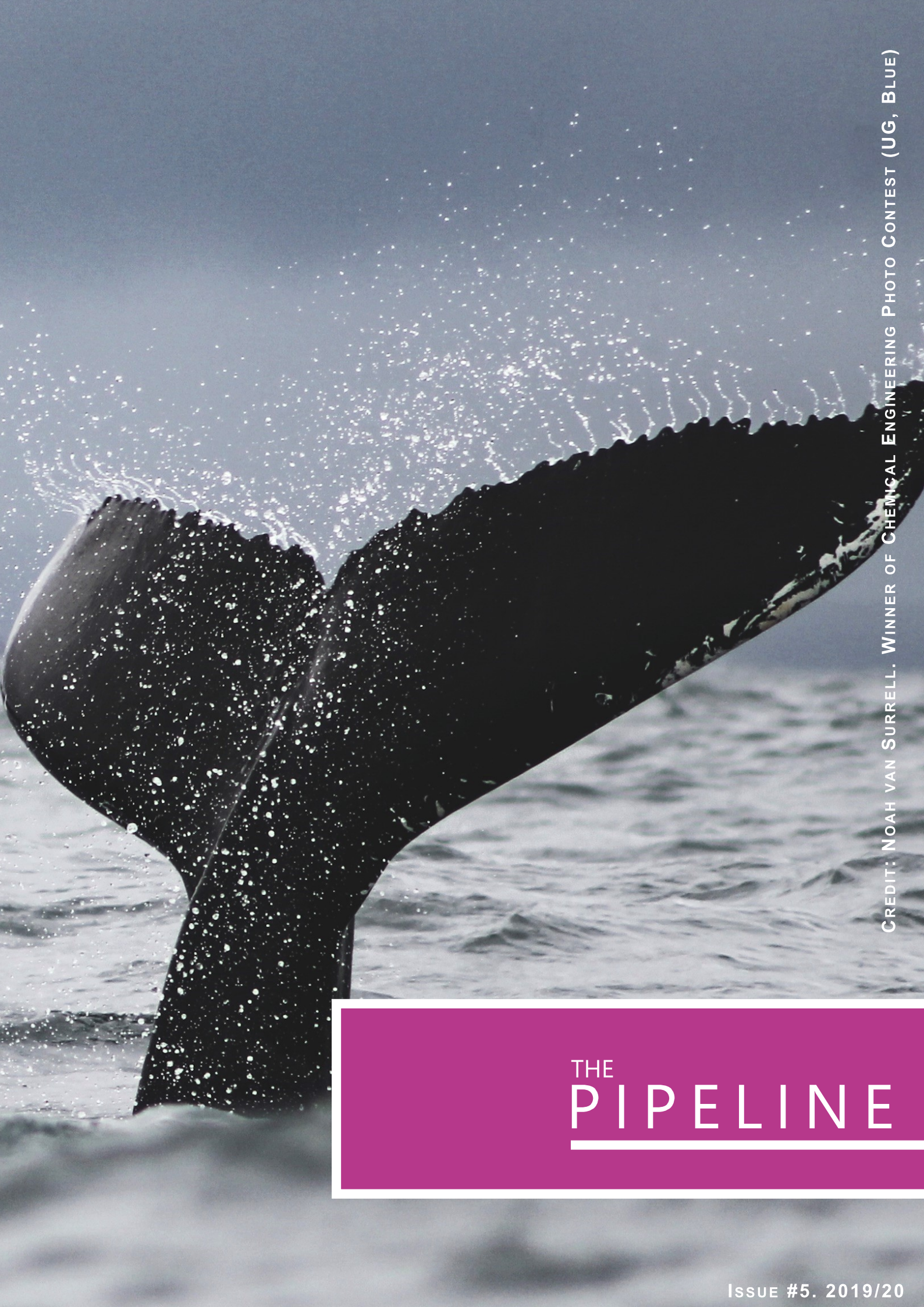

Credit: Noah van Surrell. Winner of Chemical Engineering Photo Contest (UG, Blue)

THE PIPELINE

Issue #5. 2019/20

IMPERIAL CHEM ENG SOCIETY

CHEMENGSOC SOCIAL MEDIA

GENERAL FACEBOOK PAGE: *www.facebook.com/icchemengsoc*

FLICKR: *www.flickr.com/photos/chemengsoc/albums*

EMAIL: *guilds.chemeng@imperial.ac.uk*

WEBSITE: *www.chemengsoc.com*

INSTAGRAM: *www.instagram.com/icchemengsoc*

LINKEDIN: *www.linkedin.com/company/imperial-college-chemical-engineering-society*

DEPARTMENTAL SOCIAL MEDIA

WEBSITE: *www.imperial.ac.uk/chemical-engineering*

TWITTER: *www.twitter.com/imperialchemeng*

LINKEDIN PAGE: *www.linkedin.com/showcase/department-of-chemical-engineering*
LINKEDIN GROUP: *www.linkedin.com/groups/1829242*

OTHER STUDENT MEDIA OUTLETS

CHEMENG CONVERSATIONS: *www.imperial.ac.uk/chemical-engineering/research/chemeng-conversations-*

FELIX: *www.felixonline.co.uk*

ENERGY JOURNAL: *www.energyjournal.co.uk*

IN THE PIPELINE

A NOTE FROM THE EDITOR

Looks like weve made it

I mean, except for the deadlines. (Flowsheeting, FYDP, MATLAB, Phys Chem, RDCP - if that's still a thing.) But it's *obviously* the final stretch. Make use of it - watch the **Talent Show**. It is the **highlight of my year**, and gives me an excuse to *have fun* close to deadline times as Metric is half a minute away from study rooms.

