



April 2020

Graduation Special Edition

The following newsletter has been created to engage with those passionate about Humanitarian Engineering (HE) by providing information and resources to our subscribers. This issue highlights key events, projects, and opportunities for involvement all related to HE at Mines and around the world.

Congrats HE Grads!

We are so proud of our 2020 spring HE and Peace Corps Prep graduates! In spite of a very unusual final semester, they continue to amaze us with their hard work and dedication to Humanitarian Engineering.



Name	Major	Minor
Madison Anderson*	BS in Civil Engineering	McBride Honors in Public Affairs
Travis Cotter	BS in Civil Engineering	Leadership in Social Responsibility
Cassidy Grady*	BS in Geological Engineering	Engineering for Community Development
Paige Kadavy	BS in Mechanical Engineering	Engineering for Community Development
Moira Laughlin	BS in Environmental Engineering	Leadership in Social Responsibility
James Marquis	BS in Environmental Engineering	Humanitarian Engineering
Seamus Millett*	BS in Civil Engineering	Engineering for Community Development
Franco Pilone	BS in Environmental Engineering	Engineering for Community Development
Bilal Reza*	BS in Electrical Engineering	Engineering for Community Development
Aurora Waclawski	BS in Environmental Engineering	Leadership in Social Responsibility
Ely Womack*	BS in Environmental Engineering	

* Successfully completed the Peace Corps Prep program

HE grads, please fill out this [form](#), so we can stay in touch!

Please join us on April 30th at 5 PM MDT [via Zoom](#) to celebrate their accomplishments and hear about their post-Mines plans.

Senior Shultz Scholars

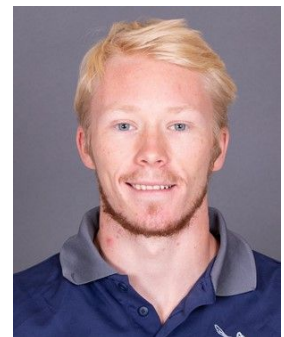
Seamus Millett

Civil Engineering '20

Engineering for Community Development Minor

Shultz Scholar, Peace Corps Prep Scholar

My name is Seamus Millett and I am part of the senior class of students graduating this spring with a minor in Engineering for Community Development. I have been involved in many activities throughout my time at Mines, from varsity athletics to a member of ASCE but my experiences with the Humanitarian Engineering program have been the most influential for me. I have gotten the opportunity to take amazing courses and be a part of one-of-a-kind projects around the world as a member of HE and I can not be more grateful. Along with my experiences for the past three semesters, I have had the





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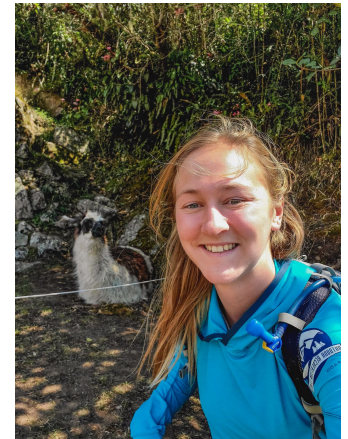
privilege of being a HE Shultz Scholar and this has allowed me to be a more integral part of the HE program. My projects as a Shultz Scholar have focused on building a connection between industry and other engineering disciplines and humanitarian engineering.

Upon graduation, I will be continuing my HE focused engineering work as a Geotechnical Engineer for BGC Engineering. The company is a consulting firm focused on geologic hazard mitigation and geological engineering, but they have a strong commitment to community development and sustainability. The skills and experiences I gained as a member of HE were particularly interesting to the company and I hope to continue to use those skills throughout my career.

Cassidy Grady

*Geological Engineering '20
Engineering for Community Development Minor
Shultz Scholar, Peace Corps Prep Scholar, SRSE President*

I am Cassidy Grady and I will be graduating in May 2020 with a degree in Geological Engineering and a minor in Engineering for Community Development. My extra-curricular activities at Mines include acting as project lead for the Mines Without Borders Water Project, promoting HE on campus as a Shultz Scholar, finding time to get outside as Vice President of the Backcountry Ski Club, and working as an undergraduate researcher on multiple projects with faculty in the Engineering, Design, and Society division. In my HE classes, we spent a lot of time talking about people. I learned how to listen and understand others in a way that has shaped the way I approach engineering problems. It is an understatement to say HE has influenced my time at Mines. Through HE, I found something to which I could belong and learned a tremendous amount about myself, engineering, and empathy along the way.



