The CoRe Experience is committed to “building the whole engineer”. 
CoRe Annual Report 2020-2021 | 2

**Commemorating 2020-2021 - A Year like No Other**

June 7, 2021

**A Different Fall Experience:** As the academic year comes to a close, I would like to reflect on the challenges and accomplishments of our team. The incoming Fall 2020 class included 1465 engineering freshmen. This is compared to the record 1706 students we welcomed in Fall 2019. Due to the pandemic, we had a novel experience last Fall with new students not actually coming to campus with our recommending students remaining in their homes and having courses delivered online. We are planning to offer our 2021 incoming class a near-normal experience as we expect to have students, faculty and staff back on campus this Fall.

**Another Change for Colloquium:** We also had a format change for our Fall 2020 Annual Colloquium. The event transitioned to an online webinar with prerecorded messages from guest speakers. We were pleased to have over 800 incoming students and their families participate with views coming from 16 countries. We were privileged to have Adrienne Jamail, a 2005 MSU mechanical engineering graduate now with Deloitte Tax Analytics, as our guest alumni speaker. She inspired our students to become good students and great MSU alumni. Additional messages were presented by Dean Leo Kempel, Assistant Dean Amanda Idena, CoRe Co-Curricular Director Carmella Davis-King and me. Thank you to all who participated and made this a successful event.

**Transition of Academic and Co-curricular Programs:** Another consequence of the pandemic had us transition not only our EGR 100: Introduction to Engineering Design, EGR 102: Introduction to Engineering Modeling, EGR 291: Engineering Your Success, and EGR 891: Technical Writing for Engineers and Scientists to complete streaming online delivery formats, but we also pivoted our tutoring program and co-curricular events and activities to accommodate the majority of our students who were not on campus. Details of our accomplishments are contained within the sections of this report that follow.

**Peace Engineering Initiative:** We continued our strong relationship with the MSU Presidential College in the Arts and Humanities (RCAH) Program on Sustainability in Costa Rica and our joint three-course sequence in Peace Engineering. The courses consist of designing solutions for Costa Rican community partners in EGR 100; learning the post-conflict reconciliation process in RCAH 202: Peacebuilding through Art, Humanities, Social Sciences and Engineering, and working directly with communities in Costa Rica in RCAH 203 Transculturalization through the Ages: Designing for Peace. This past year we had over a hundred EGR 100 students working on two separate projects. The first had teams designing solutions for the Girls for Success program, a daily after-school initiative for indigenous young women in Hone Creek, where our engineers developed technologies for the school to create and distribute materials and collect assignments virtually. The other project had the EGR 100 students working with community members from San Luis to create prototype designs of educational lookouts for visitors along the scenic road between San Luis and Monteverde.

**Education Abroad in Central America:** During the 2020-21 school year and as part of the RCAH 203 course, we had another two groups of students work on the implementation of community-based design projects in Costa Rica. The first occurred at the end of fall semester when seven MSU students assisted local leaders through a virtual program in the design of programming and physical improvements to the facilities of Naciones Palmichal, a sustainable education center in Palmichal. In Spring 2021, we had another group of three students travel with me to Hone Creek to implement the educational technology solutions developed by the EGR 100 students the previous Fall semester. This program has been a great learning experience for our students to not only provide designs for “real” customers, but to also assist in making their solutions a reality in an international setting.

**CoRe Personnel:** Our staff has also been busy sharing lessons learned through attending conferences and presenting papers at national gatherings such as the American Society for Engineering Education (ASEE) conference and the First-Year Engineering Experience (FYEE) conference. Both events were held virtually this past year due to travel restrictions related to the pandemic. We also developed a new promotional video that may be found on the CoRe website as well as here: https://www.youtube.com/watch?v=ZGQDU-Ridyo

**New CoRe Facilities:** This Fall, we will finally begin to use our newly-renovated facilities in Wonders Hall. The project included construction of 30,000 square feet of classroom and laboratory space with major emphasis on expanding project capabilities for the EGR 100 course. Another portion of the project was the construction of the new CoRe Tutoring Center.