We also need to reflect on the absurdity that we placed ***SECOND*** at **Frank Morton**. Apparently, our frail, stooped frames and RSI-strained hands managed to defeat every other team but Birmingham. We gotta place credit where it's due - congrats to everyone who competed, because **you beat** almost **everyone**.

Photo Competition deadline is ***today*** - you can win up to £100 (~42.5 portions of Leon's Baked Fries). We have some fantastic photographers in the department - see Noah's entry on the front cover. So *display* that effort, and you will also see your work *displayed*. **Enter here**: is.gd/photocomp2020

Stay strong, everyone. As a wise man once said, **"It doesn't have to be good... just feasible."**

Kathryn

A NOTE FROM EL PRESIDENTE

Dear all

I'm taking a break from choreographing the lecturers' performance for the **TALENT SHOW**, which I encourage you all to attend. I am warming up my vocal chords currently…

WELL DONE TO ALL THAT WENT TO FRANK MORTON. It is excellent that you went, and let's face it, Birmingham likely don't have so much **FUN** final year design to do. I hope that the final years are all sleeping enough, and **PLEASE STOP USING PREVIOUS YEARS' REPORTS FOR GUIDANCE IN HOW MUCH WORK IS REQUIRED, BECAUSE WE TOOK A LOAD OUT.**

Now, many of the staff at Imperial are on strike, but even more have decided **BECAUSE WE LOVE YOU** that we don't want to screw up your teaching (also, we do actually like to be paid). Anyway, bear in mind that college is reducing the benefits of your lovely lecturers and professional staff… and you might mention that you support them in an e-mail to the provost…

Right, I'm going to stop ignoring my final year design group (sorry…) and start paying attention to them…. Till next time, **STAY FROSTY**.

Paul

CALENDAR

YOUR SOCIAL LIFE - SORTED

CHEMENG AND COFFEE

MONDAY 2ND MARCH, 12-2PM, ACEX FOYER

PANCAKES for ***PANCAKE DAY***. Do I need to say more?

Apparently I do. For all y'all who enjoyed gorging on Lindt chocolate on Valentine's Day - why not bask in the batter-y goodness that is **pancakes?** Plus it's **free** *and* it **fits in with lectures.**

NEWITT LECTURE

TUESDAY 3RD MARCH, 6PM, LT1

For those of you who want to save the planet... This is your chance to hear the CEO of **CeresPower**, a world-leading developer of low cost, next generation **fuel cell** technology. And, by the way, the CEO is an Imperial ChemEng alumnus *departmental humble brag*.
We're not just celebrating past students. Undergraduates will get rewarded during the departmental undergraduate prize ceremony - with **monetary awards.**

TALENT SHOW

THURSDAY 5TH MARCH, 7PM, METRIC (@UNION), **£5 + FREE DRINK**

Talent Show is the meme of ChemEng. Here, you learn that students have lives ***outside*** ChemEng. Acts include songs, dances, **rap battles** and occasional pole dancing. Acts are not limited to students however - **lecturers also get involved** and show to the world they are more than the machines we often perceive them as. Or, as Chris Tighe puts it: "*I wouldn't miss the opportunity to make a complete tit of myself every year at the Chem Eng talent show, in a pathetic attempt to curry favour with the students.*"
Pictures will not do this event justice, so enjoy some sensational **YouTube** clips of the acts: **is.gd/1xAToz**
MUSICIANS/COMEDIANS/TALENT WANTED: tinyurl.com/BPTalentShow2020
Buy tickets here: is.gd/NmIaLF

ANNUAL DINNER

WEDNESDAY 18TH MARCH, MILLENNIUM GLOUCESTER HOTEL, **£40**

Fourth Years and MScs - make sure you've saved the date for ChemEngSoc's Annual Celebratory Dinner in March! The dinner serves as a **celebration** of reaching the end of your UG/PG degrees! The evening includes a **prosecco reception**, **three-course meal**, **music**, **entertainment** - plus the **rest of your year.** This event is also attended by many of our **beloved staff members**, who will help you to celebrate your almost-graduation in style. **Tickets: released *TODAY***.

Heads up, ChemEng:

"We want to make events as accessible and well-attended as possible. We now have a **small budget available** to help any students who feel like they are not able to afford to attend ChemEngSoc events. Please get in touch with me (f.marsh@imperial.ac.uk) for details and how you can access the funding."

