OXE Newsletter

October 2017

OXE Upcoming Events:

Graduate School Panel
Time: 5:00pm
Date: Wednesday, November 1
Location: CHE2110

ChemE Happy Hour
Date: November 3

Remember to sign up for volunteering events!
https://docs.google.com/spreadsheets/d/14QiUSVPNEKbjoLiz3fHBu-g_cDOPUNBSVG_tD1CP2U/edit?usp=sharing

Current OXE Tutoring Schedule:

Course	Tutor	Time	Location
CHBE301	Sina Ataei	Tu 5-6pm	CHE2110
CHBE302	Liang Gao	Wed 12-1pm	AichE Lounge
CHBE250	Dat Huynh	By Appointment: dhuynh1@umd.edu	
CHBE410	Karan Patel	By Appointment: karanpatel347@gmail.com	
CHBE422 - 0102	Deiaa Harraz	By Appointment: dharraz@umd.edu	
CHBE422 - 0101	Manoj Silva	Fri 10am - 11am	ESJ1212
CHBE440	Sophie Dietrich	Fri 10am - 11am	AichE Lounge

*Note that tutoring sessions for CHBE422 - 0102 will now be held by appointment.

*See weekly emails for most up-to-date tutoring schedule.

How to Impress Your Crush: Chemical Engineering Edition

By Sina Ataei

Maybe she's that cute girl that sits two rows in front of you in kinetics, or maybe he's that handsome boy in your orgo class; either way, you've been crushing on that person since you first laid eyes on them at the beginning of the semester. The problem: you are probably too scared to just go up to them and ask for their number. I mean, who wouldn't be? Well then, consider this your lucky day, because I am going to teach you a foolproof way to get the attention of your crush! So, without further ado, we are going to get right into it.

Step 1: Establish your presence

The best way to do this is to just sit down next to them in class and be sure to introduce yourself once you sit down. First impressions are very important when it comes to meeting new people, so to really impress your crush, you have to make a dazzling first impression. Chances are that other people have also tried to talk to your object of affection, so in order to stand out from everyone else, you could use some of my favorite conversation starters. These are guaranteed to get a laugh from your crush AND leave a good first impression on them.

Conversation starters:

- Are you an exothermic reaction? Because it's getting really hot in here.
- Are you made of copper and tellurium? Because you are CuTe.
- Even if there wasn't gravity on earth, I would still fall for you.
- You're so hot, you must be the cause of global warming.

Step 2: Cut to the chase

At this point, it is safe to assume your crush is quite aware of your interest in them, considering you just used a very cheesy pick-up line, and sat next to them in a lecture hall that's half empty. So, instead of beating around the bush, just cut to the chase, and hit them with the icing on top of the cake:

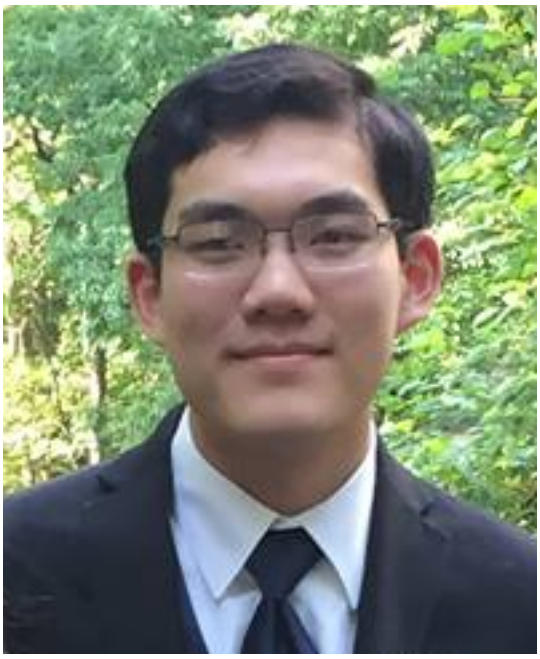
"Are you a carbon sample? Because I want to date you!"

This can really go either way, but the important thing to remember is that there are still plenty of other fish in the sea.

Tune in next month to learn how to do some really cool science tricks to actually get a date with your crush.

