The University of Iowa

EDITOR: Rachel Seibel

AIChE Fall 2017

Advisor's Corner

By: Prof. David Murhammer, Professor and AIChE Student Chapter Advisor

Greetings to Hawkeye Chemical Engineers!! This Fall 2017 issue of our AIChE Student Chapter Newsletter begins with a special feature containing alumni quotes about chemical engineering that our editor, Rachel Seibel, obtained at the University of Iowa College of Engineering reception held in Minneapolis, MN during the national AIChE meeting. This issue also contains articles about the new addition to the Seamans Center (which opened in October), the Society of Women Engineers Annual Conference, the Kids Day Camp, and the AIChE National Conference. This issue also contains three topical papers from the Process Calculations course taught by Professor Julie Jessop. These articles discuss different aspect of chemical engineering. The final three articles in this issue are about current student experiences conducting research, a cooperative education experience, and an internship.

University of Iowa American Institute of Chemical Engineers

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Engineering Through the Years

By: Rachel Seibel

While many things have changed within the College of Engineering, the one thing that has never changed is how much the students, both past and present have enjoyed the experience. Whether it was due to the amazing students, the incredible faculty, the in-depth curriculum or the atmosphere of being a Hawkeye, the time spent as an engineering Hawkeye is unforgettable. However, do not just take my word for it; instead listen to everyone else's favorite part of being a member of the College of Engineering legacy.

"I participated in many campus organizations: union board, student council, etc. The best part was that I had the full support of the faculty to engage in extracurricular activities. It gave me the skills I needed to do my job in marketing and as a technical representative at DuPont before beginning my career as a consultant."

-Bill Liike, '55

"Other than the technical writing, the best thing I learned about was economics."

-Ronald Brown, 61'

"The great thing was the small classes and how much the faculty cared." And "Having the College of Liberal Arts school right there by the College of Engineering."

-Diana Warner, '73

"I liked the small classes and the excellent professors, especially Greg Carmichael, David Rethwisch, and Arthur Vetter."

-David AmEnde, '88

"As a graduate student in biomedical engineering at Iowa, I really appreciated the personal interactions with faculty in the College of Engineering. Faculty were genuinely interested in the students and interacted with us as peers or the colleagues we were to become after graduation."

-Joseph Hale, '91

"I love the community. It was so supportive and engaging that I stayed to get my doctorate."

-Beth Rendktt, '03

"My favorite part is the sense of community, not just across the Department of Chemical Engineering, but across the university."

-William Liechty, '07

"I was a graduate student at Iowa and I thoroughly enjoyed my four years there. The department was very welcoming and it made it a family environment with the Thanksgiving Potlucks hosted by the department. I liked the collaborative research components of the department and their willingness to help in any situation. Plus, the Ped Mall was awesome. I made great friends and great memories during my time at Iowa!"

-Treniece Terry, '08

"The comradery of being in small classes."

-Austin Hangarther and Katie De Hoedt, '15

"Very vibrant community and many friendly faces."

-Erica Ricker, '17

"I love the small College of Engineering on a Big Ten campus. I have amazing opportunities with athletics and performing arts, but I also have great relationships with my professors and classmates, which has allowed me to be successful."

-Madison Murhammer, '18

Engineering Through the Years (cont)

"I came for the amazing chemical engineering curriculum and stayed for the great people."

-Lizzy Zimmerman, '18

"Pancheros."

-Emmy Moore, '19

"The best part about Iowa is the engineering alumni."

-Matt Kuster, University of Iowa Center for Advancement

It is safe to say that being a part of the College of Engineering has and always will be a life changing experience. Another thing that will never fade is the University of Iowa versus Iowa State rivalry. Go Hawks!

"You walk west until you can smell it. Then you walk north until you step in it. Moo You!"

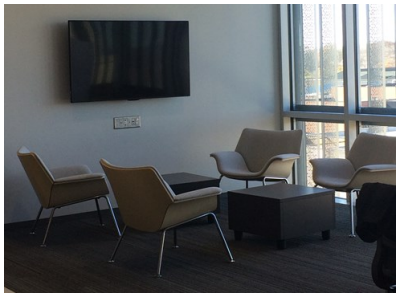
-Anonymous

Huge thanks to everyone who contributed quotes regarding their experiences!