Faith

Look what we did!

ADL Workshop

Wine & Cheese

Exxon Mobil Tour

BY DESPOINA RIGOU (MSC)

FRANK MORTON
BOSS LEVEL: COMPLETE

BY JAMES MORRISSEY (Y4)

Frank Morton 2020 was an unlikely sporting success for Imperial Chem Eng, coming second place only to hosts and 6 in-a-row winners Birmingham.

Despite our small numbers, we made a big impact and finished in the top three for half the sports we participated in. The winning sports were:

Badminton – 1st Place (*Siddharth Halder, Nicholas Emilio Sutjiono*)

Climbing – 3rd Place (*Daniel Freake, Isobel Melvin*)

Dodgeball – 1st Place (*Stefan Opiola, Maria Starikova, Daniele Pessina, Roshan Sivabalan, Sarah gunnery, Matthew Sood*)

Lazer Tag – 2nd place (*En You Sim, Hann Qiang Liew, Wei Yang Lee, Christopher Brooker, Vikneswaran Sathasivam, Ahmed Massli, Pravin Suduwelikanda, Christopher Chan Jian Wei, Aulia Rahmayanti*)

Table Tennis – 1st Place (*Zian Zhan*)

Ultimate Frizbee – 2nd Place (*Luke Whittington, Su Cheng Tung, Alex Baldwin, Yash Nirmal, Anujan Kirupakaran, James Morrissey*)

Here are some great photos of our Chem Eng teams in action:

Think you can lead Imperial to victory? Run for Sports Officer next year during the Elections.

Email rjm216@ic.ac.uk if you have any questions.

FOLLOW THE FACEBOOK EVENT FOR UPDATES

Tickets out Monday 24th February – check your emails!

ADVENTURES ON TOUR

ADVEN-TOUR TO SOUTHAMP-TOUR-N (...)

BY ELLEN PLAYER (Y2)

Considering the **upcoming leadership elections**, I thought it would be a good chance to share with you an insight into ChemEngSoc Tours. This year, there have been four main trips that I have **helped to organise**: a learn and lunch with **Shell**; a trip to **AstraZeneca**'s R&D Centre in Macclesfield; an afternoon with **OSIsoft** and most recently a trip to **ExxonMobil**'s Fawley Refinery - home to one of the **largest refineries in Europe**, as well as to a **large petrochemicals site**.

After months of planning, advertising and sending frantic emails, the trip to Fawley was finally set on Valentine's Day... a symbol of the many hours of love that were poured into it. We made an early start, waving goodbye to Colin in the Pilot Plant and saying hello to Dudley the Driver who would join us on this adventure. We soon found ourselves on the windy roads towards Fawley, **distillation columns** and **cat crackers** towering in the distance.

On arrival, we were briskly checked by security and sent towards the main building to meet the Exxon representatives. The reps gave introductory presentations for the site, which were enlivened by the staff choir belting out 80s ballads in the room next door. This was followed by **a lunch** attended by **many former students** from the department who are now working at Exxon as well as a few members of their **grad schemes**. This was truly useful for anyone wanting to work at Fawley in the future to gain an understanding of both the **application process** and the style of **working environment**.

The **site tour** was perhaps one of my favourite parts of the day, as it allowed you to see the **full scale of Fawley**. One focus of the tour was the Fawley **cat crackers**, some of the largest in Europe. Cat crackers are vital in modern refining; they take less desirable, **heavy molecules** from the **distillation columns** and break them into **shorter, desirable materials**. These short chains can be used as a feedstock for both petrol manufacture and petrochemicals. The cat crackers at Fawley provide a vital role in the plant as they feed into two sides of the business: **refining** and **chemicals**.

In the afternoon we were challenged to a **Process Simulation** task. We **worked in teams** to discover an issue in the plant and to alert the designated 'site managers' if there was a problem. This encouraged us to **think outside the box**, drawing on our knowledge of **process control** and **separation processes** to find a solution. The importance of the scenario training was made clear when ExxonMobil shared the story of a reactor previously exploding on site after a process became out of hand.

After a fabulous day with ExxonMobil, we headed back to Southampton Central for some well-earned rest. This came in the form of an **all-you-can-eat buffet dinner**; we left with full bellies and a satisfied smile on our faces. We then relaxed in the evening, with the majority of us **exploring the coastline**. Across from Southampton, you could see **Fawley lit up** providing a nice end to our day... before we all hit the pub.

This was **my last trip as Tour Officer** this year but **don't be too disheartened**, there are many trips lined up for next year and many events happening with ChemEngSoc. I have plans to pass onto the next tour officer for a **trip abroad** so watch this place.

If anyone is interested in standing for **tour officer**, please feel free to **get in contact**.

Ellen

SLEEP 101

ALL-NIGHTERS? WHAT ALL-NIGHTERS?

BY FAITH MARSH

I am sure that you all know how important it is to sleep well. However, this can be easier said than done for most of us! I have summarised some information about sleep and a few top tips to help you get good sleep.

