

INDUSTRIAL BLUEPRINT

APRIL 2013

BROUGHT TO YOU BY ALPHA PI MU AND IIE

FROM THE EDITOR

Hello IOE,

The year is almost over and finals looming. We are all putting final preparations on summer plans, so if you are doing an internship, study abroad, or anything else, have fun and learn a lot, but do not worry; The Industrial Blueprint will be back next Fall with a new editor.

This is the final Industrial Blueprint issue of the Year. This issue is packed with content. This includes plenty of course reviews, information about different organizations on campus, interesting tips, and there is even an article about how to travel from the Beyster Building to the Cooley Lab without stepping foot outside. If you have not yet registered, or are not fin-

ished, I highly recommend consulting the course review section. Additionally, if you are looking to become more involved in the University, the College of Engineering, or within IOE, I recommend looking at the section with information about organizations on campus.

I hope you have enjoyed the past few Blueprints. I have certainly enjoyed reading and editing this fine newsletter. I will certainly enjoy reading and writing for Blueprints in the future. Good luck on exams and have a spectacular summer!

Enjoy,

Jonathan Morof

NETWORK NETWORK NETWORK...BUT HOW?

By Natalie Naruns

I'm sure you've heard people talk about how Michigan has the largest alumni base. But where are all these alumni? How can we connect with them and how can they help us? The answer is to take initiative.

When doing my internship search for the summer after my junior year, I knew the location and company would be very important. This, I hoped, would make my life a little easier by finding a company I wanted to convert to for a full time position and help me build connections in my post-graduation location preference.

But to begin, I had no idea *what* I wanted to do. Having not done an internship or technical job after my sophomore year, I just didn't know what was

out there. I liked IOE 310 but discovered that you need a PhD to do optimization work and that wasn't really going to get me a first internship.

Therefore, I used LinkedIn to contact about 25 people, mostly Industrial engineers, asking them about the routes they took. To send longer messages, I joined many groups on LinkedIn including Institute of Industrial Engineers, Wolverine Networks, and University of Michigan – Norcal/SF Bay Area. I also contacted 2nd connections and built up my connection base with people I had met in my previous job as a coach/head lifeguard at an affluent country club.

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To my surprise, most people responded! I realized if people are “linked in” they are there to connect, meet people, and help. This was awesome! I asked about their career paths, other IOE routes and advice for finding an internship. I received tons of feedback about consulting, data analysis, product management, manufacturing, etc. Some were even willing to turn in my resume. With feedback from specific companies, I had a better idea of how to approach any interviews and what to expect out of an internship. I had to make sure it wasn’t going to be a “coffee-fetching” internship! I kept in touch with some of them through the interview process as well as during my internship.

It turned out Program Management was a great path for me! I was lucky to be placed in a PM

intern position in the Bay Area last summer and be able to return as a Technical Program Manager after graduation.

If you’re on LinkedIn, there is a group for IOE at the University of Michigan. Besides LinkedIn, there are a few other resources you can use to connect with Alumni. Did you know Michigan has its own alumni group called inCircle? Check it out! My advice would be to attend as many conferences or presentations that interest you and don’t hesitate to introduce yourself after! There are so many opportunities like these made available to Michigan students, so take advantage of them while you are here!

The moral I’ve come to is to “network when you don’t need it, so you have it when you do.”

THE BIG COMPANY-SMALL STARTUP QUAGMIRE

BY: HAN LIN YEO

In the midst of internship offers and rejections, many students come face-to-face with the dilemma of choosing between the “large, established firm” and the “small, anonymous startup”; this is a tough decision, but a good problem nonetheless. There is no right or wrong answer, but here are some factors you might want to consider:

Reputation and Brand Name

The perks of working in an established company could not be more obvious than the attention it garners sitting on the top line of your resume. With a relatively unknown firm, it takes additional effort to sell the company that you worked for. Explaining a business from scratch is not easy, both to recruiters and friends—who perpetually pepper you with questions.