Seaman's Center of Engineering Arts and Sciences Receives Expansion

By: Carrie Lindberg

With the incoming classes gradually increasing in size, the Seaman's Center for the Engineering Arts and Sciences received its second expansion. On October 23, 2017, the engineering building opened a new addition, this time onto the south side off of Capitol St. This 65,000 sq ft annex features new classrooms, faculty offices for the biomedical and mechanical engineering departments, an expanded student development center, team study spaces, new Engineering Problem Solving I workshops, and a fluids lab. The expansion broke ground in Spring of 2016 taking roughly a year and a half to complete. In addition to its interior features, this new expansion also sports a large covered bike area, bike access between Capitol and Madison St, and the only handicapped accessible elevator that accommodates the large hill on this side of campus.



Society of Women Engineers Annual Conference

By: Jacquelyn Ricke

The Society of Women Engineers (SWE) held their Annual Conference, WE17 in Austin, TX during the week of October 23, 2017. The first few days of the conference involve Society meetings, and student events were concentrated primarily on October 26 and 27. Ten students from the University of Iowa SWE section attended the conference this fall.

WE17 was the largest gathering yet of women engineers. There were hundreds of companies in attendance, in addition to the thousands of students and professionals. The conference serves many purposes for those there. First, there are many meetings about Society business issues. In addition to the national and international meetings held earlier in the week, there are meetings for each Region. The president, as well as both vice presidents, represented the University of Iowa at the Region H meeting. Additionally, there are other, smaller meetings throughout the week. For example, four members of the University of Iowa section met up with an alum to talk about the financial position of the section. While these meetings are vital for the Society and individual sections, they are only a small part of the conference.

The career fair at the conference is a large draw for many students. There were over 300 exhibitors at the fair, including both companies and universities. This year, the career fair was spread over two days, with several hours each day. Before arriving in Austin, several students had interviews scheduled with companies who do not recruit at Iowa; within a few hours at the career fair, even more students scheduled interviews. A few students received, and accepted, job offers from this career fair. The overall success for Iowa students means that we will continue to encourage attendance at this conference in the future.

The final primary component of the conference is the sessions. There are numerous sessions that students and professionals can attend, on a variety of topics. These range from technical to professional to information sessions about a company. For example, several of the students attended a session called "Advice from the Corner Office", where women executives from Exxon Mobile shared their experiences as a woman engineer in leadership over the years. Some also attended a panel of women from Boston Scientific to learn more about the company. It was also very exciting to see one of the SWE UIowa alumni who graduated just last December on the panel. These sessions are just a small representation of the opportunities at the conference.

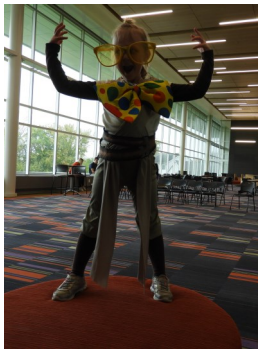
Since the WE17 Conference was such a success, the SWE section is looking forward to the upcoming conferences. This spring, the section is expecting to send about 20-30 women to Milwaukee, WI for a WeLocal Conference. Then, next fall, the WE18 Conference will be held in Minneapolis, MN. Hopefully, with the close proximity, even more students from Iowa will be able to attend and find jobs next year!

Kids Day Camp

By: Andrea Birtles and Chrissy Czarnecki

On Saturday, October 22nd, University of Iowa's AIChE chapter hosted their semi-annual Kid's Day Camp for kids from Kindergarten through fifth grade. The camp's focus is to give a basic level introduction to the children about chemical engineers do, and allowed them to try their hand at experiments that applied some simple chemistry and engineering processes. The participants were divided by age group, and the experiments were tailored to their level of understanding. The camp consisted of three activities/experiments, one of which was making their own raw cookie dough. The kids learned that by starting with just flour, milk, and a few other ingredients, a tasty product is created, which can be related to the idea that combining various atoms can create molecules. Another project that participants created was their own catapult, which was used to launch spiders into a spider web.

The catapult was a small scale model made from popsicle sticks, rubber bands, and small cups. The more popsicle sticks used resulted in different flight travels of the spiders, so kids were encouraged to try different catapult designs. This gave the children the opportunity to experience creativity and modifications with engineering design. Volunteers explained to the kids how these concepts can be applied to broader engineering projects, and the basic physics involved. The last activity was creating slime from a few basic ingredients: water, borax and glue. This experiment demonstrated a chemical reaction, as all the components together formed a solid, gooey substance. Chemical engineering students used this opportunity to explain the concepts of a Non-Newtonian fluid, as the slime was a perfect example of this.



