

Bioengineering at a Glance



Learning, Exams & UROP experiences

Binghuan Webster Li

Department of Bioengineering, Academic Representative | CSSA Secretariat

binghuan.li19@imperial.ac.uk

Peter Xie | Department of Bioengineering

peter.xie19@imperial.ac.uk

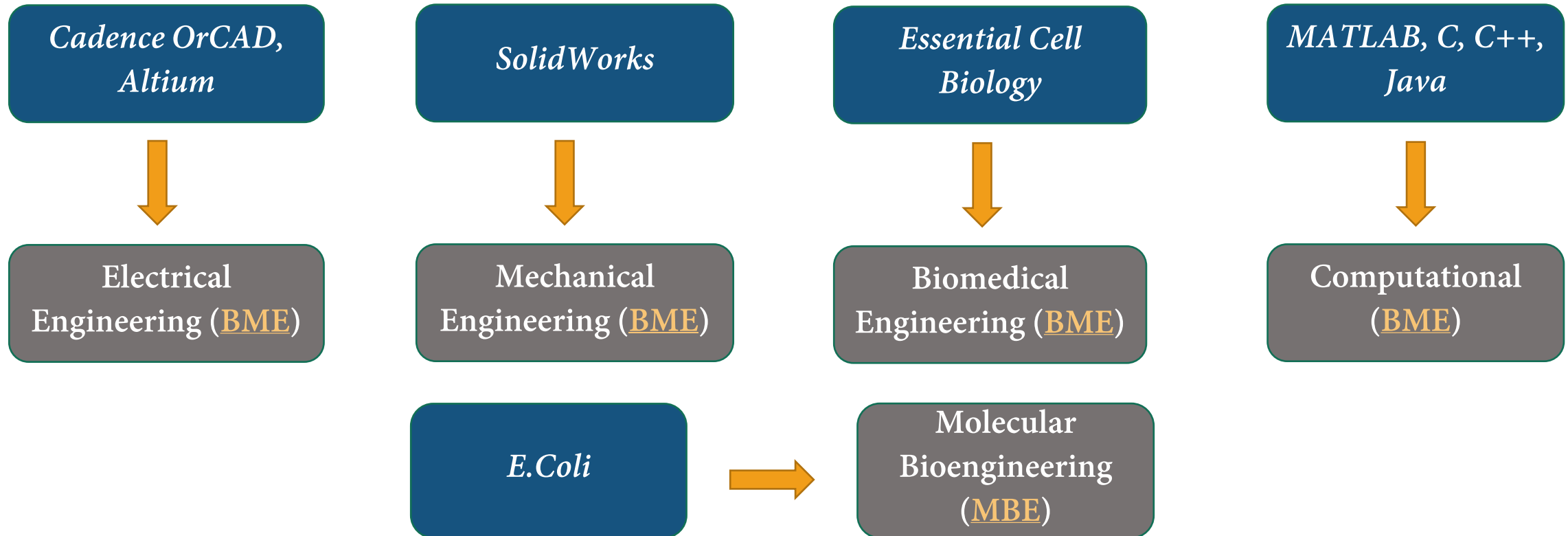
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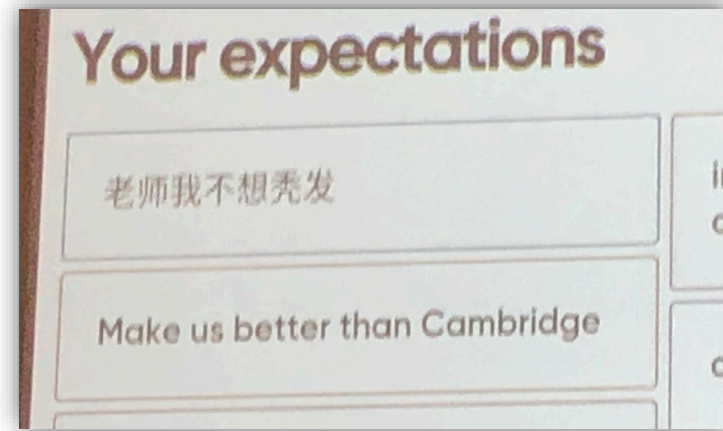
Pathways

Imperial College
London



- By permutation, $3! = 6$
- Possible upcoming programmes in Bioengineering: EMB, EBM, BEM, MEB.....

