Industrial and Operations Engineering

Industrial Blueprint

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From the Editor

Hi IOE,

It is hard to believe that this semester is almost over! I tried to include articles in this issue that would assist you with selecting courses for next semester (especially those pesky non-IOE engineering courses) as well as more internship experiences for those of you needing advice in that area.

Good luck with the rest of classes!

-Alex

Supplementing Your Education

By Brandon Rosenblum

In order to get the most out of one's college learning experience, students should work in the field that they want to pursue over the summer. Although this may seem obvious, getting an internship adds a lot more than just resume value. The IOE classes that we take give us the technical skills we need to adequately perform job tasks but a lot of the supplemental learning comes on the job. If you have any idea what you want to do, working in that field will be the quickest way to tell if you will like it or not. This summer I worked for an environmental engineering consulting firm, and was able to apply what I learned in my IOE 265 class to real world problems. In addition to applying my technical skills, I was able to deal with clients, visit a wastewater treatment plant, and take samples in the field.

Another suggestion I have to add value to the IOE knowledge you learn in college is to take classes that you find interesting, and not just the easiest classes. Once you graduate college, the chances you have to take classes taught by a professional about anything you want in the world diminishes. Last year I took a class in the School of Information and learned more about the future of technology and information than I could have ever imagined. I also got to work with a new group of people, other than the few hundred kids that are studying IOE, in my class. The intellectual breadth requirement allows you to take classes you like, and there is even the option to take them pass/fail if you really want to take the class but the workload is too difficult. I am hoping to take the rest of my intellectual breadth classes abroad next semester to gain international experience.

Inside this issue:

CEE 211: Statics and dynamics

By: David Klippel

This article is about Civil and Environmental Engineering 211, a class I took during my winter semester sophomore year. It satisfies 4 credits of the non-IOE engineering course requirement. The course is divided into two parts, statics and dynamics, focusing primarily on statics. The statics portion starts out with a basic review of physics 140…vectors, force, moments, etc… It uses these concepts and applies them to basic real world situations, such as distributed loads on a bridge.

If you can manage to wake up for an 8:30 am class everyday the class is worthwhile. It is 4 lectures a week, and 1 recitation done by the GSI on Friday that is essentially an optional review, but I would recommend attending them as they help with the homeworks. The homework is assigned weekly and is usually 5-6 questions. They are straight forward if you follow the sample problems in the textbook. The exam set-up is typical, 2 midterms and a final. A cheat sheet is allowed. If you do your homework the exams are fairly easy, especially considering the fact one question from each exam is taken from the homework directly. My professor was professor Maxwell. He's a nice guy and a helpful teacher. Overall the course is worth taking.

Accounting 471: Principles of accounting

By: Jared Kott

I am currently taking Accounting 471: Principles of Accounting. This class is ideal for Industrial and Operations Engineering majors as it is an approved Non-IOE technical elective and satisfies that requirement.

Although I am only one month in, I can already see the benefits in this class. This class gives you a general overview of a business' financial processes, while also teaching you about financial statements. I've actually already been able to apply what I've learned to the real world when dealing with my Comcast bill, as they included expenses incurred over the first 13 days of the next month, and at first I didn't realize where the extra charges came from until I calculated out how much the cost was per-day.

Now for what everyone wants to know, is this class hard and is it fun? A negative to the class is that homework assignments are due every class period (2 times a week) but you do get to drop 5 of them, and you will get full credit on the assignment as long as you complete it. The homework isn't too time-consuming, about 30 minutes per homework. The exams aren't difficult at all; it is mainly applying basic mathematics. The professor, Jefferson Williams, is a very nice guy and really cares about his students. Also, the class can be fun if you really do like using basic mathematics in financial equations. Lastly, the book is required as you get your homework from it, but it only costs about $30 online and the professor supplies you with the solution manual. In the end I definitely recommend this class to any industrial and operations engineer and to other engineers as well.

MATSCIE 220: Intro to materials and manufacturing

By: Michael Bruk

I took Materials Science 220 last semester with Professor Love. This course can be used to fulfill 4 credits of the non-IOE engineering course requirement. The course begins with a brief recap of basic general chemistry and bonding before diving into the heart of materials science: crystal structures. Professor Love did an excellent job of providing real world examples and explaining in detail how the study of materials science (i.e. how manipulating the structure of a material at the atomic level can provide a set of desired characteristics) is both valuable to the production process and economical. For this reason I believe this course is worthwhile for IOE students.