As we head into Fall, I hope we will be together again, living, learning, advising, teaching, networking and sharing. I am incredibly grateful at the determination and compassion everyone has shown during this difficult time. 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.eegr.msu.edu/coe

### MSU Students Meet with Parents and Participants at Girls For Success Program in Hone Creek, Costa Rica

### MSU Students Delivering an Engineering Exercise at Girls For Success Program

### CoRe Sounding Board Meeting in New Wonders Hall Facilities
**Co-Curricular Highlights**

Keeping Spartans safe and healthy was our top priority during the 2020-2021 academic year! As a result of the COVID-19 pandemic, all events and services were delivered online.

**First-Year Engineering Colloquium:** The undergraduate student annual colloquium welcome was turned into a live action-packed webinar. The Dean of Engineering, CoRe Director, Assistant Dean for Undergraduate Studies, and a special guest speaker, Ms. Adrienne Jarrell, who is a Mechanical Engineering alum from the class of 2005, joined Sparty to remind students to mask up for the safety of the community and to discuss academic and professional success. During colloquium, the Spartan engineering community was challenged by Dean Kempel to push to the highest level to achieve success. He explained to students the curriculum would be rigorous and challenging, but they would have access to a dedicated community of faculty, staff and administrators who would support them.

“Our College is committed to your success, and will provide you with the resources and services that you will need to become a successful engineer.” - Dean Kempel

**Programming Activities:** The Spartan Will is an unshakable mindset, disciplined and able to conquer obstacles. Although the COVID-19 pandemic created physical barriers to meeting in person, CoRe continued to meet the needs of undergraduate first-year engineering students. The need for fostering innovative and engaging services to the Spartan engineering community in an online platform was challenging but not impossible.

The mission was to quickly determine what the students needed and how to bring them together over Zoom, without causing additional screen fatigue. How would CoRe students attend co-curricular programming when all of their coursework, tutoring and more, would be delivered online? Would students feel overwhelmed and uninterested in attending another Zoom session?

To engage students who were emotionally drained by Zoom, the “CoRe at Your Front Door” series was developed. CoRe students across the country received monthly postcards and newsletters delivered to their homes, outlining study skills, time-management techniques, encouragement, mental health resources, prompts to meet with their academic advisors, advice on attending faculty office hours and more! Through the postcards and student newsletters CoRe wanted each student engineer to know the College cared and would be available to assist at any time!

“Sometimes it is difficult to know what happens after college and what it is like to work. The series provide an idea on what life is like outside of school and what you can do with your degree.” - First-Year Student

**Co-Curricular Programming:** A peer leader’s ability to motivate, inspire and create change, required perseverance and consistent dedication to their CoRe residents. As CoRe witnessed student Zoom fatigue, we soon learned student motivation to participate in Zoom programming centered on professional and academic focused events. Course faculty members were invited to present on their research areas. Engineering employers joined to share company information and deliver engineering major specific presentations. Mercedes-Benz AG held an information session on artificial intelligence and cyber security. Students also learned more about the soft skills needed to become impactful leaders.

“And there’s no better way to start a Saturday morning than with a dose of insightful leadership talks while drinking a hot cup of coffee.” - First-Year Student

Additionally, peer leaders offered evening sessions that included a computer coding for fun webinar for beginners, study groups for major specific classes, live social media take-overs, faculty panel discussions, presentations on the undergraduate research and scholarship application process, College major requirements, game nights, and a few laughs shared during a live CoRe comedy show delivered by CoRe student staff before final exams.

**CoRe Leadership Series**

This year, CoRe hosted its first annual CoRe Leadership Workshop Series. In light of the ongoing pandemic, this event was held virtually every Saturday from 9am-12pm on January 23 through February 13, 2021. The virtual workshops provided high-quality leadership development through presentations led by well-established leaders in various fields of engineering and human resources. The diverse group of presenters delivered materials on leadership themes to help engineering undergraduates develop a strong foundation of leadership beyond the classroom setting. The workshop series were very well received, with an overall participation of around 200 students each weekend.

**Program Objectives:**
- Connect students with top leaders in industry in an effort for them to learn about their path to success. Each journey to success is different and CoRe wanted to inspire students.
- Provide quality information for academic and professional development

“Sometimes it is difficult to know what happens after college and what it is like to work. The series provide an idea on what life is like outside of school and what you can do with your degree and experiences to be a leader.” - First-Year Student

**CoRe at your Front Door Series**

How can you connect with Spartans across the country? A year of celebrations

**EGR 291-Engineering your Success:** This class introduced students to key principles that provided them with the tools that they would need to become successful Spartans. Students were introduced to engineering academic disciplines, the engineering design process, ethics and professional behavior, study skills and time-management skills, along with college and campus resources. Students also learned effective professional communication strategies. Students investigated how engineering has impacted the modern world through innovation and technology. During each class session, a representative from industry, as well as engineering faculty, led short informative presentations.