The next step for me is yet to be defined. I have spent a great deal of time considering different paths I can take after graduation, and so far I have been able to narrow down my interests to what I would like to do next. I hope to find a job working in river restoration and hydrogeology, especially located in mountainous regions, where I can apply my knowledge of working with small communities who face major threats to their resources. While I face much uncertainty in my future, I feel that I am ready to handle whatever comes my way and make my own opportunities if necessary. HE has taught me that if I want to see change happen, I need to be the one to make it happen, and I know from my experiences that I have the capability to do so. One thing is for certain—I am more prepared for what the real world has in store because of my time at Mines and my involvement with HE.

Franco Pilone

*Environmental Engineering '20
Engineering for Community Development Minor
Shultz Scholar, MWB President*

My name is Franco Pilone and I am a part of the graduating class of 2020 in Environmental Engineering with a minor in Engineering for Community Development. Throughout my time at Mines, I've been fairly active on campus as the Treasurer and President of Mines Without Borders, being a





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Shultz Scholar, working in the ReNUWIt research labs, and more. Humanitarian Engineering allowed me to take some of my favorite classes that I've ever taken at Mines, like Engineering for Social and Environmental Responsibility. Being a Shultz Scholar has been a privilege for me and I hope that my efforts of being a Shultz Scholar and president of MWB have left an impact at Mines and the HE program.

After graduation, I will be continuing to assist the research efforts at Mines Park on engineered stream beds. After summer, I will be going to Portland, Maine to begin a master's degree in marine science. I will be doing research on aquaculture and stormwater effluent and its effect on the Casco Bay and the fisheries within them. My research question will become more focused. I will be able to use my HE skills to conduct more thorough research on the stakeholders and analyze the impacts of possible contamination. My HE skill set was a factor in my acceptance to this program. **My interdisciplinary skill set made me a standout among the applicants.** I am excited to start this new chapter of my life and I am thankful for the HE program and Mines for helping me get there.

HE @ Mines

Socially Responsible Scientists and Engineers (SRSE) Recap

By Cassidy Grady, President

The SRSE Club is a Humanitarian Engineering student organization that engages students, faculty, professionals, and community members in conversations around engineering ethics, social responsibility, and related topics. This past year was the first full year that SRSE has been a club, and we have seen a major increase in student involvement at our meetings and events. This past spring semester, we hosted many guests to lead discussions and provide insight. [Dr. Carl Mitcham](#), a Professor Emeritus at Mines Humanities, Arts, and Social Sciences Division, kicked off the semester by sharing his thoughts on the history and current state of China's energy sector and how it compares to that of the United States. During the next week, some members of SRSE joined Dr. Mitcham and guest speaker [Dr. Judith Shapiro](#), who had just presented on environmentalism in China for a Payne Institute lecture, for dinner and conversation. [Dr. Darshan Karwat](#) from Arizona State University visited Mines in late February to speak and share ideas on sustainability, and he visited SRSE to offer advice for the HE Symposium we are planning. This symposium has been postponed to the Spring 2021 semester. He also shared some questions he developed that are "self-reflections for activist engineers." In early March [Dr. Jessica Smith](#), the HE Graduate Program Director, visited SRSE to lead a captivating discussion on the perspectives of social responsibility for consulting engineers. During the discussion, we referred back to Dr. Karwat's questions and considered how an engineer for a geotechnical consulting company might answer the questions. Due to the COVID-19 stay-at-home orders, we had to cancel and/or postpone some of our meetings, but we hope to invite them back to present next year! Fortunately, we were able to hold three weekly meetings using Zoom over the past few weeks. First, Seamus Millet, an HE Shultz Scholar, presented on his Capstone design team's project to [redesign a backpack](#) for small-scale miners in Colombia who are carrying ore out of mines. Then, Devan Payne presented on his Statistics Practicum project about methane emissions in China. Finally, our last meeting was hosted by a Capstone design



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team [designing a crop storage facility](#) in Uganda who talked about their trip to Uganda to gain stakeholder feedback and context for the project.