During a small break in the program, a Halloween experimental demonstration was performed for the kids outside. By combining a few common chemicals and using yeast as a catalyst, a mixture was created in a caldron. As the chemicals reacted, the product expanded, and created an exothermic reaction that made a foam substance. This is commonly known as "elephant's toothpaste." The camp was very successful and the kids had a lot of fun. We look forward to the next Kid's Day Camp, which will take place in Spring 2018, and will have a theme of Earth Day.

AIChE National Conference

By: Rachel Seibel

On the weekend of October 27-October 30, the American Institute of Chemical Engineering National Student Conference took place in Minneapolis, Minnesota. The conference kicked off with an inspirational keynote speech given by Bernard Harris regarding his journey to becoming an astronaut. Dr. Harris's speech provided an amazing atmosphere and momentum to start the conference. The numerous workshops and presentations given at the conference allowed all the attending students to find something to participate in. Our chapter gave a workshop presentation on How to Run a Successful Kids Day Camp courtesy of Emmy Moore, Madison Murhammer, and Lizzy Zimmerman.

In addition to the workshop, many of the students attending gave presentations regarding senior design projects and research the students participate in on campus. The presenting students received numerous awards. Andrea Diaz, Carrie Lindberg, Nicole Loch, and Austin McKee received the Safety & Health Division National Design Competition Award for Inherently Safer Design. This award was also presented to Will Dougherty, Carson Hemphill, and Vincent LaPelusa, in addition to the Jack Wehman SAChE Team Design Award for Overall Safety.

Furthermore, some of our students received individual awards. For instance, Lizzy Zimmerman, our chapter president, won the Donald F. & Mildred Topp Othmer National Scholarship Award and Adam Weis earned the Donald F. Othmer Sophomore Academic Excellence Award.

Not only did our chapter members go above and beyond, but the entire chapter was recognized through the Outstanding Student Chapter Award for the 13th consecution year.

The conference was a weekend to remember as it provided students the opportunities to gain networking connections, broaden their horizons, and be recognized for their effort and excellence as chemical engineering students. With such an amazing national conference, we cannot wait for the regional conference this coming Spring at Oklahoma State University.

Nanoparticle Drug Delivery

By: Sarah Hoadley

Chemical engineering is an incredibly broad discipline. At this second, there are advancements being studied in energy, environment, polymers and pharmaceuticals, as well as other areas of science. There is a whole world full of opportunities for chemical engineers. One upcoming field with unlimited possibilities is drug delivery. A specific aspect of drug delivery that is gaining attention is the use of biodegradable nanoparticles. This is an important area of chemical engineering due to the advancements in medicine that could be made.

Nanotechnology is not an extremely new field, however in recent years it has started taking off. It is now being used in many different medical areas, including drug delivery, therapy, diagnosing, and even cell repair (Nanomedicine). Nanotechnology is exactly what it sounds like. It is "the science and technology of small things" in particular things that are less than 100 nm in size." (Rathbun, Lynn, and Nancy Heally). One product of nanotechnology advancements is biodegradable nanoparticles. Biodegradable nanoparticles are becoming more widely available for medical use. Since particles are on a similar size scale to viruses, an assumption was made that they could be "capable of enhanced interaction with cell membranes and proteins (Mahapatro, Anil, and Dinesh K. Singh, 55)." The small size also allows nanoparticles to "deliver small molecular weight drugs (Mahapatro, Anil, and Dinesh K. Singh, 55)." The particle's ability to move throughout the body makes it ideal for targeted delivery especially when combined with its improved controlled release potential. They "effectively deliver the drug to a target site and thus increase the therapeutic benefit, while minimizing side effects (Soppimath, Kumaresh S., et al., 1)." Instead of taking a pill and releasing the drug into the blood stream where a percentage is always lost, the particles can carry the drug to the target area before releasing it. This allows a much higher percent of the medicine to reach the affected area, and it also lowers the risk of the medicine interacting with the body in the wrong place.