As this academic year comes to a close, we are encouraged by the potential to return to in-person learning for Fall. We would like to especially thank the students for the grit that they have shown during this very challenging time. They tried to find avenues and silver linings despite the pandemic. They are a true representation of the Spartan Will!
**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.

**Online Instruction Continued in Fall 2020**: During Fall 2020, the class continued entirely online. This included labs, assignments, exams, office hours, and open labs all being held over Zoom. Lecture videos were made each week for the students to watch on D2L. All projects, except LEGO robotics, solar car and Arduino projects, continued for students online. These hands-on projects were replaced with new online projects, and were completed using software applications throughout the design process.

Instead of the LEGO robotics project, a Cell Phone App project was given to all student teams for the first project, with the students having a choice of a variety of projects for the second project. A new application, BlueStacks, was used to emulate the application functions on laptops, and was useful when students did not have an Android phone. Also, an additional software was utilized for the 3D Printing CAD Drawing project. This software was Autodesk Fusion 360. Tutorial videos were also created for the students to use to develop their 3D Printing CAD Drawing project. This software was Autodesk Fusion 360. Tutorial videos were also created for the students to use to develop their 3D Printing CAD Drawing project. This software was Autodesk Fusion 360. Tutorial videos were also created for the students to use to develop their phone cases in Fusion 360. Finally, the sponsored projects were open to any student in EGR 100 interested in participating in them. This meant that for the first time, students were able to choose their project preference, since all projects were online. There was no longer the restriction of limited materials for each project.

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**EGR 100 Projects and Sponsored Projects**: The second design project in EGR 100 involves a choice of five projects. These projects are the design of a heat exchanger, 3D printing CAD drawing design of a cell phone case, water filtration design, Costa Rica community design, and CoRe industry-sponsored projects. CoRe industry-sponsored projects involved collaborations with BorgWarner on Hydrogen Fuel Cell System Requirements and GE Renewable Energy on Wind Turbine Gearbox Life Extension. CoRe continued a successful partnership with the Residential College in the Arts and Humanities (RCAH) on the Costa Rica design project.

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**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.

“Tutoring was great, very helpful. They helped me understand to the point where I could explain it well to others.”

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“The tutor was very helpful in not only explaining the homework questions but also explaining the thought process on how to get to the answers.”

“They were wonderful at explaining why and how to do the problem while having me do the work.”

**Dr. Morgan is always prepared and very well-spoken. She presents the necessary information in an engaging way that makes the work more enjoyable. Her cheerful disposition showcases how invested in the work she is.”**

**“Dr. Morgan is a great professor and I really enjoyed the course.”**
CoRe Annual Report 2020-2021 | 8

**EGR 102 - Introduction to Engineering Modeling:** This is a two-credit course offered every semester in which students learn basic mathematical modeling techniques and engineering problem-solving through engaging with real-life engineering problems. To perform the modeling, students also learn advanced Excel skills and a computer language called MATLAB.

Students in the course attend one 50-minute lecture and two 80-minute labs every week. In the lecture, students are introduced to new engineering modeling concepts and given an open-ended engineering problem to solve for the week. In the first laboratory, students are introduced to new computer skills and allowed time to discuss in their teams how the new skills might apply to the weekly problem and develop a problem-solving strategy. They are guided by their TA who acts as a project manager. In the second lab, students are given time to work in teams to solve/model the weekly problem using the appropriate modeling software (Excel or MATLAB).

**Online Instruction Continued in Fall 2020:** EGR 102 had made the transition to online content delivery relatively smooth. All instruction continued in the format of pre-recorded videos launched at regular intervals throughout the week. Online office hours were extended into the evenings so that students in all time zones could easily participate in class Q&A periods. Other assignments, quizzes, and readings had already been conducted in an online format, so no changes were necessary. To simulate classroom engagement, active listening-style response questions were embedded into lectures through different resource tools. These were paired with the new online text which embedded student activities and auto-graded sample problems for students to work through. In this online environment, the goal remained to judiciously use class time to communicate the most concise and concrete information in an efficient manner, while maximizing student engagement with the materials presented.