Scope of Work

Established companies *usually* offer structured experiences, developed and tuned over years of hosting summer interns. The same may not be said of smaller or mid-sized ones, where you might be assigned to a wider variety of ad-hoc tasks. Structure has its merits, in that the work you do

would be more predictable and that you’re less likely to touch the copy machine, but it would also be difficult to gain experience outside the division you will be working for.

Fit

Unlike the two factors above, fit is an extremely subjective factor to take into account. And there’s usually an accompanying difficulty: you do not know what it’s like to work for either company. Still, the impressions formed by recruiters and interviewers should give you a clue on the type of people you would be working with. The onus is on you to decide which group you’d be more comfortable working with.

Interest

Personally, I consider this the most important factor of all. It would be beneficial to do an internship in a field you’re interested in, because it provides you with knowledge and experience that may be relevant when you interview for future positions.

Of course, there are other factors to take into account, such as salary and location. But if you’re having a hard time, both are probably good picks; just make the most of what you choose.

BEHIND THE CAREER FAIR

BY: ARIELLA ROSE

Being a committee chair for the SWE/TBP College of Engineering Career Fair that occurs annually in September was one of the most beneficial experiences of my college career so far. I truly believe that there is no better way to ensure yourself at least a handful of interviews than be a part of the team that puts on the event.

To be eligible to apply for a position as a committee chair, you must be a member of the Society of Women Engineers or Tau Beta Pi – The Engineering Honor Society. There is a fairly short application to fill out each February to be in consideration for a leadership role in this huge event. Each year, four directors are in charge, while the rest of the positions form committees. The committees are logistics, hospitality, volunteer, reception, publicity, directory and registration, and webmaster.

I was fortunate enough to be a member of the

directory and registration committee. This position allowed me to speak with representatives from almost every company that attended the fair. When each company arrived, they came to me at the registration table, where I explained to them what they needed to know for the day and pointed them to their table. Recruiters knew my face and would look for me to ask questions that they had. Many even knew me by name and would call me out in the crowd to come speak with them.

During the career fair, committee chairs still have the opportunity to speak with companies, who recognize and appreciate the work that they've done. Every one of us received a large amount of face time, which leads to interviews. If you want to get close with recruiters, there is no quicker way than a position like I had. I definitely recommend one of these positions for a great opportunity to get your dream job.

ALPHA PI MU: INDUSTRIAL ENGINEERING HONORS SOCIETY

BY: SARAH TOMMELEIN

Many students during their freshman and sophomore years get weekly emails announcing tutoring sessions held twice a week by a group called "Alpha Pi Mu". I was one of those students, also, but always thought Alpha Pi Mu was just another one of those many clubs that the University of Michigan offered and I would never know what they did.

It was an ordinary school day when I checked my email and I had one new email from Alpha Pi Mu, and it was not a tutoring email, so I thought I would open it up and see what it was all about. I learned that Alpha Pi Mu or APM was the Industrial Engineering Honors Society and only the top juniors and seniors were invited to be initiates. Learning that I was not only being invited to join this club, but I was also one of the top students in the junior class, I thought I would give this honors society a chance and attend the first weekly general assembly meeting the next week. At the first general assembly meeting, I soon learned what the APM Honors Society was all about.

Dinner is provided at every meeting, which is very enticing, but I would also have the opportunity to

take part in many events such as community service, social events, professional development opportunities, and tutoring sessions. Alpha Pi Mu seemed like the perfect opportunity to get involved outside of school. To become an official member, you have to go through two semesters of being an initiate. Every semester, each initiate must accumulate 10 points by taking part in some of the events listed above.

The general assembly meetings, held every few weeks, are about more than just dinners. Meetings usually start with an icebreaker activity and then it moves onto the main purpose of each meeting. The meetings this semester have included a mock networking session, a speech on engineering ethics, an introduction to Industrial and Operations Engineering research, and a supply chain workshop. I believe that anyone who has the opportunity to join APM should definitely join for the opportunity to meet other fellow Industrial and Operations Engineers and get involved outside of the classroom atmosphere.