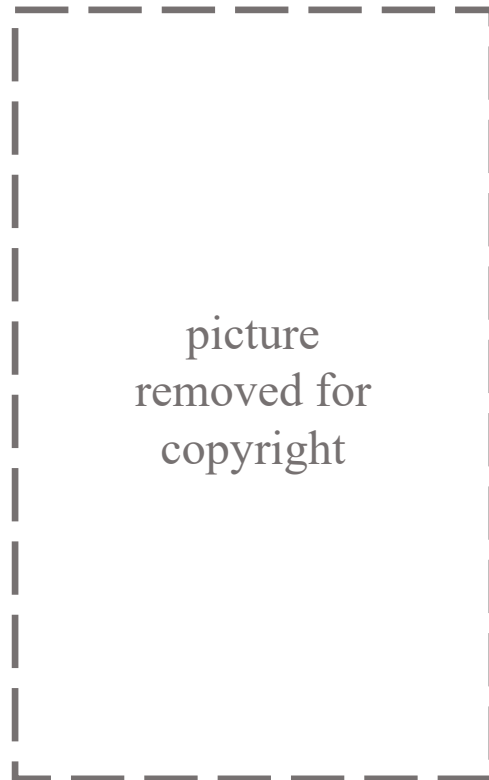
Academics and Students



1. *Lecturers with kind faces*
2. *Students with honesty*
3. *Rock band and Bioeng cowboys*

Research in Bioengineering

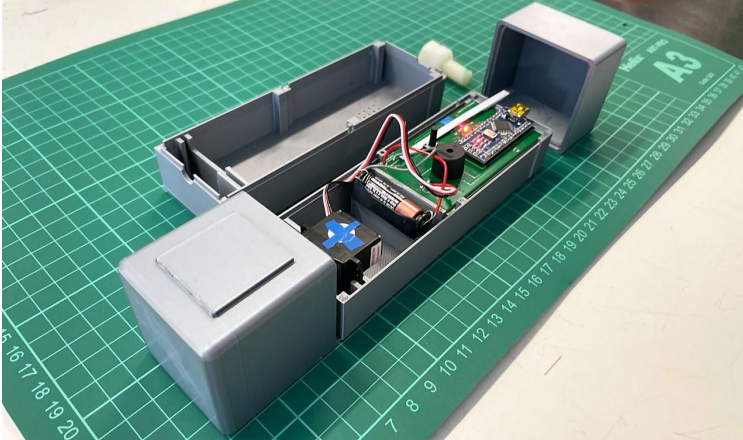
- *Cardiovascular diseases – atherosclerosis & heart failure*



Key research fields

1. Biomechanics and Mechanobiology
2. Biomedical Sensing, Diagnostics and Imaging
3. Computational and Theoretical Modelling
4. Medical Devices
5. Molecular and Cellular Bioengineering
6. Neurotechnology and Robotics
7. Regenerative medicine and Biomaterials

Projects from Bioengineering students



Exam Formats

- Winter (December/January) + Summer (April/May/June) assessments
- Timed-Remote Assessments (TRAs) over the past 2 years
- Mixed exams coming in summer – TRAs (a very few) + in-person exams
- Well... good luck!

Before the exams...

- SHOULD know before written exams
 - Exam format – in-person written / computer test or TRA?
 - Question format - open questions, MCQs or a combination of two?
 - Length? Any specific requirements? (25% extra time once confirmed by dept.)
- GOOD to know before the exams
 - Memory based or mathsy?
 - Past papers available to you?
 - If yes, how much resource can you get?
 - Ask the seniors!

Secret gossips...