As a whole I would classify the first half of the course as relatively slow-paced, which makes it ideal to take this course with difficult first 7 week IOE courses. This practice of pairing Materials Science 220 with intensive 7 week courses is very common, and in fact is even suggested by the chemical engineering advisors (who suggest pairing this course with P-Chem).

Don't be fooled, however. The pace of this course picks up dramatically after the first exam, to the point where a chapter or more of the textbook is covered weekly. At times the pace of the course can feel overwhelming, but reading the lecture slides before class and skimming the textbook helps greatly.

Homework is assigned and collected weekly. The problems were typically very easy and directly from the textbook. As long as you pay attention in class and skim the textbook these should be easy points to earn. The 3 quizzes given throughout the term are almost identical to the homework problems, so if you spend an appropriate amount of time on the homework these should be easy as well.

We were allowed to bring in one "cheat-sheet" for each midterm (one-sided for the first exam, two-sided for the second exam) and two for the final (double-sided). This greatly alleviates the pressure to memorize all the formulas and content covered in class. The exams were fair and often reflected the homework sets.

Overall this course serves as a great supplement to any IOE student's education. The emphasis on concepts rather than direct computation may be well suited for students who would like a break from the quantitatively intensive IOE courses. It also is ideal for students who are taking first 7 week IOE courses, since the course is very slow-paced during this timeframe.

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Get Lucky in hong kong

By: Devin Chan

I think, as most of my fellow IOEs know, we have a pretty flexible schedule that allows us to study abroad, due to being able to take our tech electives, general credits, etc. abroad. I think the real issue is that most people won't take advantage of that opportunity.

Having gone through the process of applying, I can see why a person might decide against it. You might think you don't have enough credits to make up a full semester abroad (I can't take an extra semester off). You might be slightly depressed by the fact you did not get your first choice of going to sit next to the Eiffel Tower waiting to meet the undying, passionate love of your life in Paris. You could just be nervous about leaving everything behind, save a few pictures of ol' mom and pop, and your secret teddy bear Alfonso you carry with you everywhere. However remember, it is a normal process that everyone who has thought about going abroad has gone through at some point. I still remember before boarding the plane the sudden urge to go back to Michigan and its familiarities. All of those urges were gone in a span of two weeks. What I'm really trying to convey is whatever doubts or perceived setbacks you have now, they will be dashed once you're there.

"You have the opportunity to test your limits, challenge your global perspective, and experience a new culture along the way."

I have NEVER met a single person who has studied abroad that has NOT enjoyed their experience there. You have the opportunity to test your limits (particularly your palate if you go to Asia, in a good way); challenge your global perspective (i.e. being the obnoxiously loud American); and experience a new culture along the way.

I studied abroad at the Hong Kong University of Science and Technology (HKUST). Studying abroad gave me an ocean view outside my dorm room (slightly better than my view of the CC Little Bus Stop from my house, though convenient). It gave me the opportunity to jump 60 feet off a cliff in the Philippines – broken leg, cast and all. It gave me the honor of being called the "hero cripple" by the other tourists, and being questioned as to whether I was actually Filipino, after having been asked by 16 locals (yes, I counted). It gave me friends who share that same single experience that can never be replicated, friends that extend to all borders – from France to Singapore. This even includes one person who laughed while I was struggling to walk through the sand on crutches. You know who you are.

But more importantly, I would never have appreciated Daft Punk's significance to the French, nor Swedish House Mafia to – go figure – the Swedish. Or even the NSYNC-throwback music of Cantopop and K-pop to the local Hong Kongers and Koreans.

So if nothing else, go for the opportunity of learning new things that can give you courage to try new things, and will change your life. In my case, I now "Get Lucky" listening to much more disco tech music, while having adopted some of my French friends' (terrible) dance moves.

Medline industries, inc. internship

By: Emily Burns

This past summer I worked at Medline Industries, Inc. as an industrial engineering intern. Medline is a large privately held medical manufacturer and distributer. They produce a variety of products and have locations throughout the world. The division that I worked in – the Sterile Procedure Tray division – packaged custom sterile trays to be used in hospital operating rooms. The building that I worked in consisted of a receiving dock, a large warehouse, and an operation-level clean room. The custom trays were packaged by assembly line in this clean room. Because Medline produces custom trays for so many different hospitals and procedures, their assembly line is run with people instead of machines to have increased flexibility.