SRSE would like to thank HE Associate Director Julia Roos for her never-ending support and encouragement throughout the year; HE Directors Dr. Juan Lucena and Dr. Jessica Smith for their invaluable guidance; and everyone who is part of the HE Program and the Engineering, Design, and Society Division at Mines for their input and attendance at our meetings and events. We hope you will join us next year for more discussions, social events, and the 2nd Annual HE Symposium on Environmental Justice.

Colombia CARE Team Project - Part 2: Next Steps



By Alex Vo, Juliana Anderson, Madison Anderson, Bilal Reza, Arielle Rainey, and Charles Collins

Project Advisors Prof. Elizabeth Reddy and Prof. Alina Handorean

With the close of senior design, our Santa Rita CARE Team is so excited to have a completed module to hopefully continue for the next senior design team to expand upon and test in the community of Santa Rita, Colombia. We were very disappointed when we learned that our travel to Colombia was being canceled after the COVID19 outbreak, but we still achieved multiple iterations of testing our water filtration module with local schools. After that testing and then presenting our project to our clients, we received a lot of good direction for the project in the future. Some feedback they gave us consisted of expanding the project to reach adult learners. In Santa Rita, adults could also benefit from the program for implementing at home or learning about the importance of water filtration for themselves, especially adults who lack higher education. The learning modules could even be a source of economic opportunity for the community, so that adults and children could see the financial benefit of this water filtration module. Our advisors had some concerns about the cost of our module, so encouraging members of the community to take ownership of these water filtration kits could help address that.

Other feedback we received emphasized the importance of follow up modules, possibly one of which could address trash management (which would be generated throughout the water filtration module). Mercury is also a historical source of contamination in Colombian waters, so addressing techniques to filter out mercury is another way to expand the project. Though this would depend on the availability of chemical testing in the Colombian schools, it is a way to add another scientific layer to the module that could dig deeper into toxicity and acidity. When tailoring the project to adult learners, this layer would also be very beneficial since it is a higher level. Essentially, the project could be as complex or simplified as the learning background of the audience, because the general topic introduced allows for a lot of versatility in the presentation and delivery of the concepts.

We are very honored that our educational partner Uniminuto will also be using our module for schools in their nearby community of Bogota. Some members of our team that will be continuing with graduate school next academic year will also be involved with the project. There is the potential for water related research

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with this project in the waterways in Santa Rita, such as understanding the increased water acidity that comes from coffee processing that increases the toxicity of mercury contamination and the breakdown of the coffee cherries from coffee production into acetic acid. Professor Juan Lucena will also pass on the potential for economic opportunity to his contacts in Santa Rita. We are very excited that this project will continue on and eventually be implemented in the Santa Rita community!

Uganda Crop Storage - Part 2: Lessons Learned

By Laila Amery, Sydney Fesenmeyer, Jessica Horii, Chris Linan, Abigail Tiesman

Project Advisors Prof. Alina Handorean and Prof. Elizabeth Reddy

Upon returning from our trip to Uganda, the team reconvened to share notes and experiences. We quickly learned that a recurring theme between the group was how impactful stakeholder engagement was. Being on the ground speaking to the farming groups we were designing for was completely different from any preliminary research we had conducted.

The hours of reading, research, and client meetings fell away upon landing in Uganda. After meeting with our client on the first day and touring downtown Kampala, we were able to interact socially with the local population and get a true understanding of the environment. Global Livingston Institute is particularly focused on cultural sensitivity and immersion, and thus, paired us with a local Ugandan who is part of their team. After a crash-course on Ugandan history, culture, and customs, we began exploring the richness of the country. This guide acted as our translator and mentor, helping us understand the issues the villages in rural Uganda are facing. This helped immensely in understanding cultural norms and societally acceptable engineering solutions.

The biggest difficulty we faced as a team was learning that our clients' desires did not align with those of the farming cooperatives. It became apparent to our team that after visiting multiple sites, the message was clear – they wanted the exact opposite of our assigned project. This created conflict between teammates, as some felt we should proceed with the original plan, while others asked if it was ethical to move forward with a facility we knew was not wanted or trusted. We learned how to have a professional conversation amongst the confusion and miscommunication, then listened to the non-profit's perspective and vision.

All in all, this experience has touched us in ways we did not imagine. We are extremely grateful to have experienced the difficult situations we were in and we continue developing new skills and appreciation for the community around us. Our trip to Uganda has changed our worldview and deeply impacted us as we move into the next stage of our lives.