- *Imperial Bioeng character alignment chart* (ver.2018, unknown source)

Imperial Bioeng character alignment chart

| | lawful | neutral | chaotic |
|---------|----------------------|------------------------------------|--------------------------------|
| good | Holloway, paschal | Bob spence | O Hare |
| neutral | Tang <u>mengxing</u> | Maria parks, peter <u>weinberg</u> | Hernandez, Amanda <u>foust</u> |
| evil | Ben <u>almquist</u> | Spyros, Rylie green | "Your lecturer" |

- *Imperial Bioeng Bingo*



Some (serious personal) suggestions

- Before the exam:
 - Go through the lectures with your problems. Make reasonable guess.
 - Compile your own notes and formula sets if possible.
 - Ask for clarifications – examinable and in-examinable contents / calculators or MATLAB availability.
 - Take sample papers and past exams as references ONLY – do not 100% rely on them!
 - Someone is there for help!
- During the exam:
 - Your calm is the king
 - Paying attention to time is good, but make sure it does not affect your thinking
 - Demonstrate your thoughts clearly and concisely

After the exams...

- Two-week policy **not** applicable
- No provisional marks available before the moderation
 - Moderation: unknow mechanism (sometimes, via throwing a dice)
- Key dates (for reference)
 - Winter assessment results will be released at some random time during spring
 - First week in July: your progression outcome
 - Email from Mr. H, via departmental internal web
 - Last week in July / First week in August: your year grade
 - Via My Imperial

Historical data, all UG cohorts

| Cohorts (academic year 2020-21) | 1 st (69.5+) | 2:1 (59.5-69.5) | 2:2 (49.5-59.5) | 3 rd (40+) | Cohort size |
|---------------------------------------|----------------------------|--------------------|--------------------|--------------------------|-------------|
| MBE Y1 | 43% | 35% | 17% | 4% | 54 |
| BME Y1 | 35% | 36% | 22% | 2% | 123 |
| MBE Y2 | 47% | 28% | 13% | 2% | 45 |
| BME Y2 | 59% | 31% | 7% | 2% | 118 |
| MEng MBE Y3 | 57% | 34% | 6% | N/A | 35 |
| MEng BME Y3 | 57% | 35% | 4% | 1% | 113 |
| MEng MBE Y4 | 57% | 33% | 10% | N/A | 21 |
| MEng BME Y4 | 57% | 37% | 3% | N/A | 117 |

本人郑重承诺：
我仅代表 Imperial College
最低教育水平，不能体现该
校平均实力，特此声明。

Good luck in your upcoming exams!

UROP Programme

- A UROP is an **internally based** (internal to Imperial College) **research experience** undertaken by an eligible student, supervised by member of academic staff.
- 6-12 Weeks, usually during the summer
- A chance to be a part of an academic research group and take part in **real-world research** in a scientific field

How to Apply?

- Email a Professor whose research interests you! Attach your CV, explain your interest!
- Main Fields of Research:
 1. Biomechanics and Mechanobiology
 2. Biomedical Sensing, Diagnostics and Imaging
 3. Computational and Theoretical Modelling
 4. Medical Devices
 5. Molecular and Cellular Bioengineering
 6. Neurotechnology and Robotics
 7. Regenerative medicine and Biomaterials

UROF Funding

- Deadline = 14th of February
- 300-400 pounds per week
- UROF Supervisor Statements due 25th of February
- Funding is competitive!
- Link: <https://www.imperial.ac.uk/students/fees-and-funding/undergraduate-funding/loans-and-grants/funding-for-placements/urop/>

My Experience – Year 1

- Modelling Lymphatics
- MATLAB. Mathematics, Fluid Mechanics
- Modelling Mechanobiology of lymphatic contractions at sub-cellular scale