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As an industrial engineering intern I was able to work on many different projects. This is an opportunity that is not offered by many companies and was extremely beneficial. I got to participate in process improvement projects in the warehouse, a LEAN event, time studies and analysis in the production room, and work heavily with an outside consulting company. This diverse experience was extremely beneficial and I would recommend choosing a company that has this option.

The most valuable thing that I learned this summer is the importance of establishing a relationship with the plant operators. The people that perform the process that you are studying and trying to improve have the best suggestions. In addition, they are the ones who will need to implement any changes you suggest. Establishing a relationship with the operators is the first thing that you should do upon entering a new factory environment. Medline was extremely focused on having workers submit ideas for process improvement. This culture made it extremely easy to get ideas and feedback from the people working. The second most valuable thing that I learned is to never think about industrial engineering as eliminating jobs. If you frame your work in this way you will build enemies in the place that you are working. An alternative solution to firing people to save money is to simply not fill positions after people are fired for other reasons. This attitude is important to keep in mind when interacting with the people who could view your improvements as a threat.

Industrial engineering can be applied to many industries. Working in a manufacturing setting gives industrial engineers the ability to work on ergonomic projects, LEAN and six Sigma projects, and many other things. Working for Medline showed me the value of working with the employees who do the tasks that you're trying to improve. It also taught me how to frame project results in a way that promotes their success.

Johnson controls internship

By: sarah tommelein

This past summer, I interned at Johnson Controls in Plymouth, MI. Johnson Controls has three business units; Automotive Experience, Building Efficiency, and Power Solutions. I interned in the quality department within the Automotive Experience business. My main responsibilities were to implement a new auditing process to about 20 North American plastic injection-molding plants and then introduce the plants to the new database that would go along with the new audit process. The new auditing process was called "Layered Process Audits", which essentially makes sure that every level of management at the manufacturing facilities were performing the audits. This would include all the plant managers all the way down to the line workers. The database that went along with the new auditing process was implemented to ensure that all of the plants had a consistent way

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to store and record all of their data. When I first started my internship, I visited a few different plants and every plant was conducting their audits a different way, so it would be hard for Johnson Controls to compare the different plants based on quality control standards.

Through my internship, I was able to learn a lot about the automotive industry. Johnson Controls, being an automotive supplier, I was able to understand exactly how complex of a process it is to manufacture a vehicle. Every single piece of a car has to be manufactured perfectly, or else it becomes scrap and won't be used in the final product. The goal of the new auditing process that I was implementing was to take precautionary steps initially to prevent scrap or "bad" products before they come off the line, instead of taking reactionary steps after the part already comes off the line and could already be scrap. Having high scrap rates would be a waste of money for the company since the part is not good and can't be used, but already used some of the raw materials.

Overall, I thought my internship at Johnson Controls was a very good experience. I was able to meet many new people from all over the country, since I had to travel to difference plants. I think it was also good to get some professional work experience to see if the automotive industry or quality is an area that I would want to pursue after I graduate. Overall, I think that everyone should take the opportunity to intern during a summer to get some work experience and use what we have all been learning in school.

ROUNDABOUTS

By: Christine Dolikian

My entire life has always operated on "Michigan time."Though not a problem now, I was continuously running late before I started here at U of M. As a result, I have given a lot of thought to how traffic could be moved more efficiently on those days when I am running late and stuck in traffic.

One promising means to increase efficiency is the roundabout. The roundabout is an alternative to the 4 way stop that has the potential to increase traffic flow. But do they really increase traffic flow through an intersection? The people on MythBusters put this to the test.

On MythBusters, they first set up a realistic 4 way stop intersection. They allowed cars to drive through the course continuously for 15 minutes and counted the number of cars that passed through the intersection. On average in the 4 way stop course, 385 cars passed through the intersection in the 15 minutes. MythBusters then set up a realistic roundabout course. They allowed the drivers to familiarize themselves with the roundabout before testing so the results would not be skewed. The cars were similarly allowed to drive continuously through the roundabout course for 15 minutes and the number of cars that passed through the intersection was recorded. On average, they found that 460 cars passed through the roundabout intersection in the 15 minutes. The roundabout showed an impressive 20% improvement from the 4 way stop.

When roundabouts were put to the test, they proved to be more efficient in traffic flow than a 4 way stop. For this reason, roundabouts are now spreading to many countries including the United States. A roundabout can be found in Ann Arbor at the Geddes Road Interchange on U.S. 23. Go check it out!