Student Research Spotlight: Dat Huynh

By Austin Hughes



Dat Huynh, a junior CHBE major, has been working in Dr. Sriram's lab since April 2016. He got involved in research because he wanted to get hands on experience in a lab to apply science outside of the classroom. Dr. Sriram's research group focuses on metabolic engineering. Simply put, metabolic engineering is the process of genetically modifying cells to improve cellular properties or increase production of a desired chemical within the cell.

Dat studies the metabolism of *Pt*, a type of algae, and *Bt*, a type of bacteria. When he began his research, Dat observed that the growth rate of *Pt* increased when grown in the presence of *Bt*. Since then, he has been trying to deduce the mechanism for this change. To explain his research, Dat drew an analogy to a flowchart from CHBE101. The cell is the system. There are nutrients and other elements going in, and waste products and other products coming out. Inside the cell, thousands of reactions are occurring. Each reaction has a certain extent of reaction, referred to by the technical term "flux." By studying the distributions of amino acids produced within the cell, he can determine the fluxes, thereby "getting a glimpse of the metabolic profile of an organism."

However, Dat notes that he has encountered a problem with studying amino acid distributions because there is no way to differentiate between the amino acids produced by the algae and by the bacteria when they are grown together. To solve this problem, Dat tried separating the algae and bacteria by a semipermeable dialysis membrane, but was unsuccessful. Now, he feeds the cells glucose labeled with C^{13} isotopes. Then, he tracks the labeled carbons through to certain amino acids that are produced only by the algae. He can then use this information to determine the metabolic profiles of the algae and bacteria.

When asked about potential applications for his research, Dat stated that this type of work could be used to increase the production of a desired product within algae cells. For example, he explained that algae is commonly used as a source of biofuel, and through genetic modification algae cells could be made to produce more of the molecules used in biofuel production. After graduating, Dat plans to enter industry in either the biotech or pharmaceutical field. Later in his career, Dat says he may decide to return to school for his Ph.D. to become a professor.

Chemical Engineering in the News

By Hannah Cetuk

The depletion of fossil fuels has prompted a push for renewable and cleaner energy through a variety of methods. Biodiesel is a type of diesel fuel that is developed using vegetable oils, most commonly rapeseed oil, and animal fats. It produces fewer harmful emissions and greenhouse gasses and its biological sources make it easily renewable. Unfortunately, biodiesel can generally not be used in conventional diesel engines due to its high boiling point in comparison to petroleum diesel. These high boiling points are the result of long carbon chain lengths and lead to buildup of residues in engines, even when biodiesel is diluted with petrodiesel.

A recent advancement coming from the University of Kaiserslautern in Germany published in June of this year might change that; researchers have made the first step in making biodiesel compatible with the common diesel engine. In their experiment, the researchers were able to catalyze a reaction in which the long chain fatty acids characteristic of biodiesel were converted to a mixture of shorter chain compounds. With this alteration, combustion of biodiesel would start at lower temperatures meaning that it could be utilized in petrodiesel engines with much greater efficiency.

While this is a huge step in the biofuels industry, there is a long way to go in terms of manufacturing processes. It has yet to satisfy all requirements set by the EN-590, a standard for diesel fuel properties set by European Committee for Standardization. More innovation and process design will be necessary for commercial use. Nevertheless, this is exciting for Chemical Engineering students looking to pursue a career alternative fuel sources so keep an eye on biodiesel for interesting advances in the near future. For more information, see their paper published in *Science Advances*.

Pfister, K., Baader, S., Baader, M., Berndt, S., and Goossen, L. (2017). Biofuel by isomerizing metathesis of rapeseed oil esters with (bio)ethylene for use in contemporary diesel engines. Science Advances. 3(6).

ChemE Group Profile: ChemE Car

By Annika Vaerst

I know that, as ChemEs, we frequently think to ourselves, "I have more free time than I know what to do with!" Joking aside, there are many great organizations within our department that will help you to socialize with other ChemEs and get some professional experience. This month, I sat down with Ryan Felix from ChemE Car.

AV: Please tell us a little about yourself.
RF: My name is Ryan. I'm a senior ChemE and I'm the president of ChemE Car this year.