DIFFICULT CONVERSATIONS – HOW TO DISCUSS WHAT MATTERS MOST

BY: JAMIE SANDERSON

The University of Michigan Shell Leadership Conference was held on February 2, 2013, at the Ross School of Business. One of the gifts Shell gave the students at the end of the day was the book, *Difficult Conversations – How to Discuss What Matters Most* by Douglas Stone, Bruce Patton, and Sheila Heen, copyright 1999, The Penguin Group, New York. Initially I was not very excited about reading this book, but then I decided if the people who put on the conference felt it was useful enough to give it to all of us, then it must have some merit. It was better than I anticipated. From my perspective, the goal of the book is to help people develop better communication skills in order to deal more effectively with others. The authors present an approach that describes the method they feel will most likely achieve satisfactory results when having to have one of those “difficult conversations.” They explain the process and provide examples. Towards the end of the book they include “A Difficult Conversations Checklist.” This is an abbreviated version of that list:

Step 1: Prepare by walking through the three conversations: sort out what happened, understand emotions, and ground your identity

Step 2: Check your purposes and decide whether to raise the issue

Step 3: Start from the third person

Step 4: Explore their story and yours

Step 5: Problem-solving

There were a couple of points that the authors made that I found especially interesting:

There are some situations that are unlikely to improve no matter how skilled you become in this process. The goal is to get better results most of the time.

A common perception, and one I think I personally previously believed, is that, in difficult conversations, it is better to “stick to business” and keep emotions out of it. The truth is that “... difficult conversations do not just involve feelings; they are at their very core about feelings. ... Engaging in a difficult conversation without talking about feelings is like staging an opera without the music. You’ll get the plot but miss the point.” (p13) I think this point is very important. Our feelings are based on our perceptions, and it is possible for us to negotiate or modify our perceptions. The example they give to briefly illustrate this is encountering a shark while scuba diving. Your first feelings could easily be terror and panic, because your perception is that the shark is an immediate threat. However, if your guide tells you it is a reef shark which never preys on anything as large as a human, your feelings may be less fear and more curiosity. Your perception drives your feelings.

Overall, I feel reading the book was worthwhile. I think simply becoming more aware of the dynamics of difficult conversations will help me improve how I deal with them. However, I believe (1) that truly implementing this approach will take a significant concerted effort and (2) that the process should first be tried in situations of limited importance. I definitely think these are skills that will improve with practice.

WORKING FOR IPE

BY: JENNIFER LIU

A lot of students want to study, work, or intern abroad during their college career. The International Programs in Engineering Office (IPE) is an on campus resource that helps students with this process. As engineers, sometimes it is hard to study abroad and still graduate on time- that’s why IPE has partnered with leading technical universities around the world!

I first got involved with IPE last year when I studied abroad in Berlin, Germany in the summer. I saw a job posting online (psst.. IPE is currently hiring summer peer advisors for 2013!) and applied. I was excited when I was offered the job. As a peer advisor, I was trained to be familiar with IPE’s policies and programs, and hold walk-in hours every day to help students with whatever they need. I work with about 6 other students as peer advisors and we help the 6 staff advisors with miscellaneous tasks around the office, pre-departure orienta-

tion, weekly fireside chats, social networking, etc. After a semester of working and learning about IPE’s other programs, I decided to study abroad again! This summer, I am going to Shanghai, China on one of IPE’s biggest and most popular programs. I know it is going to be an unforgettable experience and I am thrilled to have another great opportunity to expand my world knowledge.

Getting more involved with the College of Engineering really helped me see all the hard work the CoE staff puts in to everything they do. Our staff is tirelessly working on ways to give students the best college experience. There are countless opportunities at Michigan- especially for engineers. I would strongly encourage anyone to learn more about the different offices in the CoE and take advantage of these amazing resources we have!