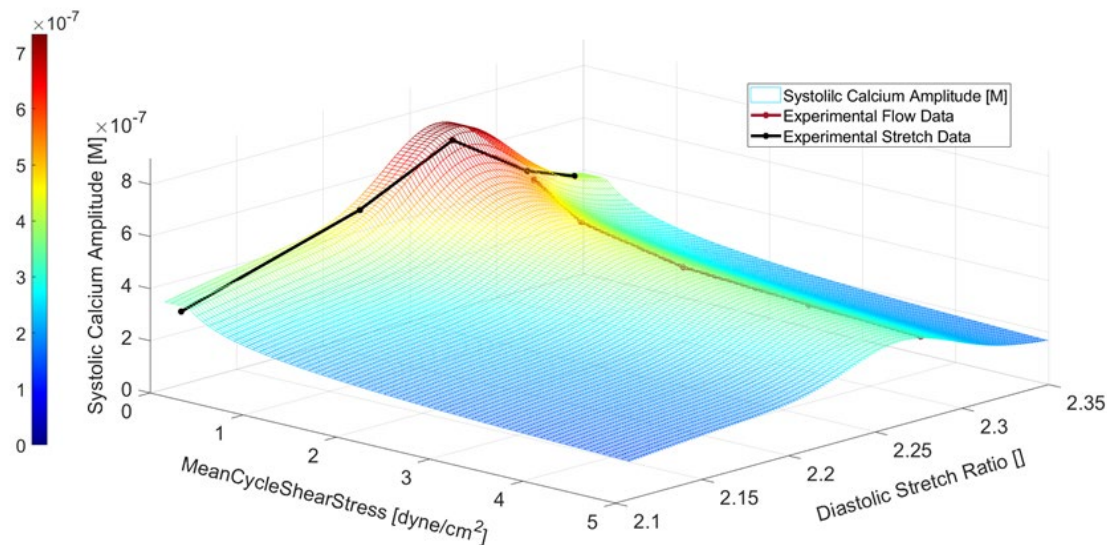


Fig. 2 Mechanical Regulation of [Calcium]