The sleep-wake cycle can be described as a 24-hour internal "clock" that synchronises our brain and controls when we should be awake and when we should be asleep. It is controlled in several ways, including hormones. Sleep allows our bodies and minds to rest, repair and re-energise. It is recommended that most adults get between **7-9 hours of sleep per night.** Some evidence has shown that sleep deprivation can significantly impair learning and cognitive abilities. Each stage of sleep serves a **unique restorative function**, including muscle recovery, hormone regulation, and memory consolidation, making it essential to allow enough time to cycle through all sleep stages. Below the different sleep stages are described:

Stage 1 ("Drifting"): This when you are falling in and out of consciousness. During this stage, you can be partially awake. This period of drowsiness eventually leads to a light sleep.

Stage 2 (Light sleep): ~50% of the time spent asleep is in Stage 2. During stage two, eye movement stops and brain waves slow with the occasional burst of waves called sleep spindles.

Stages 3 & 4 (Deep sleep): These stages are often the hardest to wake up from, and are extremely rejuvenating to the body.

Stage 5 (REM): Most adults spend about 20% of sleep in rapid eye movement sleep. In REM-phase sleep, the mind energizes itself while the body is immobile. Most dreaming takes place here as a result of heightened, desynchronized brain waves. It also revitalizes the brain, supporting sharp and alert daytime function.

It is normal to wake up a little between sleep cycles. Try not to check the time when this happens just make sure that you have an alarm set for the time you want to get up in the morning. You can get help with your sleep using Sleepio, www.sleepio.com. It will ask you a series of questions about your sleep and then send a report. You can continue with a sleep improvement programme if needed.

Here are **seven tips** for good sleep:

1. Get a least **15 minutes** of natural sunlight per day
2. **Limit caffeine and alcohol consumption**, especially after 5pm
3. **Minimise refined carbs** with your evening meal
4. Get 15 minutes of **resistance or HIIT exercise** everyday to boost serotonin, try not to exercise right before going to sleep unless relaxation or stretching
5. Go to bed and wake up **at the same time** each day if you can
6. **Turn off any electronic equipment** at least 15 minutes before bed
7. **Keep hydrated**, having at least 6-8 glasses of water a day

If you are having issues with sleep or want to know more about anything in this article please **get in touch.**

FAITH MARSH is the departmental wellbeing adviser. Get in touch if you need advice, a chat or a delicious cup of tea. Faith also can help to provide funding to attend ChemEngSoc events. Find her in ACEX 218, or email: f.marsh@imperial.ac.uk

UNCLE B

SMART, SASSY, AND WISE - YOUR GO-TO GUY

UNCLE B WANTED ME TO CALL IT UNCLE B III - REVENGE OF THE SITH. I REFUSE TO FURTHER THE ASSUMPTION THAT IMPERIAL STUDENTS ARE NERDS. PLUS: TOO CHEESY.

Hope everyone is having a grate term so far? With the annual Frank Morton Sports day, Fawley Refinery trip and Wine & Cheese night all happening this month, I feel this edition is a great chance to remind everyone: life shouldn't just be all work and no play! Now for your questions, let's havarti't… (**Ed**: Ugh… I'm glad you're graduating this year)

The Gouda

Q: How was Wine and Cheese Night?

A: Really fun and very successful (if I do say so myself). Still a bit blue it's over honestly.

Q: How to "please someone"?

A: Free food goes a long way! Seriously, who could disa-brie with that? (**Ed**: …)

Q: How did I get "rejected due to the high volume of applicants"?

A: Despite how good of a candidate you may have been, places are incredibly competitive sadly. Try not to let it demotivate you too much. After all, you won't ever get a place if you never even apply!
That said… <**Incoming Uncle B Rant**> Not everyone even gets the courtesy of a response. Reminds me of that time I got rejected from an internship approx. 2 years after applying…You don't say!? I kinda guessed I hadn't gotten the place after the 5th email saying… <**/end rant**> ahem. Keep at it!

The Feta

Q: How do you make the perfect risotto?

A: "Step 1: Heat the stock. Peel and finely chop the onion and garlic, trim and finely chop the celery. Finely grate the Parmesan." (Oliver et al., 45 minutes) *Reproduced from: www.jamieoliver.com/recipes/rice-recipes/a-basic-risotto-recipe/*
True Uncle B fact: I've never once had decent risotto. OP, I feel your pain.

Q: Who is the most honest person in this department?

A: I'd say myself but I'm a liar who always lies…wait.

Q: Why is TEP so hard?

A: I personally found TEP kinda enjoyable, however I really struggled on other projects. Everyone has different strengths and weaknesses. The most effective team players recognise this and ensure every base is being covered.

The Stinking Bishop

Q: What is ChemEng?

A: -Checks date- …Oh….oh no…

ChemEng Love,

Uncle B xoxo

Got a ***burning*** question for Uncle B? Write your questions on the board outside the study rooms.

