineering from faculty members and engineers currently in the workforce. This academic year, CoRe expanded programming services to include the residential settings of engineering students outside the South Neighborhood. As the student population continues to grow, CoRe consistently strived to create programming opportunities for these students too. We share the highlights of the year.

**Scholarships:** Access to scholarships for many students can assist them in avoiding significant loan debt. CoRe partnered with the Engineering Career Center to present a variety of financial opportunities on campus and in the College of Engineering. Dr. Friedrich, Director of Student Engagement, walked students through the application process and answered questions they had about eligibility and deadlines. She made the application process less intimidating to motivate them to apply.

**Big Tech Panel:** Peer Leaders are an amazing asset to CoRe. Not only are they mentors but they hold valuable internship and co-op experiences. Collectively, they held an insider’s perspective, working at the following companies: Apple, Amazon, Google, Meta, and Microsoft. Throughout the academic year, CoRe peer leaders shared their experience of working with technology industries. They also invited past supervisors to discuss with their residents the strengths and capabilities of each company. Students who attended each presentation learned what the day and life of an intern or co-op opportunity could bring.

**Date Your Major:** A themed night was spent learning from upper-level students in the College about engineering majors, undergraduate research, internships and engineering student organizations. During this event, the questions ranged from the process of selecting a major to course difficulty. Peers openly discussed time management, study skills and the importance of attending faculty office hours. Many students also used this event to join an engineering student organization.

**Wacky Weekly Day Events:** In between classes, CoRe hosted high impact, quick engagement events. Each week, CoRe hosted a table in Wilson Hall to update students on important College and campus dates while drawing them into a quick game of *“know your College and campus resources”*. Students could spin the wheel to win a prize and collect information on annual course enrollment. They also received informational pamphlets on study skills, discover when to sign up for housing, learn about financial aid, credit no-credit grading system, major requirements, time management, conflict management, and to the dates and locations of their final exams. The purpose of these events was to highlight important campus and College information and assist students to navigate what they needed to do to maintain their status as a successful Spartan.

**Lab Tours:** A CoRe goal for the 2022-2023 academic year was to educate undergraduate students on the importance of engineering research and its impact on the greater community. CoRe was very proud to offer students tours of labs in the College of Engineering and to encourage future work as researchers. This opportunity was made possible by the Recruitment and K-12 Outreach Office in the College of Engineering.

*“My mom signed me up to live in Wilson Hall. I had no idea that I was in CoRe. Here I met my best friends and earned CoRe Points for attending events.”*

**Spartans Will:** Bringing the community together after experiencing a tragedy created a sense of togetherness and fostered community resilience. Acknowledging the trauma and helping students find meaning through memorial tributes and therapy dogs provided the pathway to community healing.

**Community Services:** Many students come from communities where helping others is very important. For them volunteering provided a sense of accomplishment knowing that they had a role in making their community a better space for all residents. CoRe organized a *PIE YOUR LEADER* fundraiser to help raise money and awareness for the Haven House, a local family shelter. Students signed up to place a whipped cream pie in the face of their CoRe Leaders after making a \$2 donation to the Haven House of Greater Lansing. All funds raised went directly to supporting families who face homelessness on their paths to stable homes.



*“My peer leader helped me when I didn’t know where to go for help.”*

**Information Sessions:** An equally important part of the College experience is the learning that takes place outside the classroom. Information sessions are an easy way to gain knowledge on topics not covered in class. CoRe offered informational sessions on the following topics: office culture, conflict resolution, College admission, what engineering is about, stress management, how to find a campus job, services provided by DECS, health and nutrition, importance of faculty office hours, what to do if one is not doing well academically, CAPS services and how to discuss students’ major during family gatherings.

*“I grew and learned more about what I want to do in engineering.”*

**Preparing for Final Exams:** The most important role a CoRe Peer Leader plays is to serve as a friend to incoming students and give them a safe space on campus to find support. As students prepared for final exams week, sometimes a good scream was needed. CoRe gave them the opportunity to do just that and the tools to prepare for this very important week. CoRe made classroom space available for quiet studying and placed upper-level students in the spaces to help with any unanswered academic questions.

**CoRe Gala:** The CoRe annual end-of-the-year celebration was a night to remember. Dressed in formal attire, students celebrated the end of the academic year and all that they had accomplished. The event offered dancing, food, and a royal casino. Upon their arrival students were presented with fake casino bucks to play games throughout the night. Food, fun and laughter were offered in abundance.