One specific area of research that focuses on the use of these nanoparticles, is cancer vaccinations. The particles have been found to have several advantages over more traditional delivery systems including: targeting, response stimulus, pathogen mimicking, and sustained release (de Barros, Cristina Maria, et al., 202). This makes them ideal to battle tumors and other cancers. "Surgery and radiotherapy cannot address the problem of metastases, and chemotherapy is often limited by its highly toxic side effects and the capacity of tumor cells to develop multidrug resistance" where as cancer vaccines delivered with microparticles "promote enhanced cellular immunity, a key requirement in achieving antitumor activity" (Ahmed, K.K., Geary, S.M. & Salem, A.K, 220). The particles are a safer alternative that help the body build immunities rather than just destroying the cancer cells and building no resistance.

Chemical engineers are at the front of these advancements. Major factors in the success of the particles are the "size, shape, surface properties, drug loading and release (Zhang, Junwei, and Mark Saltzman, 2)." All of these factors combined "are critical determinants of the fate of the delivery vehicles and the efficacy of the treatment (Zhang, Junwei, and Mark Saltzman, 2)." Chemical engineers are on teams that design the particles as well as determine the loading capacity. They are involved in every step. In one of the pharmacy labs on campus, a chemical engineering graduate student is working with a team of doctors to determine the ideal particle loading capacity for a medicine they develpoed. It is an exciting opportunity for medicine in the future. Nanoparticles have the potential to revolutionize drug delivery.

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Chemical Engineers in the Production of Mammalian Cells

By: Esmeralda Orozco

Chemical engineers are heavily involved in the biopharmaceutical industry. The biopharmaceutical industry is the industry responsible for the production of medical drugs and cell cultures for patient treatment in hospitals. Biochemical engineers, in particular, work to improve mammalian cells. Mammalian cells are isolated tissues that are cultivated, or grown, outside a living organism in fermentation chambers.[1] Bioreactors, or fermentation chambers, have enabled the mass production of mammalian cells under controlled conditions. Mammalian cells are particularly important in the production of vaccines, antibodies, and stem cell therapy.[1] Chemical engineers are responsible for making these therapies easily accessible.

As previously stated, mammalian cells are important in stem cell therapy for cancer patient treatment and the production of vaccines. The American Cancer Society estimates that there will be nearly 1.8 billion new cases [of cancer patients] in 2017.[2] With the increasing rate in cases of cancer patients, human mesenchymal stem cells (MSCs), a form of mammalian cells, are being transplanted into cancer patients to directly target cancerous cells. MSCs are cells that can self-renew and increase rapidly in numbers to help aid healthy cells.[3] Mammalian cells can also be used to treat other cancers, such as leukemia, a cancer that targets blood cells, in the form of bone marrow. Sasaportas et. al found that MSCs taken from a patient's bone marrow are easy to obtain and can multiply quickly when cultivated under controlled conditions outside the patient's body. The cells are then returned to the patient's body to help treat the cancerous cells.[3] These stem cells allow the regeneration of healthy cells. In addition to cancer therapies, cell cultures are also used in simpler practices such as the production of vaccines. As children, most of us received certain vaccines to help fight viral infections. Viral vaccines are produced at a large scale against viral infections such as polio, mumps, measles, rabies, and hepatitis B.[1] For example, the influenza, or flu vaccine is one of the most common uses of cell cultures, with approximately 500 million doses.[4] The flu shot helps prevent you from getting sick in the near future.[5] Engineers develop complex and practical medicines that benefit everyone on a daily basis.

Chemical engineers not only help in the advancement of medicine, but they also seek solutions to the limitations of mammalian cell production. Bioreactors in which batches of cell cultures are produced are the most common because they are the most efficient and maximize the amount of cell cultures produced.[6] Though bioreactors are efficient, the cost of production and maintaining a manufacturing plant is in the hundreds of millions of dollars.[5] These expenses have led engineers to find alternative methods to reduce costs. Some proposed methods include single-use equipment processes and continuous processes.[5] Single-use equipment processes, as

Chemical Engineers in the Production of Mammalian Cells (cont)

the name suggests, occur in equipment that can be disposed of after a single use. These would allow for "a higher degree of operational flexibility, lower capital investment, and faster turnaround time."[5] A faster turnaround time means that there would be a lesser amount of cell debris, or dead cells, in the product.[4] This further means that the overall product quality would be higher.