DMCs

DEEP MEANINGFUL CONVERSATIONS

BY KATHRYN JAITLY (Y4)

I'm going to graduate in... too short of a time, and it's got me thinking.

A couple of years ago, I was sat in a pub chatting with two **EEE** guys. One of them asked the other: "**If you were a fresher, would you study here?**" The other one took a long sip, placed his pint on the table and sighed. "**No.**" It makes you think.

We chose this uni based on course quality, university reputation and course description. In other words: it's high in **THE rankings**, it's **almost Oxbridge**, and **course content didn't matter too much** - those two former points convinced you to to attend here. **We made these choices at 18.** Have our opinions matured?

At A-Level we **barely understood the words 'chemical engineering'**. We liked **maths**, we liked **science**, we **'wanted to change the world'** - therefore chemical engineering. Fast forward a few years, and we see people **trying to escape STEM** for 'the City'. We hear **a third of graduates end up in finance**/management consultancy. What happened to us? Were we just **naive**, or did the degree cause this to happen?

Meanwhile, you see figures who made it through the pain, reaching the pinnacles of their professions: **Marlene Kanga**, **Judith Hackitt**, ***Dame* Julia Higgins**... the list goes on. The course must get some things right.

I spoke to a range of students to figure it out. I asked them all: '**Do you feel fulfilled by the degree?**" Is it **worth it**? Do you feel, fundamentally, that the pain and success was/is/will be worth it? Here is what they said:

To be honest, ChemEng does **differ from my expectations.** When I applied for this course, I knew it was the killer major of Imperial. I just assumed it was challenging - not so **time-demanding.** Apart from this drawback, the contents of the course are **rather detailed** - we get to learn everything from pure chemistry to pure physics, plus learn useful skills (**MATLAB, labwork**). I would also emphasize that **all of our professors** are responsible and approachable, they teach clearly during lectures and help students after class. I believe this course will be enjoyable and fulfilling - **if you devote yourself to it.**

Y1 UNDERGRADUATE

Firstly the good: meeting lots of new people, saying I go to Imperial (useful in job applications) and gaining soft skills like time management and groupwork which will be so useful later on in life. **Then the bad:** The workload and the fact that you'll never really enjoy/tolerate all of your courses. So have I found my time at Imperial fulfilling? **Yes, mostly.** At least I hope that the short term pain and sacrifices will be worthwhile in the long-term. But of course **only time will tell.** And would I rather do another degree somewhere else? Probably not, but **I haven't started flowsheeting yet**...

Y3 UNDERGRADUATE

Overall, yes. I came to university to learn about ChemEng and the degree has definitely **taught me the theory** behind it. The coursework, dreaded as it is, has also helped develop skills that I wouldn't have otherwise. I also know I'll likely be **making plenty of money** once I graduate. However, in some sense the degree isn't entirely fulfilling since it **opens up a lot of questions** about the world that aren't covered in lectures. I don't think this is a bad thing. In a way, the degree doesn't really serve to fulfil, but instead enables one to see what it is they want in order to be fulfilled, and **that's even better.**

Y2 UNDERGRADUATE

This is a question I have found myself asking throughout my time here. After all, getting **a degree is not cheap** and demands a **lot of time and effort**, especially at Imperial. Hence, there have been several times when I felt – **is this worth it?** And after three and half years, nearing the end of my degree now, I do feel **it was**. Not only has my degree enhanced my **technical** and **numerical skills**, but through coursework and other team activities has also equipped me with the **soft skills** necessary for the workplace. Through being part of societies and clubs, I have also had a chance to **broaden my horizons** and **dabble in activities beyond** my degree – making me feel fulfilled in my time here.

Y4 UNDERGRADUATE

Studying ChemEng at Imperial has enabled me to work on a project that I am **deeply interested in** and will help **make a difference** to the world. It has also helped me widen my horizons in terms of **applying my chemical engineering knowledge** in modules such as **nuclear engineering** and **business**. Even though all this does make the course pretty hectic, I still am very **grateful** to have met such **bright and intelligent minds** on my course as well as around Imperial who inspire me to **push myself every day**.

MSC STUDENT (ACE)

Programmes can be quite **demanding**. One can expect to have **five or six deadlines within a week**, and yet other times there may be **nothing** in their schedule. With this time, one can explore all that this **world-class city** has to offer and soak it in. Once one finishes a gruelling task such as an exam, they feel as if a **tremendous weight has been lifted** from their shoulders and can once again enjoy life. Therefore, I would say that **I am fulfilled** by this degree, in the sense that once I complete the challenges presented along the path to my degree, I can sense it **all coming together** in the end.