*“I came for pizza and learned that I wanted to work in cybersecurity.”*

*Top: Peer leaders with the Co-curricular Director Carmellia Davis-King*

*Right: Peer leaders actively prepare for CoRe gala*

*Below: Peer leaders bring therapy dogs to alleviate student-stress and aid healing*



*“The late night study break snacks and games were fun.”*

*Top: Students take a break from their study-night*

**A Big Thank-You!** Each year students arrive on campus, looking to explore all that the College of Engineering has to offer. The excitement of developing new skills, becoming an engineer, meeting new friends, joining a student organization and more, fill the air of the South Neighborhood. This excitement is very contagious and must not be extinguished! CoRe had the enormous task of grabbing the attention of over 1900+ Spartan engineering majors fast and sustaining their engagement throughout the entire academic year. Through advanced planning, College and Corporate partnerships, we are able to say farewell to another successful year of CoRe events and activities.

It is always an honor to serve the students and to play a small role in their transformative learning experiences.



# First-Year Engineering Academic Highlights

CoRe’s academic program is based on the principle that engagement in meaningful engineering experiences early in students’ undergraduate careers supports their success and persistence to graduation. Through our courses EGR 100: Introduction to Engineering Design and EGR 102: Introduction to Engineering Modeling, we strive to engage students across the disciplines in team-based projects that pique their interests and give them a window into what professional engineering really is. Activities this year focused on engaging with campus and community partners.

**EGR 100:** An important part of the CoRe Experience is the academic program. EGR 100: Introduction to Engineering Design, is a required course for all incoming first-year engineering students. These students are introduced to the engineering profession and the engineering design process through team-based, interdisciplinary design projects and report writing.

With in-person labs and lectures, additional hands-on design projects were added to the labs and lecture assignments were conducted using handwritten assignments. For the water filtration design project, students built filtration columns and Red Cedar River water was collected and used for this filtration design project. In addition to this, students were able to participate once again in designing Battlebots. This project involves student teams creating Battlebots with Lego robot kits, and using them to compete in Battlebots tournaments during lab. The best designed robot then wins the tournament.



Left: Adafruit Gemma LED Design Project: Student Adafruit Gemma LED Circuit Design using conductive thread to attach the circuit to an MSU T-Shirt

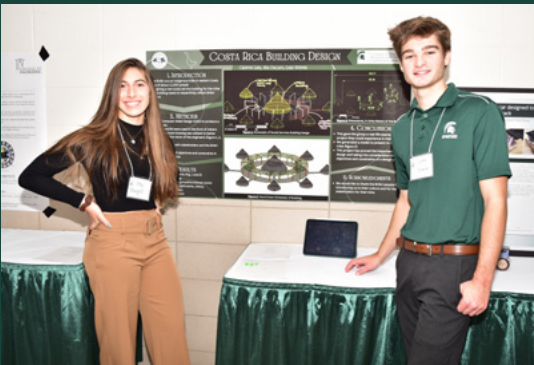
This was another project that could be included with fully in-person lab instruction. Additional improvements were also made to the new Adafruit Gemma LED circuit design project. This project involved not only soldering the circuit, but also enabling students to sew circuits using conductive thread. This allowed teams to design wearable electronics using the circuits. Also, all of the design projects continued to be offered from the beginning of the semester to encourage usage of the Wonders Hall EGR 100 lab facilities. In addition, D2L continued to be improved in how the course was presented, to focus more on what the students needed to accomplish each week and help them keep track of the course schedule and prepare for future assignments.

*“Dr. Morgan was always willing to answer questions and ensure that students fully understand the course content.”*

**EGR 100 Projects:** In EGR 100 there is a choice of eight projects. These projects are the design of a battlebot, creation of a phone app, 3D printing CAD drawing phone case design, an Adafruit Gemma LED circuit creation, water filtration design, design of a mini solar car, Eli Lilly Drug Manufacturing, and Costa Rica community design. CoRe continued a successful partnership with the Residential College in the Arts and Humanities (RCAH) on the Costa Rica design projects.

