



Durham
University

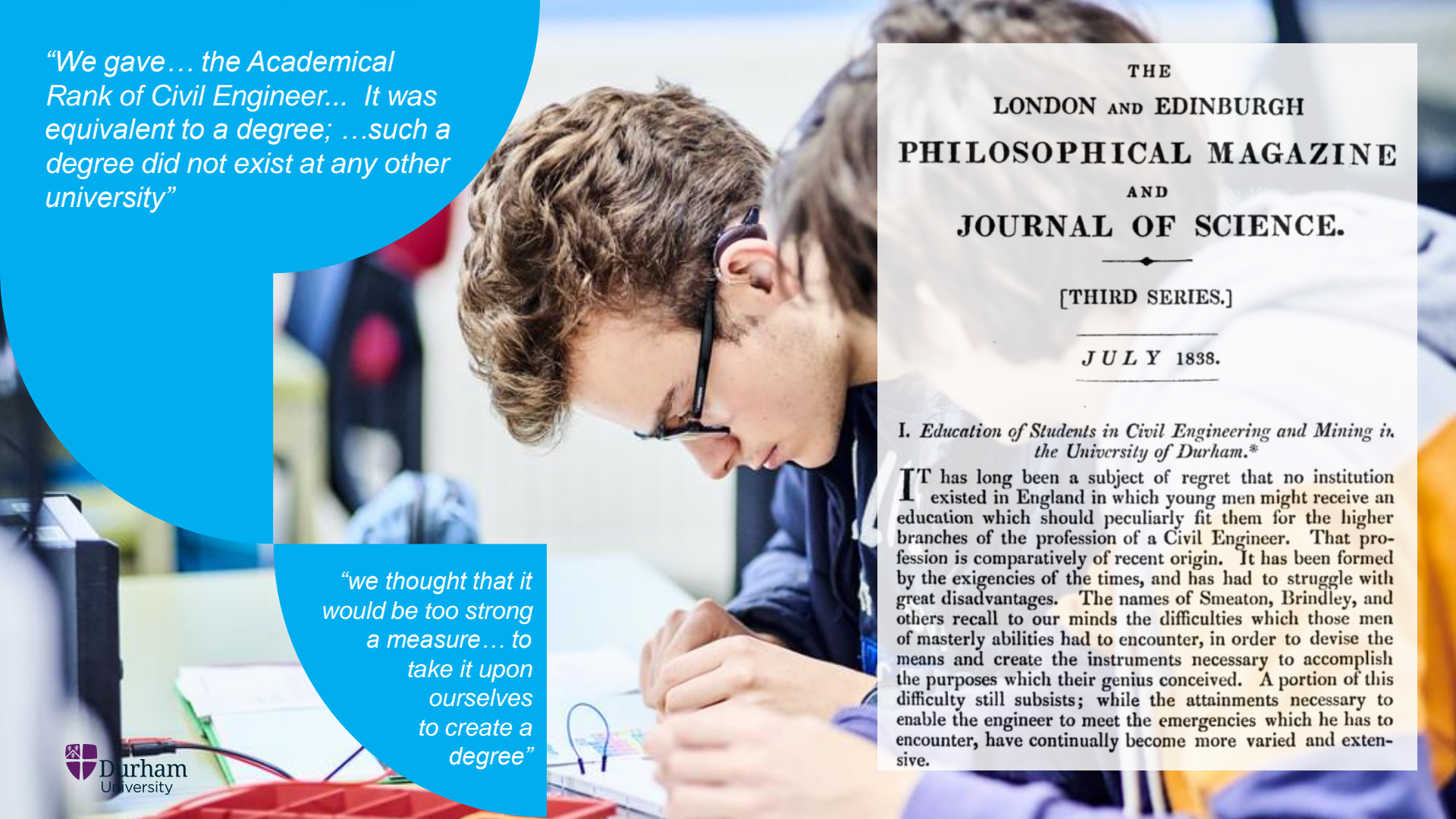
Department of Engineering

Undergraduate Degrees

Dr Iddo Amit

Assistant Professor & Admissions Tutor

 [@Durham_Eng](https://twitter.com/Durham_Eng)

A young man with brown hair and glasses is focused on his work in a laboratory. He is wearing a blue lab coat and is working on a breadboard with various electronic components. The background is slightly blurred, showing other people and equipment in a lab setting.

“We gave... the Academical Rank of Civil Engineer... It was equivalent to a degree; ...such a degree did not exist at any other university”

“we thought that it would be too strong a measure... to take it upon ourselves to create a degree”

THE
LONDON AND EDINBURGH
PHILOSOPHICAL MAGAZINE
AND
JOURNAL OF SCIENCE.

[THIRD SERIES.]

JULY 1838.

*I. Education of Students in Civil Engineering and Mining in the University of Durham.**

IT has long been a subject of regret that no institution existed in England in which young men might receive an education which should peculiarly fit them for the higher branches of the profession of a Civil Engineer. That profession is comparatively of recent origin. It has been formed by the exigencies of the times, and has had to struggle with great disadvantages. The names of Smeaton, Brindley, and others recall to our minds the difficulties which those men of masterly abilities had to encounter, in order to devise the means and create the instruments necessary to accomplish the purposes which their genius conceived. A portion of this difficulty still subsists; while the attainments necessary to enable the engineer to meet the emergencies which he has to encounter, have continually become more varied and extensive.