Mammalians cells have been at the center of biological research since the 1940s. Chemical engineers, along with efforts from the medical and chemistry departments, have aided in the further development of cell cultures. Chemical engineers have also been responsible for ensuring product quality and addressing limitations that arise during production.

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Earth's Energetic Future

By: Nathan Jarvey

In 2015 alone, the United States emitted the equivalent of 6.566 billion tons of carbon dioxide gas into the atmosphere (EPA). This amount of pollutants would be considered incredibly large if it wasn't only 15% of the global emissions, placing the not-so-grand total at roughly 45 billion tons of gas annually. Based upon global statistics from 2005-2014, that elevates the amount of CO_2 in the atmosphere by 2.11 parts per million each year, a rate of increase this planet has never faced, nor is capable of incurring for much longer without some drastic environmental changes (Pro Oxygen). The issue of the global environment has only been magnified by the aftermath of the sequential hurricanes Harvey and Irma, as well as the rampant wildfires raging throughout the western half of the continental U.S. No solution to this pressing issue is simplistic, but many chemical engineers are working continuously to design green energy solutions by undertaking many of the technical challenges of preventing further emissions and/or removing the presence of greenhouse gases already in the atmosphere. Their work is vital to both the continuing advancement of alternative energy technology and the future of the planet itself.

From the perspective of a chemical engineer working to address this issue, one question stands above all: what can be done to or with carbon dioxide in order to remove it from the atmosphere or prevent it from reaching the atmosphere in the first place? Solutions under the umbrella of Carbon Capture and Storage (CCS) so far seem to vary (CCSA). The most widely used solution is the use of compounds where the ammonia molecule (NH_3) has one or more of its hydrogens replaced with an organic group, also known as amines, to cause a reaction between CO_2 and itself (Jacoby). These reactions gather much of the CO_2 into a relatively small area and allow the

Earth's Energetic Future (cont)

engineers to move it to a more desirable location, such as deep underground caverns far away from anything which could accidentally expose them to the surface (Jacoby). While this does reduce the amount of carbon dioxide emitted by a significant margin, it costs roughly 30% of the energy that is produced by a given large-scale plant to keep the material heated to a temperature where it can react properly (Jacoby). Thus, while it has proven to be a reliable solution over the course of the decades it has been in place, it most certainly is not an optimal solution. Chemical engineers are currently developing alternative solutions, though most have not been able to be expanded enough for widespread commercial use yet. In the future, however, chemical engineers will likely help create faster and less energy-intensive solutions by using other catalysts to promote various chemical reactions which remove carbon dioxide from both the atmosphere itself as well as power plants (Bunje and Extavour). An alternate solution to that is making use of the carbon dioxide that's gathered in multiple ways, such as supporting plant life (which turns carbon dioxide into oxygen using photosynthesis) or simulating that reaction using synthetic reactors (Bunje and Extavour).

All of the above methods can be used to help eliminate CO_2 emissions, but what about removing the need for those technologies beyond the carbon dioxide already in the atmosphere entirely? Even with the policies implemented by the EPA in recent years, fossil fuels still make up roughly 81% of the energy produced annually in the United States (IER). To mitigate the negative environmental impact of fossil fuels, chemical engineers, as well as other scientists and engineers, are developing products and processes which produce electricity without the need for burning any of the greenhouse gas-producing fossil fuels. If the U.S. were to be even somewhat close to 100% alternative energy production for an individual day, there could be days like Germany had on May 8th, 2016, where citizens were actually paid to use electricity because so much was produced (Geier). Of course, the U.S. uses a significantly higher amount of energy on a daily basis than Germany, but with the vastness of the continental U.S. and the multitude of options for green energy, the potential is most certainly there. One future option is that of solar roadways, literally roadways made of or topped with a layer of solar panels, which mitigate the issue of taking up a lot of useful space by simply being applied over preexisting roadways while sacrificing overall efficiency and cost reductions. While not currently economically plausible en masse, as proven by France's implementation of 1 kilometer of single-lane solar roadway in Normandy, there is promise for the future (Anthony). Based upon anticipatory figures, France has spent roughly $5.2 million on the Normandy roadway, and is only expected to produce enough electricity to power the street lights for a singular village of about 3,300 inhabitants (Anthony). Considering this is just one small designation of one of the many areas of alternative energy and the speed at which new technologies are being developed, the future of green energy under the guidance of chemical engineers and their colleagues looks to be rather bright.