Y1 UNDERGRADUATE

Unlike many other people in Chem Eng, I feel like **I'm not suitable for the degree**. I wasn't good at physics in high school, and the courses and projects involved in Chem Eng **usually made me struggle**. It's an absolutely **challenging course**, but thanks to it, I was trained to **think more analytically**. I have **complicated feelings** about the degree. On one hand I **never feel passionate** about the course, while on the other hand I've spent most of my time in the past four years **getting along** with it. So do I feel fulfilled by the degree? Probably the answer is yes because **I survived finally.**

Y4 UNDERGRADUATE

If I get to summarize my degree with you today, I would say it is **not** about the material that I get to (binge) learn before exams, but about the **people I've met**. From dedicated **academics** to **students** with incredible and various backgrounds, forming all together a stimulating learning atmosphere. It's about **skills** too. Not the "**dealing with impossible equations**" ones but what someone would call "**soft skills**": overcoming deadlines, stress and dealing with failure to (hopefully) **become a better person** every day. Because **I don't feel accomplished by designing crazy plants**, but by doing it with friends while **keeping a good life balance**!

MSC STUDENT (ABE)

Coming to a world-class university, I knew the degree was going to be a **tremendous amount of work**. I am half-way through first year and yet I feel as if I have done enough work to obtain my degree already! I have friends studying engineering in the US and while they are doing GCSE Physics in their first year, I am **struggling to understand** how Heat and Mass Transfer works. I'm finding it **difficult to meet deadlines** and **keep up** with lectures and at the same time, **enjoy** university life (*I know this is expected*). But with three more years to go, I know I have **so much more** knowledge and experience to be gained and **many more opportunities** to enjoy university life. I feel like it's **too early to say** that I've been fulfilled by my degree yet but I'm sure in the future this will change.

Y1 UNDERGRADUATE

MASTERING METHANE

ADAPTED FROM BP MAGAZINE

BP MAGAZINE IS A PUBLICATION RELEASED BY BP PLC. IT PROVIDES "REGULAR REPORTS FROM OUR GLOBAL ACTIVITIES, THE PEOPLE WHO MAKE THEM HAPPEN, AND THE CHALLENGES FACING OUR INDUSTRY."

Drones equipped with space-age sensors are part of a wave of advanced technology zooming into operation at BP's new major oil and gas processing projects as part of a programme to **continuously measure methane emissions.**

The high-tech kit is part of an **industry-leading BP programme** to continuously detect, measure and enable the **reduction of methane emissions** at new and existing BP-operated Upstream assets. This crackdown on emissions has been made possible by a raft of new and complementary technologies, such as:

- **Gas cloud imaging (GCI)**, tested in the deserts of Oman at BP's Khazzan tight gas project, allowing constant site monitoring

- **Drones that live stream data**, thanks to highly-advanced on-board sensors developed by NASA

- **Smart glasses** for field operators using multi-source augmented reality (AR) to enable the wearer to read sensor information on their lenses and communicate in real time with technical experts at a control centre

- **Video-imaging spectral radiometry flare monitors** using infrared images to measure how efficiently a flare consumes emissions

- **Hand-held gas leak detectors**

"This programme represents an industry first and reflects our commitment to be a **leader in advancing the energy transition** by maximizing the benefits of natural gas," says Gordon Birrell, BP's chief operating officer for production, transformation and carbon. BP believes that **natural gas can play an important role** in tomorrow's lower carbon energy system. It is abundant, affordable and has half the emissions of coal when burnt for power.

Figure 1: A BPX technician reads sensor information on her smart glasses out in the field that is relayed to an expert in the control centre

But natural gas is mainly methane. And, if methane escapes into the atmosphere unburnt, it can be a potent greenhouse gas.

"For gas to play its fullest role in the energy transition," says Birrell, "**we have to keep it in the pipe**. This new technology will help us do that by detecting methane emissions in **real time**. The faster and more accurately we can identify leaks, the better we can respond and, informed by the data collected, work to prevent them."

The continuous measurement of methane emissions marks a **step change** in the industry's approach to tackling emissions of the potent greenhouse gas.

Mastering Methane

Historically, engineering calculations and emission factors have played an important part in quantifying emissions. The proven technology to systematically move beyond that approach hasn't existed - **until now.**

BP's vice president of digital innovation, Morag Wilson, led the hunt for new technologies. She says: "Many of today's technological breakthroughs were only aspirations until recently. Three years ago, we sat in a room and brainstormed what we would need to achieve continuous measurement, because, at the time, the technology portfolio needed was not yet fully developed."

GCI, when combined with other techniques, such as drones and what the industry refers to as '**methane-sniffing**' technology, is now creating a 'step-change' in how BP can operate its new major projects, explains Watson. "As a result, inspections that used to take **days** will now be able to take **30 minutes**," she says.

BP has already set itself a **methane intensity target of 0.2%** from its Upstream operations and has held a series of methane roundtables around the world, bringing together experts from academia, NGOs and policy-makers to improve understanding across the industry. On the back of those events, BP set out possible actions and priorities, which have formed the basis of recent progress.

Mars Calling

Figure 2: The FlyLogix drone that circled the Clair for a record-breaking 90 minutes

BP set a new UK record for the **longest commercial drone flight** while testing one methane-detecting technology.

A device fitted with highly-advanced sensors, originally designed by NASA for the Mars Curiosity Rover, circled BP's Clair platform in the UK North Sea for 90 minutes, covering more than 185 kilometres – smashing the previous record of 100 kilometres.