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From the HE Classroom

Prof. Stephanie Claussen

Teaching Professor, Engineering, Design, & Society and Electrical Engineering

EDNS 315, Engineering for Social and Environmental Responsibility, is one of the gateway courses for the two HE minors. It is also gaining in popularity among non-HE students due to its status as an H&SS mid-level elective and its relevance to future engineering work. The course explores the role of individuals (us!), engineering education, professional engineers, and the engineering profession in social and environmental responsibility. It introduces students to multiple theoretical lenses for exploring such topics, while also exploring topics of current relevance such as bioengineering, the role of algorithms in our lives, and hostile urban design.



I have loved teaching this course since the fall of 2018. I enjoy being challenged by the students each day in class, while in turn having the chance to challenge them. It is a joy to see them wrestle with what it means to be a responsible engineer, what they want their future work to look like, and who should get to make decisions around responsibility.

I hope to see many of you in my class in the future!

Past Events

Virtual Lecture by Nicole Hanson

Sustainability Specialist, International Copper Association

Nicole Hanson is Mines Alumni who graduated in 2014 with a degree in Mechanical Engineering and a minor in Humanitarian Engineering. Nicole currently works as a sustainability specialist for the International Copper Association (ICA). Through a webinar co-sponsored by the Payne Institute, Humanitarian Engineering, and the NSF-funded PIRE Responsible Mining, Resilient Communities project, she was able to share her journey from graduation to where she is now, working on sustainability in the copper industry. Nicole provided insight on artisanal mining operations, namely gold mining, around the world including the types of risks artisanal and small-scale gold miners face and how their operations relate to her experience with copper mining on an industrial-scale. At the end of the talk, Nicole answered a range of questions from the audience about her work with ICA and she offered guidance for graduating students on how to find and land a job in the field of corporate sustainability.



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They Say It Can't Be Done

Film Screening and Discussion with the Film Team

“They Say It Can't Be Done” is an inspiring documentary focusing on the impacts of regulation on innovation. The film highlights four very unique and innovative stories on

growing organs for patients in need of organ donors, growing meat in a lab that requires no slaughterhouses and uses plant based material to help grow the meat, carbon dioxide capture and sequestration using filters absorbing CO₂ from the forces of the wind, and aquaculture and ocean farming of mussels and kelp that require almost no food to grow. The film narrows in on these four topics and focuses on how regulations impose on the growth of each of these innovations. It takes a careful process not saying regulation is bad, but saying that it is a complex entity that can inhibit the rapid growth of innovative ideas. Not to say the innovative ideas are bad, rather the future is unknown and regulations are necessary to control the potential of something very bad happening. Personally, I believe that all of the stories highlighted in the film are great innovations that should be pursued. The filmmakers chose these stories to highlight due to their likely potential to expand and grow into something that our future is likely to have.



Students and faculty at Mines were able to get an exclusive viewing of the doc that has yet to be distributed through major media outlets. Better yet, students and faculty were allowed the opportunity to talk with the filmmakers about the movie and the stories within them. Patrick Reasonover, Andrea Fuller, and Jo Jenson joined a zoom call with Mines students and faculty to discuss the themes in the film and the other ideas that were pursued during the filmmaking. Topics of discussion included the meat culture labs and its potential during times of panic and pandemics (like the one we are in now), regenerative agriculture, how to tell a story and make unbiased documentaries, and the process of regulation from entities like the FDA and USDA. All parties that participated in the zoom call benefited through the collaborative discussion.

If this interests you, be on the lookout for a potential documentary series on your television, as the filmmakers are attempting to create a docu series on more innovative ideas like the ones mentioned above.

Web Lectures in HE classes

In an effort to stay connected and continue learning during the current pandemic, the HE program organized a number of virtual lectures on topics that exemplify the principles of our program. Here are some of the valuable lectures that our students enjoyed.



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John Edisson Serna

Director of Sustainability, Mineros SA

Mineros is a mid-tier gold mining company based in Colombia and in this lecture, John Serna discussed how they are growing their mining operation while maintaining sustainability. Their company is dedicated to maintaining environmental and social responsibility, and after each site has been closed, the company takes the time to replant native species and initiate local projects with nearby communities. All of this is done by working with community leaders and private organizations at each site so as to ensure that Mineros is considering both the impacts that their operations will have and the needs of the community. They are helping to lead the way in sustainable mining and are an incredible example of how engineering can benefit both projects and communities at the same time.