Right: Students present on Costa Rica Community Design Project on Design Day, Fall 2022

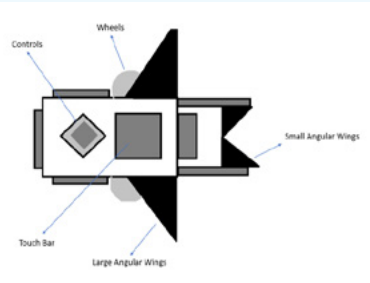
Below: Students present projects on Design Day, Fall 2022



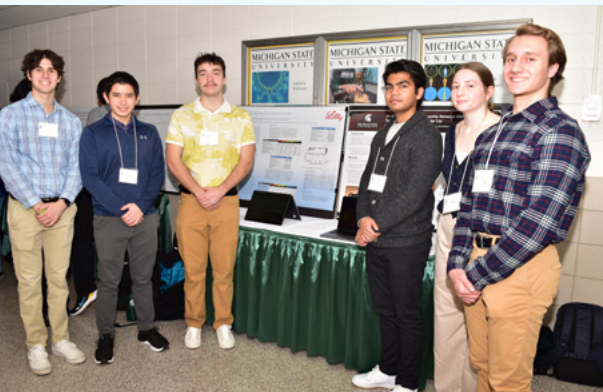
*“Dr. Morgan was excellent in conveying what she expected from us students. She was also attentive to all students even though she has an extremely large class which I am impressed with and grateful for.”*

**EGR 100 Paper Presented at FYEE:** A study was developed to examine the team experiences in EGR 100 in an effort to improve the course. A paper describing this study was submitted to the 13th FYEE Annual Conference, and a presentation discussing this study was given at this conference in August 2022. The paper presented was titled “Student Reflections on Team Experiences in a First-Year Engineering Course”.

*“Dr. Morgan was also a good professor. She didn’t try and trick you on the material, but instead was more focused on us learning and understanding the content. She was also very nice and helpful when I had group work issues.”*

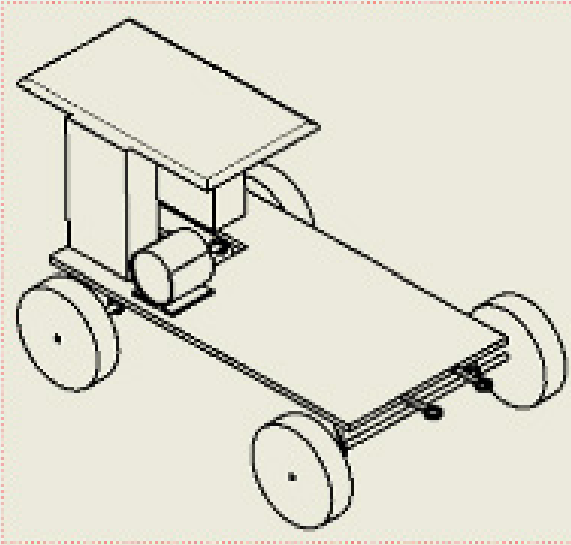


Left: Drawing of Student Battlebot Design  
Below: Students present on an Eli Lilly Project on Design Day, Fall 2022

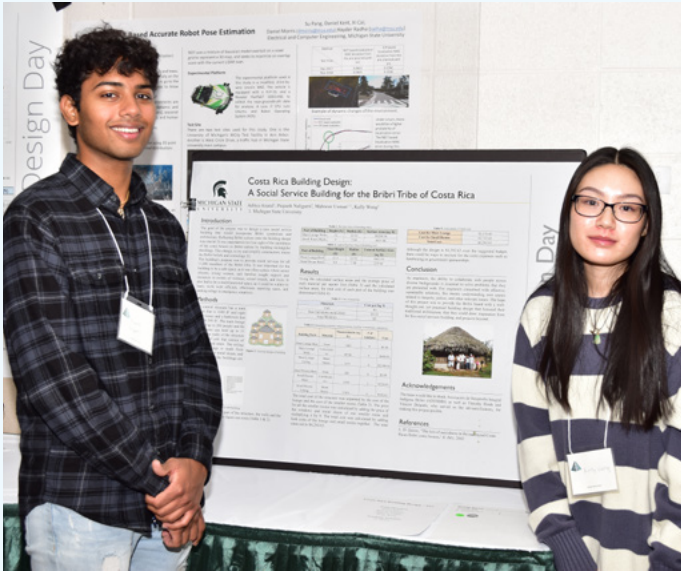


Top: Interim President Teresa Woodruff visits students and EGR 100 instructor Jenahvive Morgan on Design Day, Spring 2023