THROUGH NORTH CAMPUS WITHOUT GOING OUTSIDE

BY: IAN FISK

Directions from The Bob and Betty Beyster Building to the Cooley Lab, without stepping foot outside:

1. Enter through main doors of Bob and Betty Beyster Building
2. Take a right as you pass through the lobby and proceed down the hall into the DOW building.
3. Follow the hall until the end and take a right through the first set of doors, then take a quick left through a single door labeled "stairs 3". Do not go out the last set of doors that lead outside.
4. Go up 3 sets of stairs and take a left through the door into the DOW building.
5. Follow until the end of the hall (in sight), then take a right at the sign pointing to GG Brown.
6. Proceed down the hall and take a right at the room numbered 1180.
7. Continue down the hall until it ends and take a right turn headed towards the EECS building.
8. Keep walking down this hall and take a left at the end.
9. Go through the doors headed towards the EECS building and continue to stay in this hall as it takes some quick turns left and right.
10. Go through the door and you are now on the second floor of EECS. Proceed across the bridge going over the main lobby area and continue to go straight until you reach the stairs.
11. Walk down 2 flights of stairs and go through the door towards your left at the bottom.
12. Continue straight after passing through this door and take a left at the end of the hall. You are now in the EECS hall with mostly 1300-1500 room numbered lecture halls.
13. Proceed down this hall with the diag to your right. Go through the first door almost headed towards the dude but then immediately go through the single door to your left.
14. Take a quick left after passing through this door and head down 1 flight of stairs.
15. Continue to stay on this hall and take a right as it ends near 2 vending machines.
16. Go through the doors and walk across the connecting bridge from EECS to Lurie Engineering Center.
17. Go through the doors at the end of the bridge and then the door at the end of the hall.
18. Take a left, walk straight and take a right where it says ground level stairs.
19. Proceed up 1 flight of stairs then turn directly behind you at the top of the stairs and head towards the main lobby of the Lurie Engineering building.
20. Take a right and head towards 1610 IOE by passing across the connecting bridge
21. Continue straight as you pass Chi Systems lecture room and walk across the IOE-NERS connecting bridge.
22. Take a right at the end of this hall and continue forward. You are now in the Cooley Lab main entrance and can catch any bus towards headed towards central before the giant mob waiting outside of Pierpont.

Estimated Total Travel Time = 10 min

MINOR IN ART AND DESIGN

BY: CHRIS TROJNIAK

The School of Art & Design offers a minor in Art and Design for students in the College of Engineering. IOE students with experience and interest in visual art may consider pursuing this minor. However, there are several factors that you consider before making this decision.

A total of 21 credits are required for the minor. These credits are achieved through a drawing course, a core academic course, two core studio courses, and three elective studio courses.

If you are passionate about art and have an interest in improving your artistic ability, you will find most of the courses offered to be very enjoyable. However, you should consider whether or not the addition credit requirements and class time are feasible for you. If you still want to take courses in Art and Design, but don't think the minor is feasible for you, there are several courses offered in Art and Design for non-major and non-minor students that you may want to consider as an alternative.

MSE 220

BY: NAZ OZEN

IOE requires 3 non IOE engineering courses. As I was planning my schedule, I decided to take one of them this semester. MSE 220 Introduction to Materials and Manufacturing is a very interesting course taught by Prof. Brian Love. Although the topic is not very related to what we study in IOE, it is still fun to explore a different subject in engineering.

There are 3 lectures per week, all taught by the professor and attendance is checked through iclicker questions. The professor assigns a problem set every week and the problems are generally in medium difficulty which encourages the students to learn about the subject

and keep them connected with the course material. There are 3 quizzes throughout the semester and the questions resemble questions on the midterm.

It is very fascinating to learn about the production and inner structure of materials that make up everything around us. It is also beneficial to learn about another engineering discipline because knowledge about the subject makes it easier to communicate and work together. I recommend MSE 220 to everyone who is looking for a non IOE engineering course.

IOE 466: STATISTICAL QUALITY CONTROL

BY: GENE YI

IOE 466 is a course designed for IOE students who want to learn about statistical tools and concepts that are used for improving product quality. Students will get to learn about the implementation procedures and quality engineering tools used in industries.

Statistical process control is a quantitative technique used for quality management. The main objectives of statistical process control are to monitor and control manufacturing processes, to identify any vital quality problem in the processes, and ultimately to improve the quality of a product or service in order to satisfy given requirements.