Garrett Mason

Senior Innovation Officer, Pact

Garret Mason spoke about Asset-Based Community Development and the importance of seeing communities for what they have, instead of what they lack. Mason emphasized throughout his lecture that unless we think about the assets that each community has, sustainable development will not be possible. And how do we do this? The questions we ask have the power to shape the mindsets of those we work with, so it's important to ask communities what they know, what they care about, what they are good at, and, most importantly, what their vision is. These are the questions that lead individuals to find their own power, and when we empower communities, we encourage sustainable development.

CU Boulder Graduate Students

Shaye Palagi

PhD Candidate

Casie Venable

PhD Candidate

Briar Goldwyn

PhD Student

For this lecture, these three CU Boulder graduate students discussed the importance of participatory research and the methods they used when working with communities in the Pacific after tsunamis or typhoons have destroyed their physical infrastructure. While there are many different methods for engaging communities, the methods that we chose to use as engineers should be those that empower communities. The hardest part about this is that every community is different, and sometimes projects can have infinite possibilities. However, no matter what the methods or the purpose of the research, good participatory research begins with respect. By engaging with community leaders and members from all different groups within the communities, we as engineers can better understand the culture and the context of local communities so as to choose methods that are accessible and relatable so that we are able to listen to each part of a project and hear the voice of all stakeholders involved.

Giselle Figueroa

Director, Laboratorio de Antropologia Abierta

Giselle Figueroa is a Colombian anthropologist who worked with small scale gold miners in Colombia and has done research along the gold supply chain. The lecture was focused on her research in Marmato with



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small scale gold miners and London with gold buyers. She outlined her research and then discussed how the various ethnographic methods she used are shaped by the socio-economic and political context in which the research takes place. This gave the students an opportunity to learn and reflect on the different ethnographic methods for research and how they can shift based on context and location.

Alumni Corner

Addy Bateman

Engineering for Community Development minor, Mechanical Engineering major

Graduated May 2019

About 6 months after graduation, I had to make a really tough choice between two jobs. One choice had me continuing an internship, which was giving me the technical experience I felt my resume needed to make me a “better engineer.” The other had me taking a leap of faith into a completely new industry that I felt was having a greater hand at changing the world. I was lamenting to a family friend about the tough decision, deciding between the people I was enjoying working with and the potential of a new job opening different doors. She told me, “Sometimes you’re going to pick a job for experience. Sometimes it’s for the impact it has on the world. Sometimes it will be for your family, or the location, or the money. In the end, you have a lifetime of jobs, so just pick the one that’s right for you at this moment.”

As an HE grad, I remember feeling torn about finding my next job. Should I look for a normal, technical engineering job and focus my efforts on intrapreneurship? How picky should I be in analyzing a company’s mission and its community involvement efforts? As someone who was pretty desperate for a job after graduation, when it came down to it, I was concerned I wasn’t going to have my top choice of HE-centric jobs (which I didn’t). Three months after graduation and nine months after starting my job hunting process, I finally got a job offer. It wasn’t perfect, it was an internship for one year with a company that did not have intense CSR efforts or community outreach of any kind. But at that point, it was a job. This experience circles back to what my mentor said. Sometimes you just need a job for experience, so I settled and took it for that (also money, since I was pretty broke at that point). Fast forward 6 months later, I was blessed with the opportunity to make a choice between two jobs, and this time I chose for the impact my position would have on the world. I’m sure my next choice will be for a different reason, and the one after that, and so on.

In the end, to be a great Humanitarian Engineer, it doesn’t really matter what job title you have or what industry you’re working in. The most important aspect is that it alters your way of thinking to be more perceptive and understanding of the problem as a whole, not just the technical challenges that lie with it. Don’t be afraid to talk about your experiences as an HE student, even if it’s for a job in an industry you don’t think will care. Trust me, they’ll care that you’re able to look at a problem from multiple different angles, not just the one you’re taught in technical classes. I know you all are looking for jobs in a really tough market right now. But trust that you are a qualified, capable, incredible engineer who is going to find the right job at this time. And we’ve got 50+ years of jobs ahead of us, so don’t rush on finding the perfect one. You’ve made it through Mines - you can make it through this. Congratulations to the grads out there!