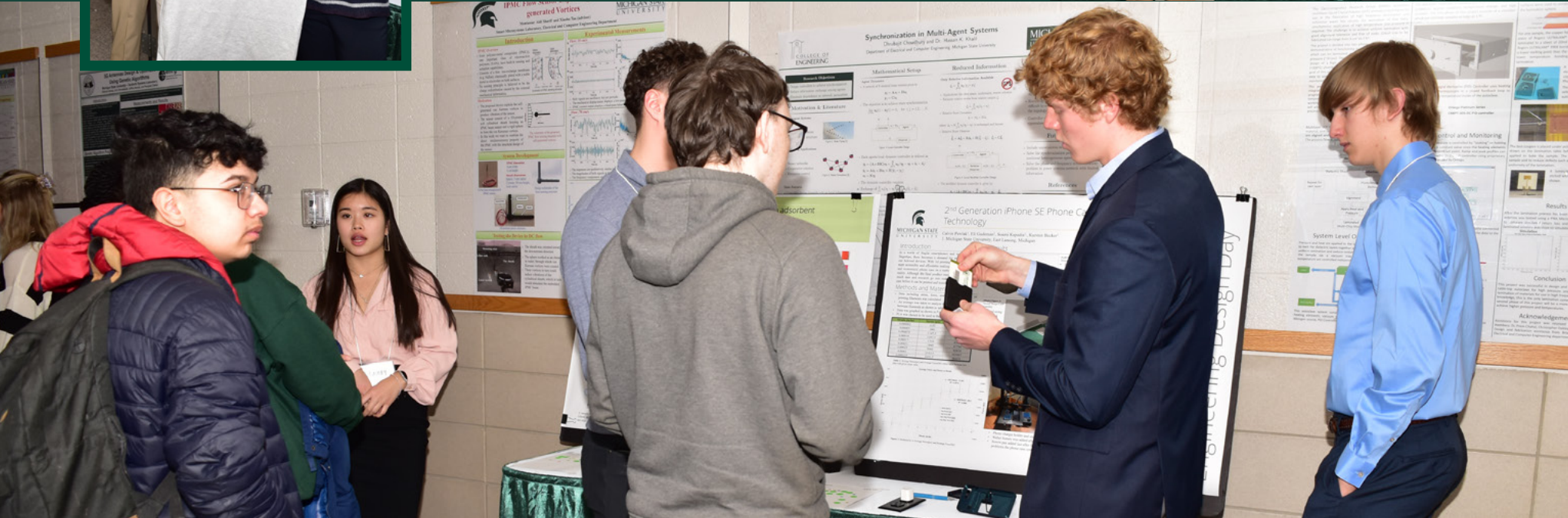
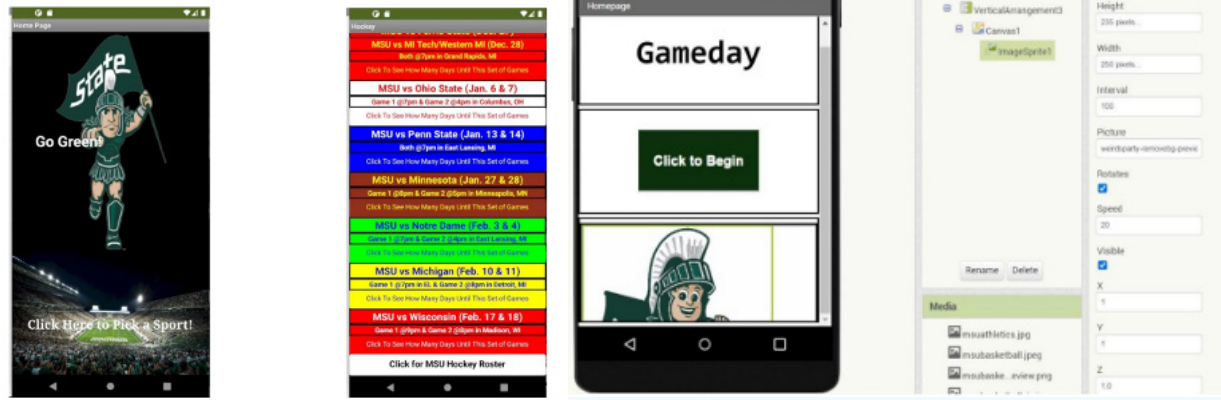
Right: Solar Car Schematic in AutoCAD



Right: Students Present on Costa Rica Design Project on Design Day, Fall 2022



Below: Phone App Design Project: Student MSU Sports Cell Phone App with Program Settings







**EGR 102:** An Introduction to Engineering Modeling is a dynamic and essential course for aspiring engineers. This course is specifically designed to provide students with a strong foundation in the vital concepts and techniques of mathematical modeling used in the engineering field. In the labs and lecture, students explore topics such as linear and nonlinear systems, optimization techniques, numerical methods, and computer simulations through engaging hands-on projects. By working collaboratively with their peers, students not only gain a deeper understanding of engineering modeling principles, but also develop valuable communication and problem-solving skills required in today's competitive job market.