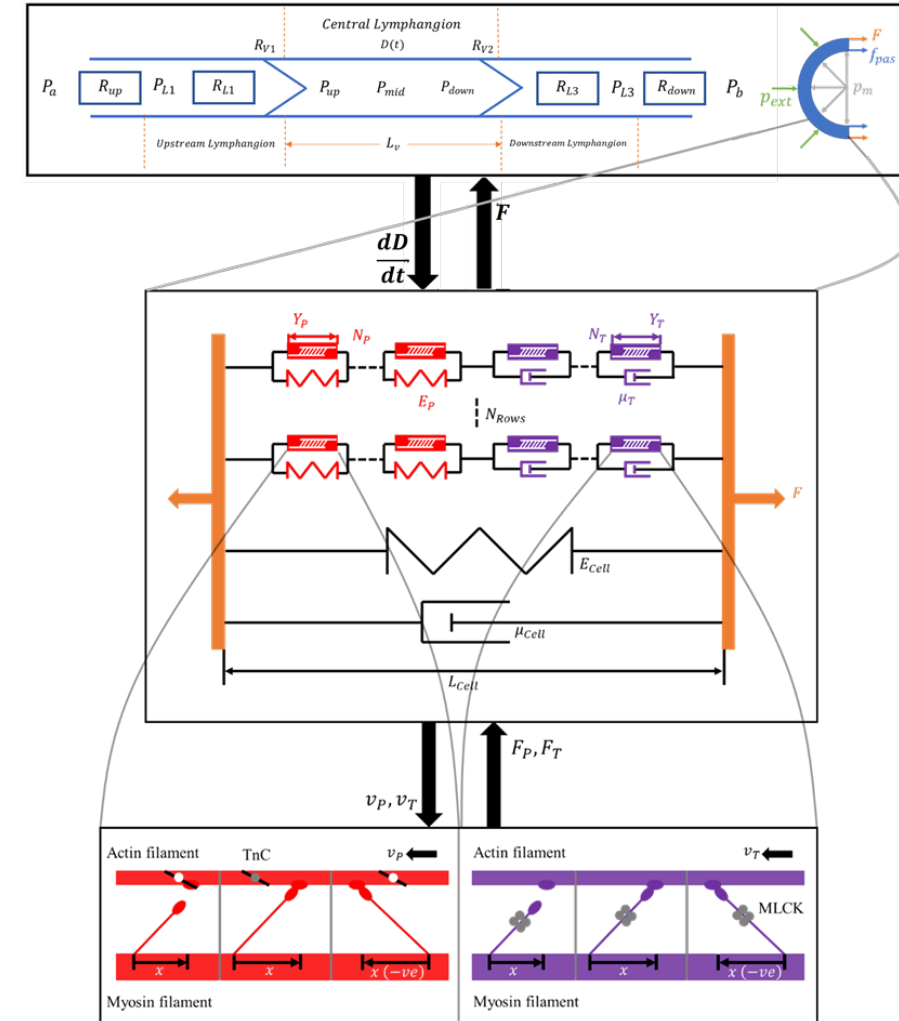


Fig. 1 Lymphatic Muscle Cell Schematic

My Experience – Year 2

- Studying Chemokine transport in Microfluidic devices
- Experimental project – cells, proteins, live imaging....
- Computational aspects – image processing, deep learning, algorithm development...