AV: What is ChemE Car?
RF: It is a student organization as well as a competition team. The team builds a small, shoe-box sized autonomous vehicle. The car runs off of unique chemical reactions with a starting and stopping mechanism. It competes in an engineering accuracy competition, with the goal being to get the car to drive as accurate of a distance as possible. An accurate distance means that the car will drive 15-30 meters in a straight line and you get points off for going over or under that predetermined mark.

AV: What are you and your team working on this year?
RF: We qualified for the national competition and we're working on making the car as accurate as possible for that. We'll be flying to Minneapolis, Minnesota, to compete.
We're also designing a new car for next spring's regional competition. We're designing a new reaction for that. Previously, we used the Briggs-Rauscher reaction as our starting and stopping mechanism. This year, we're thinking about doing another oscillation mechanism, called oscillating luminal clock, or the chameleon reaction.

AV: What kind of responsibilities would a team member have?
RF: A new team member could join the nationals or regional car team. Both of the teams have similar duties. The national car team runs a bunch of trials and tries to improve the accuracy and they also build batteries from scratch. The regionals team is more focused on design considerations. For example, how large to build the car, how to set up the car, the electronics setup, and so on.
We meet every Tuesday at 6:30pm in CHE2108. We have four sub-teams (kinetics, structure, battery, and electronics) and each of those teams sometimes meets at other times.

AV: What's the best part of ChemE Car?
RF: It's like a family because some of the older people who have been there are really invested in the team. In addition to the environment of ChemE Car, you get hands-on research and design experience. There's one student who's a freshman who has been really involved in the battery team and it's cool to see her so invested.

AV: How does someone join ChemE Car?
RF: They can show up to the meeting or send us an email at chemecar.umd@gmail.com.

Best of luck to ChemE Car at Nationals!

ChemE's Corner

By Dat Huynh

Hey beautiful ChemE's. Welcome to this month's iteration of ChemE's corner, the only place crazy enough to give out advice from a ChemE.

This week we'll be answering the tried and true question, what keeps us up at night, the question most basic to our existence: what is the meaning of ChemE? Many have asked this question and today I, Mr. ChemE, will be revealing the truth.

Diapers are soiled and distillation columns start to boil. Forget your design or thermo homework and dive into this letter.

> *Hey Mr. ChemE,*
>
> *I haven't been able to sleep at all and when I do I have nightmares about Chemical Engineering. I imagine myself talking to Perry about the meaning of Chemical Engineering. The Numbers Felder, what do they mean?! The dreams are wild. I'm exhausted all the time. My blood pressure is through the roof. I'm drinking 10 cups of coffee a night I don't know what to do. There's one question that's plaguing me. What is the meaning of ~~life~~ ChemE?*
>
> *Sincerely,*
>
> *A Stressed Out ChemE*

This question is common when students have three exams the next day starting at 8 AM and it's already 3 AM with no hope in sight. It is a fundamental yet elusive philosophical question of the chemical engineer. So fundamental it even precedes the question of, "what is chemical engineering?" to which most people fail to answer (plug: check out CHBE100 with Dr. Goldberg next semester). What is the meaning of Chemical Engineering? Even many of the greats have pondered this very question over the years. Navier and Bernoulli, in their treatise on fluid dynamics; Sandler and Abbot, in their texts on thermodynamics; and Felder and Rousseau, in their elements of engineering, all have ruminated on this very question.

It is clear that this problem has caused you much stress. While many have suggested variations of solutions to this problem, I will discuss the one simple solution. From a Chemical Engineering point of view, there is only one solution relevant to you; there are no degrees of freedom. A trite response to a deep question and a bleak truth about the existence of all chemical engineers. There is no meaning to chemical engineering.

Send in any and all ChemE (or non ChemE) related questions to Mr. ChemE at OXE at oxe.umd@gmail.com and your question might be featured in next month's edition of the OXE newsletter.

Professor Quotes

"Chemical engineering is an art." – Dr. Choi

"Suddenly, you have very hot coffee attacking your lips." – Dr. Choi

About Laplace equation: "It deserves to be honored." – Dr. Choi

About an 'h' he drew on the board: "Giraffe." – Dr. Sriram

Submit your professor's quotes to either an OXE officer or to oxe.umd@gmail.com!