Throughout the operation, the drone **live-streamed the valuable data** collected by the methane sensor. The technology is owned by a company called SeekOps, a commercial spin-off from NASA, and effectively 'sniffs' the air for methane and records the quantities.

That data can then be used to create a **two-dimensional map of methane emissions.** This was combined with UK drone supplier FlyLogix's aviation skills to conduct the groundbreaking offshore trial.

BP intends to **deploy the technology across all North Sea assets in 2020**, marking the latest step in its global emissions-reduction programme.

THE BRIEFING

NEWS FROM THE WORLD OF CHEMENG

BY LOUIS MARTINE (MSC)

Spectroscopy Slayer

Devices using **magnetic levitation** could be used for chemical identification to detect substances that may be present within mixed samples. Methods developed by Harvard University along with the US Drug Enforcement Administration involve adding **drug samples** to a **magnetic liquid** and placing the mixture in a magnetic container. The separation is based on **relative densities** which can then be matched to reference values.

Read more: New Scientist | 23 December 2019| is.gd/nzvuJF

Oil-cleaning bacteria

Some microbes naturally possess enzymes that can break down oil, although they are rarely found near the oil spills. Researchers have developed plasmids which can pass on **'oil-eating' DNA** for five enzymes involved in **breaking down hydrocarbons**. Results show oil can be broken down up to **ten times faster** with these enzymes present. This natural process would be much better than using chemical treatments although there is an unknown risk with **releasing GM organisms** into the environment.

Read more: New Scientist | 24 December 2019 | is.gd/xgPHiP

UK fusion reactor - first 21st century fire up

In November, the JET reactor in Culham will undergo its **first trial run** since breaking the world record for fusion power production in 1997. This reaction was only sustained for **milliseconds** and after some key material changes it is hoped that it will now **last around 5 seconds**. Whatever the outcome, the resulting data will be vital for helping ITER (currently the world's largest fusion reactor) create its **first plasma in 2025**.

Read more: New Scientist | 24 January 2020 | is.gd/TeeLie

Bush fire HAZOP?

"Australia can be considered a massive chemical plant for which no HAZOP has been carried out", says David Wood, a former chair of IChemE's Australian Board. Perhaps chemical engineers could contribute hazard expertise to "Project Australia" and analyse **potentially explosive materials** including **eucalyptus oil** from gum trees. This could help minimise the effects of **bush fires**. Meanwhile, Australia remains the **largest coal exporter** with the Prime Minister rejecting calls for the disaster to prompt more ambitious climate change policy.

Read more: FEBRUARY 2020 | The Chemical Engineer | page 9

New age, new meat

The global population is expected to reach **10bn** by 2050, necessitating the need for sustainable food production. **Plant-based meat mimicry** includes aims to match the organoleptic properties of meat, such as flavour, aroma, texture and appearance. The 'Impossible Burger' uses approximately **90% less water** and land over conventional beef and emits **90% less greenhouses gases**. If you're still into eating animals then perhaps **insects** could be the way forward, showing similar resource reductions to **plant-based protein sources**. Chemical engineers will play a crucial role in the industry due to the need for manufacturing the products.

Read more: FEBRUARY 2020 | The Chemical Engineer | page 29

CHAT WITH A GRAD

JOHN CRAVEN, CLASS OF 1987

BY HIREN PANDYA (Y3)

BIO

Name: John Craven

Job: Co-Founder and Partner of Smith Square Partners

Humble Brags: Chair of ICL Winetasting Society; Worked in several of the *top banks*; co-founded a *successful* company

John Craven is a co-founder and partner of Smith Square Partners, a financial advisory firm. John has a wealth of experience in the world of finance, having worked at Salomon Brothers, Schroders, Credit Suisse and a number of smaller firms. This week, our Alumni Officer Hiren spoke to John about his career since graduating and his time at Imperial.

What has been your career path since Imperial?

I realized during my second year at Imperial that I was interested in finance and the City. I applied to the graduate programmes of lots of investment banks (and some of the big accountants), and joined Salomon Brothers (then one of the leading US investment banks - now part of Citigroup) as an investment banking analyst. I had the opportunity to focus on mergers & acquisitions

and enjoyed the combination of analytical work, deal negotiation (including the psychology) and learning about what drives many different types of businesses and industries. I still do. I've worked in a number of different organisations and discovered that I enjoyed working in smaller, more entrepreneurial firms and teams, although I learnt a lot from working in big banks. I also learnt to build and manage teams of people in addition to advising clients. Nearly 10 years ago I started an M&A boutique firm in partnership with a long-time colleague and friend and we are still going strong.

What is your favourite aspect of your current role?

Variety. I still enjoy advising clients and learning about their businesses, which takes up most of my time, but am also very absorbed in the day-to-day activities of running a small firm and ensuring we have a longer-term strategy. I also have the flexibility to pursue some outside interests – particularly around supporting young people in education and their early business life (I'm a business mentor for the Prince's Trust amongst other things). Whilst there are always frustrations and boring bits, I enjoy going to work (almost) every day.