As a whole, chemical engineers have a massive set of problems to solve surrounding the environment, problems which under today's technology likely remain implausible to solve in an economically smart manner. However, as processes and technology improve over time and new solutions are invented and developed, not only is there potential for them to literally remove the greenhouse gases from the atmosphere, but they can also prevent further damaging chemicals from reaching the ozone layer. To coincide with the positive environmental effects, their efforts will likely provide much of, if not, the entire world with less expensive, more effective, and safer energy. Chemical engineers in the sector of alternative energy may be a relatively young development, but considering the difficulty and the importance of the challenges the sector presents, it will likely be the field of the future for chemical engineers as well as many more.

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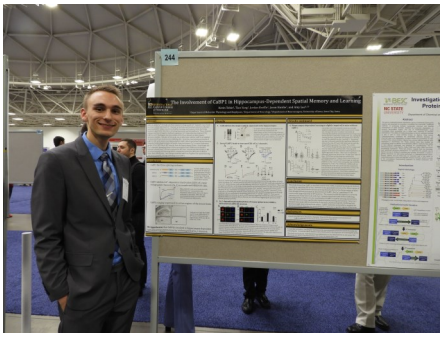
My Research Experience

By: Kevin Tobin

My fascination with STEM subjects led me to pursue a degree in chemical and biochemical engineering at The University of Iowa's College of Engineering. I decided to attend The University of Iowa because of its reputation as a research university. I started applying for positions in research labs as quickly as possible once arriving on campus and have been working as a lab assistant ever since.

I have been working in Dr. Amy Lee's lab in the Department of Physiology in The University of Iowa's Carver College of Medicine for over two years. While I do enjoy studying chemical engineering, I decided to pursue research outside of chemical engineering to obtain a broader scope of scientific knowledge. While working in this lab, I have primarily shadowed Dr. Tian Yang, a post-doctoral researcher, performing experiments and collecting data. My work ultimately helps her publish papers investigating the role Calcium Binding Protein 1 (CaBP1) in the nervous system. To me, one of the most fascinating systems in the human body is the nervous system. Further understanding of how the many intricate mechanisms within the nervous system work could lead to more advancements in making a safer and healthier society.

While working with Dr. Yang, I have worked with several pharmaceutical drugs that blocked certain biological pathways. One particular drug that I worked with regularly was isradipine. We used isradipine as an antagonist for L-type voltage-dependent calcium channels (Ca_v1) to determine if CaBP1 regulates calcium dependent inactivation of Ca_v1 channels. This negative feedback mechanism is important to restrict excessive calcium influx of the cell, which could be pathological. We only administer this drug to primary neuron cultures in lab, but it is interesting to me to think about how this drug, normally used to control high blood pressure, could potentially have an effect in organs in the human body where Cav1 channels are expressed, such as the heart, eye, ear, and brain. What effects could it have on an organism other than its intended effect? Are there ways that we could increase the specificity of the drug to reduce side effects? Would this involve a different design of the drug? Would it involve a different route of delivery? My desire to answer these types of questions and my interest in finding solutions to potential problems is what drives me to continue my education and work in research. I am applying the University of Iowa's graduate school program to obtain a Ph.D. in Pharmaceutical Sciences. Designing and conducting experiments that could help the general public would be extremely gratifying and, to be honest, sounds exciting.



International Paper Co-Op Experience

By: Emmy Moore

In February of my junior year, I accepted a position as a process engineer intern at International Paper's Cedar River Mill in Cedar Rapids, Iowa, for the 2017 fall semester. This experience has been invaluable, and has greatly improved my communication and problem-solving skills.

My first three months overlapped with the spring 2017 co-op student, so I was able to learn a lot about the plant process, as well as the daily/weekly tasks required of me. I was then informed of the projects I would be taking over from him, including a chemical trial and a machine downtime automation project.

In addition to the two projects from the previous co-op, I have had the opportunity to be involved in numerous activities throughout the mill. I was able to design all of the recruiting banners for career fairs and recruiting events, as well as participate in recruiting at the Iowa Career Fair. This was a great experience, as I was able to see things from the opposite side. Instead of just knowing what it's like to be a nervous student on the job hunt; I was able to see things from an employer's perspective, and learn what they look for in a strong candidate and what kinds of things can get your resume discarded without a second glance.