“Prof Smith had a great attitude and always wanted his students to succeed.”

**EGR 102 Team Projects:** EGR 102 students 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 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, etc.). Students then compared their own algorithms to those used in commercial apps. For extra credit, students were then tasked with generating a metric of their own choosing, using their phone’s data.

**Individual Projects:** Students in the regular sections of EGR 102 completed an individual final project at the end of the semester in lieu of a written final exam. This year, students used live data gathered from a collaboration with MSU’s Environweather Station Program to design a hypothetical solar array installment in the greater Lansing area and determine its cost.

“I really enjoy Mr. Smith as a professor. He makes it fun while also getting his message across.”

**Honors’ Student Final Projects:** For the honors’ section, the individual project at the end of the semester was chosen and designed by the honors’ students themselves, in collaboration with their TA. The students set the parameters for their own projects and designed their own codes to solve their chosen problems. They then presented their work to MSU faculty at the end of the Spring semester. Projects presented were on weather application, predator-prey interaction model, consumer price index analysis, airfield personnel scheduling, smoothie-making game, and many more.

The culmination of these efforts has been a massive increase in student receptiveness to lecture materials presented online as well as an award for the second position in the MSU AT&T Award for Best Use of Technology in an Online Class.

**EGR 891 - Technical Writing for Engineers and Scientists:** Another CoRe initiative was the development and delivery of training programs and program techniques 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 writing skills of our students, so they could write technical documents clearly, logically, concisely, and accurately. It was well received by students.

“Prof. Sarkar explained in a clear and lucid manner. Her unique set of assignments was the best part of the course. Post-class activities solidified concepts taught in her lectures.”

The instruction and overwhelming student feedback led to presenting a paper and leading a workshop at the American Society for Engineering Education (ASEE)’s FYEE Conference 2020, held virtually due to the pandemic.

“The topics covered in EGR 891 are extremely valuable, no matter where you are in your studies. Even the basics we “should” already know, this course helps make sure these skills are sharp and relevant to our current pursuits.”

“Overall, EGR 891 definitely improved my writing and formatting skills greatly. It taught me a skill which I hope to utilize for a long time.”

**CoRe Students Honored at Dean’s Showcase of Stars Event:** As of every year, Diversity Career Fair Recruiters connected with our best and brightest STEM students. Our First-Year Engineering students Fallou Mbengue, Noah Caldwell, Matai Swain, Rami Wassem Sougir, and Nash Longmire were awarded by corporate sponsors. We congratulate these high-potential students and hope they continue the work they have started.

While our focus on student safety, student engagement and success will remain, we will continue our mission to help first-year engineering students succeed.

_Spartans Will. Spartans Will._
CoRe Mission and Vision

The First-Year Engineering CoRe Experience integrates first-year engineering academics and co-curricular/residential activities to support the academic, professional, and personal growth of engineering students during their first year at Michigan State University.

CoRe seeks to demonstrate to students the importance of engineering and the positive impact that engineers make on society and the world around them. Along with community and corporate partners, we bring real-world expertise and challenges into the classroom and residential environment, reinforcing the relevance of studies in engineering to solving global challenges.

CoRe Experience Mission

• Provide early engineering students with unmatched learning opportunities within a supportive community that encourages academic, professional, and personal achievement
• Foster life-enriching connections between students and their peers, faculty members, advisors, and corporate representatives
• Cultivate students’ skills that encourage lifelong learning
• Demonstrate to the students the critical roles of engineers in contributing to society

Academic and Co-Curricular Support Employees

Graduate Teaching Assistants - 21
Academic Tutors - 48
Undergraduate Learning Assistants - 58
Peer Leaders - 35
Lab Aides - 2

Director
Timothy Hinds
Co-curricular Director
Carmellia Davis-King
Project Labs Coordinator
David Wolff
Support Staff
Aimee Reynolds

Academic Director
Jenahvive Morgan
Teaching Specialist
Debjani Sarkar
Teaching Specialist
Jason Smith
WHO WILL ENGINEER TOMORROW? SPARTANS WILL.