Where do you see yourself in five years?

Getting closer to handing the baton on to my younger partners – but still enjoying working and perhaps having more time for outside interests.

What is the biggest challenge you've faced since graduation?

Trying to get the right balance of advising and supporting my children (who are both now at university) while giving them the freedom and confidence to find their own path in life!

Which modules/experiences were most relevant to your career path?

The management and commercial modules gave me a good basic understanding and I realized I found them interesting. But the biggest benefit of being an Imperial engineer is that people assume you are smart – whether it's true or not!

What skills have been most useful to your career path?

General analytical and problem-solving skills plus a strong interest in the commercial aspects of what makes businesses tick and in financial markets. To succeed, you have to be flexible, patient and be equally interested in both the numbers and the people.

What advice would you give to students who want to follow your career path?

Learn as much as you can about financial markets and be interested in what makes businesses successful and how they make money. And if you don't find this intrinsically interesting do something else!

And to all the students on the course?

Figure out what you enjoy doing and look for a job doing that – not what you think you ought to be doing. At the time, I expected to work in industry and go back to live in the north of England where I grew up. And remember – you aren't making a lifetime career decision when you graduate – there will be plenty of opportunities to change track in the future.

If you could go back in time as an undergrad, what would you differently? And what would you keep the same?

I made the most of being a student in London and would do the same again; I wish I had kept in contact with more of my peers.

Do you miss Imperial?

I have some good memories and enjoy maintaining contact and supporting current students but always look forward in life, not backwards.

QUICK-FIRE QUESTIONS

Pineapple on pizza? Definitely not.
Favourite lecturer? Bill Wakeham
ABBA: yes or no? Yes (and Led Zeppelin)
Worst module? Physical Chemistry
Rate your life out of 10 during your degree: 8 **and after**: 9 (with ups and downs)
Favourite year of the course? Third
Which place do you want to visit next? Rwanda - mountain gorilla trekking
What is the top item on your bucket list? - Haven't had time to write one yet.

GOT MORE QUESTIONS? Get in touch: uk.linkedin.com/in/john-craven-a3335628 or john.craven@smithsquarepartners.com

PUZZLES

HANG ON... HAVE WE BECOME... ORIGINAL?

THINKER

BY LOUIS MARTINE

39.536, -119.439 = Li

45.807, 9.084 = ?

FOUND THE ANSWER?

You could win some ***ChemEng Swag***.

Email your answer to *guilds.chemeng@imperial.ac.uk* to be entered into the ***PRIZE DRAW***.

WORDSEARCH

THEME: HEAT AND MASS TRANSFER

C	F	S	Q	H	T	H	Y	L	D	U	O	B	I	L	S	D	F	F	Q	Q	I	G
C	A	I	E	R	D	G	Z	H	I	C	L	H	I	H	Q	G	S	A	H	N	S	C
S	P	K	L	O	G	M	E	A	N	T	E	M	P	E	R	A	T	U	R	E	E	O
I	F	O	U	R	I	E	R	F	X	L	Q	V	V	H	T	R	N	F	P	X	L	N
S	K	V	A	O	K	Y	M	T	A	X	N	G	Y	D	B	T	Q	N	J	L	P	V
Y	M	D	G	B	Z	B	O	F	B	I	J	T	O	Z	A	L	R	H	A	P	I	E
L	Z	X	C	Q	E	P	G	I	X	V	L	U	M	U	L	W	V	Q	C	L	C	C
A	Z	J	F	R	G	G	Z	X	S	T	L	N	Y	H	S	R	O	F	B	H	N	T
I	Z	D	I	F	F	U	S	I	O	N	N	O	I	T	C	U	D	N	O	C	I	I
D	Z	R	E	G	N	A	H	C	X	E	T	A	E	H	E	C	K	C	E	S	R	O
A	T	N	E	R	R	U	C	R	E	T	N	U	O	C	C	O	H	B	W	K	P	N
T	K	N	Z	V	H	W	G	D	N	G	J	F	I	C	K	L	F	G	G	Z	T	I
E	Q	X	U	G	H	B	D	I	R	N	H	R	E	D	N	I	L	Y	C	R	S	D
C	O	C	U	R	R	E	N	T	C	X	I	Z	M	E	Q	W	H	V	L	C	R	S
X	R	S	R	H	A	G	B	E	R	E	H	P	S	S	K	Q	Q	F	S	E	I	N
C	P	Y	K	A	Q	I	X	G	T	W	A	G	U	Q	U	T	T	T	U	Z	F	G

Words are hidden in the following directions: ⇦ ⇨ ⇧ ⇩ ⬊

WORDS TO FIND:

COCURRENT	DIALYSIS	FOURIER
CONDUCTION	DIFFUSION	HEATEXCHANGER
CONVECTION	FAIL	LOGMEANTEMPERATURE
COUNTERCURRENT	FICK	SLAB
CYLINDER	FIRSTPRINCIPLES	SPHERE