EGR 102 offers a unique learning experience that blends theoretical knowledge with real-world applications, preparing students for a successful career in engineering. This course is an excellent opportunity for students to build meaningful connections with their peers and gain the skills necessary to excel in their future endeavors.

**Project 1 (Group Project) - Creating a Step Counter:** Students of EGR 102 experienced a final project in which they used the new MATLAB Mobile program to extract raw data from their phones to create their own fitness app style algorithms. Students, with limited instruction, were tasked with converting phone accelerometer data into step and distance estimates of a user based on that user's personal information (height, weight, age). Students then compared their own algorithms to those used in commercial apps. For extra credit, they were tasked with generating a metric of their own choosing using, their phone's data.

*“I think the structure of the course is very strong. All of the components of the course come together and overall, I think it is a pretty solid course where you are able to succeed.”*

Top: EGR 102 students interact in the lab with instructor Jason Smith

Right: EGR 102 Student Khang Nguyen and instructor Jason Smith discuss model building assumptions for Khang's final project

**Project 2 (Individual Project) – Home Solar Techno Scenario Analysis:** In this individual project, students sought to perform technical and economic analyses of several scenarios for a home solar installation. To accomplish this, students were given three years' worth of solar radiation and temperature data collected from MSU's enviro-weather station in East Lansing, as well as home electricity use data for a standard east Lansing home. Using this data as well as governing equations for solar panel energy production, students were asked to determine the energy produced and payback period of a solar panel system with varying battery sizes.

**What's Coming Next:** New in Fall 2023, EGR 102 will be participating in the Burgess Fellowship program in coordination with the Broad College of Business. This will see the implementation of an entrepreneurship focused semester long project in the EGR 102 honor's section, in which we would collaborate with a local school to develop a tool using the skills learned in EGR 102 to augment classroom accessibility, safety, usability or similar.

*“The instructor was very enthusiastic about the material that we were learning, which helped me get more excited about coding even though it isn't something that I need to know for my major. The weekly projects we had to do were well picked out and related well to the material that was being taught that week. Overall I really enjoyed the class.”*



**EGR 891 - Technical Writing for Engineers and Scientists:** Another CoRe initiative was the development and delivery of training programs and program materials for graduate students on teaching and assessing technical writing in College undergraduate courses. Delivery of these materials was through EGR 891, which was taught both in Spring and Fall semester. The course aimed at enhancing the persuasive and expository writing skills of our students, so they could write technical documents clearly, logically, concisely, and accurately.

EGR 891 was very well received by students. They developed a love for writing and learned to communicate their technical knowledge to a global audience and persuade the audience that they had solid experience and expertise which showed promise for their success in future endeavors.

*“Prof. Sarkar was amazing. Really thoughtful of the students and all she cared about was we learn something.”*

The instruction and overwhelming student feedback led to presenting a paper at the American Society for Engineering Education (ASEE)'s FYEE Conference 2022, held in person at Michigan State University.

*“Prof Sarkar arranged the course curriculum succinctly and systematically, aiding the comprehension of the course materials.”*

*“As an international student, I have improved on my writing and presentation skills. In particular, EGR 891 has taught me to be direct and concise in my writing, devoid of unnecessary sentences or words. I highly recommend every engineering student to take this course.”*

Below and Right: Enthusiastic CoRe tutors hold tutoring sessions in CoRe tutoring rooms in Wonders facility



**Tutoring Services:** Through the generous support of our Theme Partners and industry sponsors, we offer tutoring in calculus, chemistry, and physics to our first-year students. The CoRe Tutoring Center is a constant buzz of activity with students getting regular assistance with courses and targeted exam preparation. Due to an increasing demand, we offered review sessions for midterm and final exams in Fall and Spring semesters. Our tutors are a team of excellent, motivated, and enthusiastic engineering students who are determined to lead and excel.

*“CoRe tutors walked me through the most challenging problems.”*

Our tutoring service expanded to offer tutoring not only to core courses, but also to college algebra and trigonometry. Our enthusiastic student tutors provided in-person and virtual review sessions before the exams, employing various resources like physical whiteboards, personal tablets, and a projector. These efforts were very well received by the students. We also provided drawing pads and styli to our tutors to annotate with ease and efficiency. We will continue tutoring and hope to continue growing with renewed challenges.

*“I liked the format of the review and the slideshow that kept everything together.”*

While our focus on student safety, student engagement and success will remain, we will continue our mission to help first-year engineering students succeed and move to the next year. **We are Spartans and Spartans Will.**





# WHO WILL ENGINEER TOMORROW? SPARTANS WILL.

**First-Year Engineering CoRe Experience**  
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