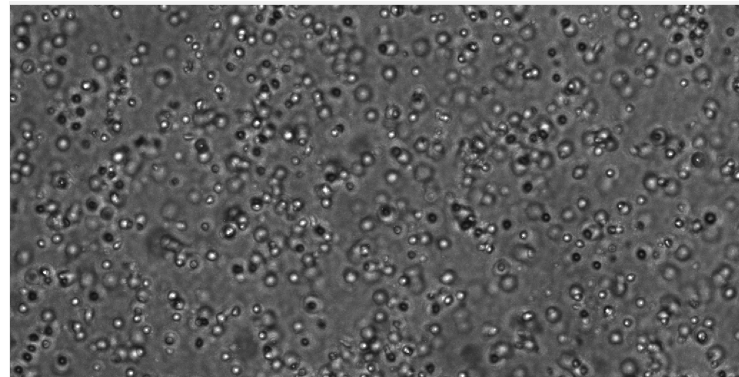


Fig. 4 Cell Tracking

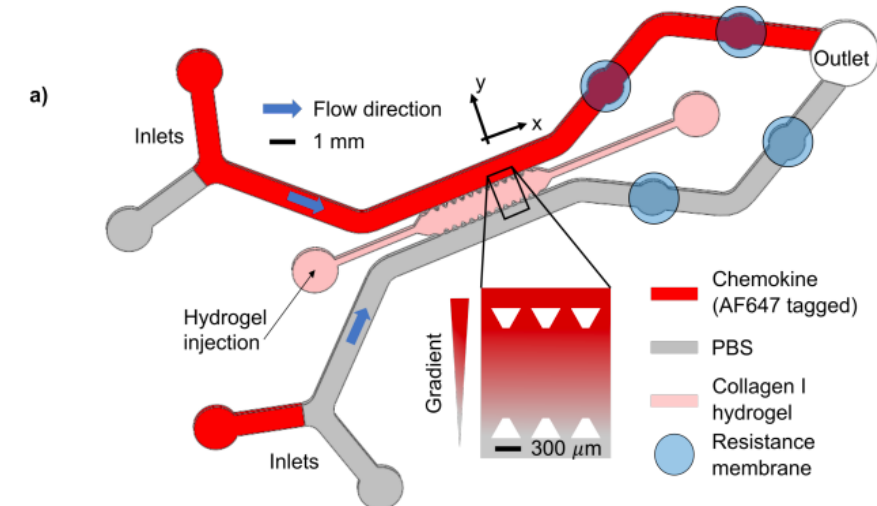


Fig. 2 Microfluidic Device

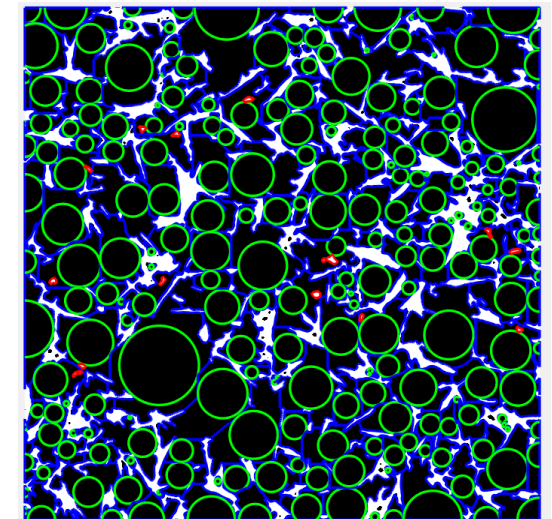


Fig. 3 Scaffold Pore size analysis

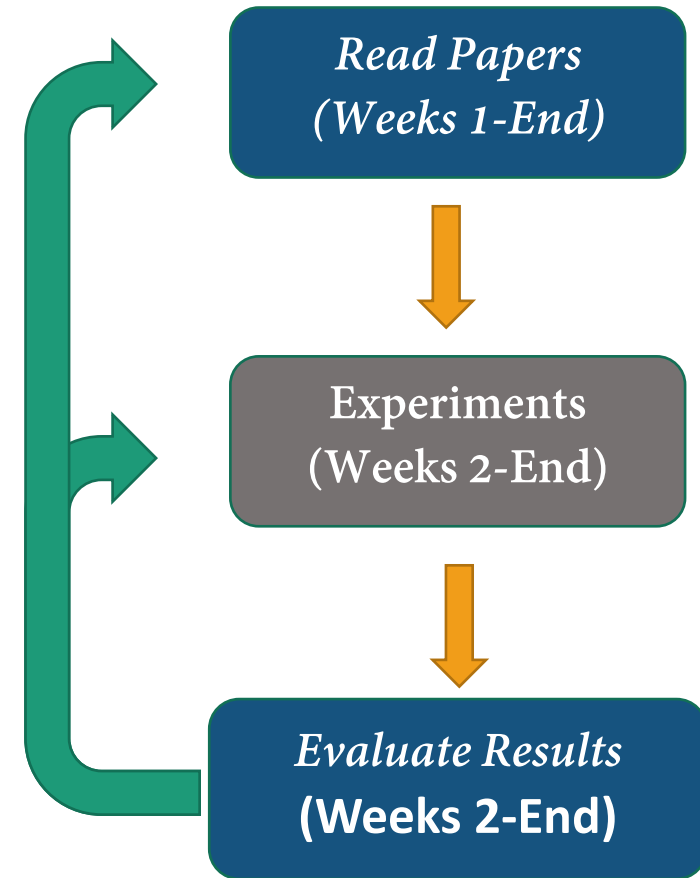
Day to Day Life during UROP

- Purely Computational: can go anywhere on earth Weekly or two-meetings per week with primary supervisor (PhD/Postdoc), and PI (principal investigator).
- Experimental: South Kensington/White City. Schedule depends on nature of work. 3 days/week of experiments, 2days/week data analysis and computational work.
- Have Fun ! Nice weather during summer.
- Do activities outside of UROP.

Advice during UROP

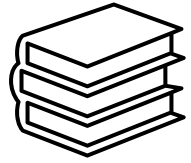
- Be Proactive! Research is very independent.
- Ask lots of Questions! Suggest your own thinking!
- Be prepared for meetings!
- Read Papers, understand + evaluate relevance to project
- Prioritize learning important skills (e.g programming, performing experiments)!

Research Timeline



After your UROP...

- See if research is something you enjoy! Lots of career options in engineering
- Appreciate the skills you have gained
- Potential to continue working during academic year
- Publishing your research (progress understanding in a field of research)
- Science can fail/not work! (not everything is guaranteed to work, especially the first time).



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