I took the class in the Winter 2013 with Dr. Judy Jin. She has been teaching this class for several years now and is very knowledgeable about this area. In each lecture, she briefly went over the basic statistical concepts and equations that will be used throughout the lecture. During each lecture, she would have some sort of a pop quiz to have the students do a problem related to the lecture. These quizzes were not graded, but

were used to keep the students more involved in class.

The class is structured as a combination of lectures and small discussions. Grades are based on weekly homework assignments and two exams. Homework assignments consist of 5 or 6 textbook problems. If you attend lectures regularly, you should not have a hard time catching up on the materials and will likely do well on the homework and the exams. The GSI also holds office hours and review sessions to help students with their homework and exam preparation.

If you enjoyed IOE 265 and 366, I highly recommend you take this class. This class is offered both in Fall and Winter. In case you are unsure about taking this class, do not worry: professor goes over the concepts taught in fundamental statistics courses (e.g. IOE 265, 366) in the first few lectures to help students determine if they have the adequate background to take this class.

IOE 453: DERIVATIVE INSTRUMENTS

BY: SCOTT CURRY

What is the course objective?

IOE 453 is essentially a finance course that teaches the fundamentals of pricing options and other derivatives including options, futures and even the pricing of new derivatives.

Well that was less than helpful, what is a derivative and why do I care how to price them?

A derivative is a financial instrument whose price is derived from an underlying asset. Though this is a mouthful the concept is quite simple. Let's start with something most everyone understands, a stock. If you buy a stock and sell that stock at a later date you make the difference of the price you bought that stock and the current price, the time you sell that stock. Quite intuitively, if the stock price goes up, you make more money on that trade. A derivative gets its price from this underlying stock. Let's say the stock you purchased was AAPL. The price of an AAPL derivative is related to the price of the stock. This is the fundamental concept of derivatives without going too far into detail on the dynamics of the different types derivatives.

Alright, so if a derivative is based on the underlying asset, why not just buy that asset?

Derivatives, although can be used for speculative purposes, much of the time derivatives are used for hedging. Hedging put in simpler terms is protecting a portfolio

from negative market effects. For instance if you went long on AAPL, and as we've seen AAPL has reduced significantly in price, replicating that positive end with derivatives can significantly reduce potential losses.

Ok, so in some cases it's better to use options, what is the importance of pricing derivatives?

This is an introductory course that introduces you to the payoff functions of these different derivatives and what variables affect the price of these derivatives. The main focus with respect to pricing is to understand what affects the price and see if there is a difference in listed price to theoretical price which could potentially represent an arbitrage opportunity.

Outcomes and Recommendation

The major outcome of this course is to develop understanding of the Black-Scholes-Merton pricing model with intuition of both discrete and continuous time methods. Through these models you can affectively develop new pricing formulas for almost any payoff function imaginable. I would highly recommend this course to anyone who is interested in the financial world as options trading and other derivatives are huge markets and are used in connection with the generic stock market.

EECS 280

BY: CHRIS TROJNIAK

When deciding which classes to take to fulfill the Non-IOE Engineering course requirements, you may want to consider EECS 280: Programming and Introductory Data Structures. If you're looking for an easy class, this isn't it. Many of the other classes that fill these requirements are easier, but none of them are more practical and beneficial than EECS 280. Engineering 101 provides a basic foundation for programming, and anyone who enjoyed it or found it remotely interesting should strongly consider building on that foundation by taking EECS 280. No matter what you plan on doing when you graduate, a basic knowledge of programming can be extremely valuable. It can provide a great addition to your resume, and may give you an edge over other job candidates. Not only will it look good on your resume, but it will also help you excel in many of your IOE

classes. This class will give you a fundamental understanding of programming techniques and principles, and allow you to use programming as a practical tool. This is done through the C++ language, but the techniques and principles learned can be applied to almost any programming language. Many IOE classes require the use of several different programming languages. After taking EECS 280, these languages become much easier to learn because the logic and basic principles of programming become second nature.

Don't let inexperience in programming deter you from taking this course. No prior programming experience outside of Engineering 101 is necessary. The teaching staff is incredible, and there are several resources available outside of normal class.