My big project for my co-op experience is ongoing, and given to our mill directly from corporate. Cedar River Mill was chosen because it is the largest 100% recycle mill in the western hemisphere. The purpose of the project is to collect as much data as possible about the incoming fiber qualities for the recycled containerboard we receive. This involved renting an expensive fiber analyzer unit, installing it, learning how to operate it, and collecting samples every four hours to be analyzed. No one at Cedar River Mill had ever seen or used one of these units, so I was tasked with becoming the mill expert on how to run it, how to fix it when it wasn't working, and how to compile the data to be analyzed. Every two weeks, I have a conference call with corporate and International Paper Technology statisticians to discuss the progress of the trial and the quality of the data.

I have learned so much from my time at Cedar River, and while it isn't directly related to my coursework in chemical engineering, it will be utilized in my everyday life from now on. My communication skills have grown tremendously, as have my problem solving skills. I have had to successfully communicate with vendors, plant operators, mill management, corporate managers, and people everywhere in between.

Aside from the skills I have acquired from my time at International Paper, I have also met amazing people and forged lasting friendships. The people at Cedar River Mill definitely made a lasting impression on me, and I hope to stay in touch with them. Besides doing meaningful work for International Paper, the people at Cedar River Mill made it that much easier to look forward to going to work each day.

My Experience as a Marketing Intern

By: Madison Murhammer

I knew early in my college career that I did not want to work as a process engineer. Next fall I plan to attend law school to prepare for my future career as an intellectual property attorney. That is the great thing about a degree in chemical engineering - you develop skills that can be applied to a wide variety of professions.

The summer after my sophomore year, I was a biopharm manufacturing intern at Zoetis, Inc., which manufactures animal pharmaceuticals. This was a very interesting experience, but it was not very relevant to my future career as an attorney. So as I was looking for internships for the summer after my junior year, I was a little more selective. I wanted an experience that would help to prepare me for my future career. I was really excited when I received an email advertising an opportunity to be a marketing intern with the University of Iowa Research Foundation (UIRF). I applied and was fortunate to be offered this position. UIRF is the technology transfer office for the University of Iowa (UI) and has the purpose of facilitating the commercialization of UI inventions through licensing and new venture formation. As a marketing intern, I was tasked with creating the marketing materials in order to market the various inventions created by researchers at the University of Iowa. I worked on approximately 20 different projects during my time at UIRF; these projects consisted of a wide variety of inventions, including a novel class of compounds used to treat opioid overdose and educational videos for young worker safety. For each invention, I had three main marketing materials to create: a technology summary, a company list, and a market letter.

I would start each project by conducting basic market research about the invention and the industry problem it aimed to solve. This research was completed by utilizing the UI library databases and reading through the patents and patent applications that were available. Using this research, I wrote the technology summary, which was a one-page non-confidential summary containing background information, a summary of the novel technology, and the advantages of the invention. My chemical engineering education was very useful for writing these summaries. I had to be able to read and interpret the technical patents and then simplify this information into a description that would be interpretable by a business manager. Next, I compiled a list of approximately 100 companies that might have been interested in licensing the technology and found 1-2 contacts from each company. Then, I emailed out a short market letter to the companies, which provided a link to the non-confidential technology summary. The companies would either respond saying they had no interest in the technology or they asked for further information.

This experience was very useful for my future career as an intellectual property attorney. I learned how patents are structured and became a lot more skilled at being able to interpret their technical content. This position also helped to improve my communication and research skills. It is important that I am able to communicate (both verbally and written) complicated ideas to people without scientific backgrounds. Even as a process engineer, it is important to be able to communicate technical ideas to management.

It was very interesting to be able to venture out from engineering and to work on the marketing side of things. I was very lucky to have this summer experience with UIRF. I think it is important that everyone with a chemical engineering degree be open to these opportunities outside of process engineering. The problem solving and technical communication skills that we have developed through our coursework have prepared us for a variety of careers, from process engineering to patent law.

Acknowledgements

Thank you to the AIChE Officers for their hard work and contributing efforts to make our AIChE Student Chapter a successful organization.

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Your help is much appreciated!

Interested in speaking at professional seminar? If so, then contact AIChE Student Chapter Vice President at kyle-mccarthy@uiowa.edu or Student Chapter Advisor Prof. David Murhammer at david-murhammer@uiowa.edu for details and availability!

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