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Wolf Reichard

Humanitarian Engineering minor, Mechanical Engineering major

Graduated May 2018

My time in the HE program at Mines was, far and away, the most impactful experience I have ever had. The opportunity to take a step back and ask "why" instead of "how" changed my career trajectory as well as my approach to problem-solving in general. I was fortunate enough to get hands-on human-centered design (HCD) experience with patients in the Centura Health system where students were tasked with improving patient experience and community members in Ayaviri, Peru where my Capstone team was charged with a low-cost home heater.

Mix these experiences in with about a thousand pages of quizzes in Dr. Lucena's class and an amazing cohort of Shultz Scholars by my side that I was able to land a job as an innovation engineer at iDE Mozambique where I spent the better part of a year designing extremely low-cost irrigation and agricultural technologies. After almost a year of this work, I realized that, in many cases, the business model was most often the primary factor keeping quality pieces of technology from getting off the ground. I found myself focusing more and more on innovative models and use cases, and less on the actual technology I was working on.

That is ultimately what led me to transfer from the non-profit space to EdgeDweller Inc. As a business consultancy specializing in the science behind creativity, EdgeDweller uses a unique approach to creating disruptive innovations and then making them work. Since starting in June of 2019, I've had the opportunity to work with many non-profits focused on employing persons with disabilities, and am now running a pilot of two different products designed to kickstart meaningful innovation in small to medium-sized NPAs. As the business community focuses more and more on design thinking, HCD insight during strategic planning has been an extremely helpful addition to my problem-solving repertoire.

In my personal life, I'm entering into the urban farming and sustainability communities in Atlanta and looking for ways to apply my technical/design thinking knowledge in an advisory capacity to the rapidly growing start-up scene. I have connected with a program managed by the Atlanta Mayor's Office of resilience to train "Atlanta Sustainability Ambassadors" and am looking forward to applying my HE knowledge to a capstone for this course project focused on how to reduce restaurant food waste and increase composting.

I wouldn't be where I am now without HE. I'm looking forward to seeing what's next for the program!

Directors' Corner

Julia Roos

HE Associate Director

Well, what an unusual spring we've had! Despite a relatively normal January start, Mines changed as the world changed in response to COVID-19. In an abundance of caution, Mines administration sent students,



Engineering as it should be.

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faculty, and all but essential staff off-campus a week before spring break in mid-March, and just before statewide stay-at-home orders were initiated.

Mines staff and faculty sprang into action, with a singular focus on ensuring our students felt supported and completed the semester by meeting their academic aims. Faculty spent two weeks learning how to bring their courses fully into remote instruction mode, and staff focused on continuing the University's mission while keeping our community connected.



We have seen some amazingly creative approaches and ideas come to life to meet these needs. Students have remarked on the work their professors put into their remote coursework, and the amount of support they feel from staff and faculty. President Johnson has hosted multiple "bring your own pizza" virtual lunches with students (complete with reimbursement for their pizza purchases!), to hear about their experiences and respond to any questions they might have. Mines' wellness center has offered remote mental health visits and multiple virtual meditation sessions, while the Mines recreation team presents daily "live" virtual workouts. Student organizations and campus communities continue to connect in regular virtual meetings and casual remote "get-togethers."

From HE and Engineering, Design, & Society (EDS), in addition to robust course delivery, we have focused on continuing to engage with our broader HE community. As discussed by our students in this newsletter, we've hosted a series of virtual lectures from remarkable HE practitioners like Mines and HE alum Nicole Hanson and Garrett Mason on a variety of HE topics, where students, faculty, and HE friends could chat with them about their work in HE. We partnered with EDS to host a virtual viewing of the riveting documentary "They Say It Can't Be Done," followed by an engaging chat with the film team. Finally, we will be celebrating our **Spring 2020 graduates** this coming **Thursday, April 30th, at 5 PM MDT**. The Zoom link for the celebration is

<https://mines.zoom.us/j/94669653267?pwd=UDVUaTJnV0R0MUJva3RaZ1F3YkdnZz09>.

Please join us if you are available, to recognize their amazing achievements!

Humanitarian Engineering Newsletter

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