1965

Engineering moved to its current site in Durham City – Christopherson Building

1986

Higginson Building constructed, creating more laboratory and teaching space

£4.5M

has recently been invested into the Department of Engineering, creating new student work space and laboratories

24

Hour access to key student working areas help our students to be flexible in the way that they study

On-line

access to the computing resources was provided to all students during Covid-19 restrictions





210

Engineering Undergraduate students per year – this makes us very small by UK standards!



1838

Engineering at Durham is the oldest course of its kind in the UK



3rd

Engineering at Durham University is joint 3rd in the UK for employability



95%

of our Engineering graduates are in graduate level paid employment or further study 15 month after graduation (*The Guardian University Guide 2022*)



55

Academic staff to support your studies, plus 20+ technical and support staff

5th

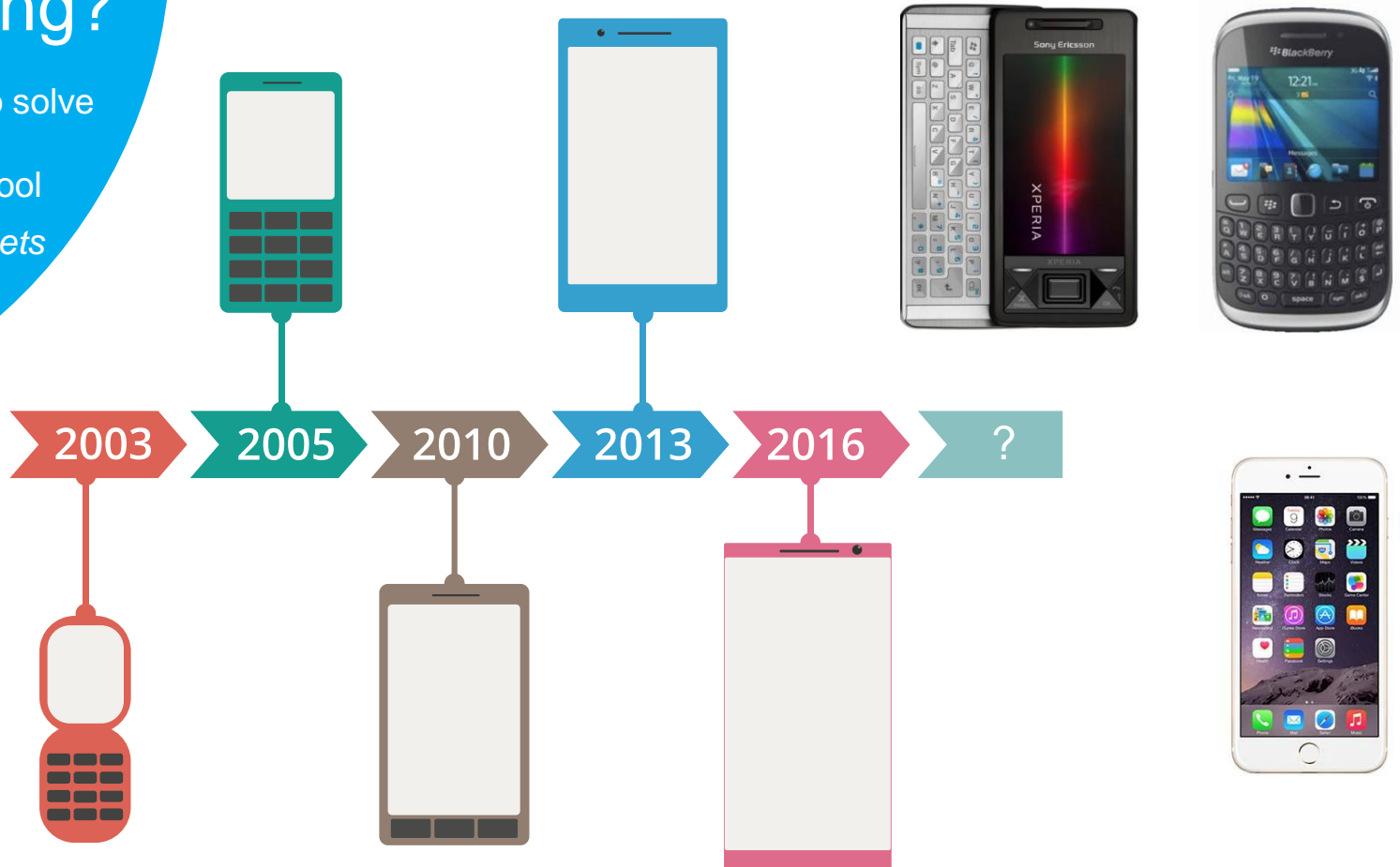
Engineering at Durham University is 4th in *The Complete University Guide 2023*



Engineering?

Applying science to solve problems using mathematics as a tool

Where Science meets the Creative Arts



Implement

execution is part of
the engineering
solution



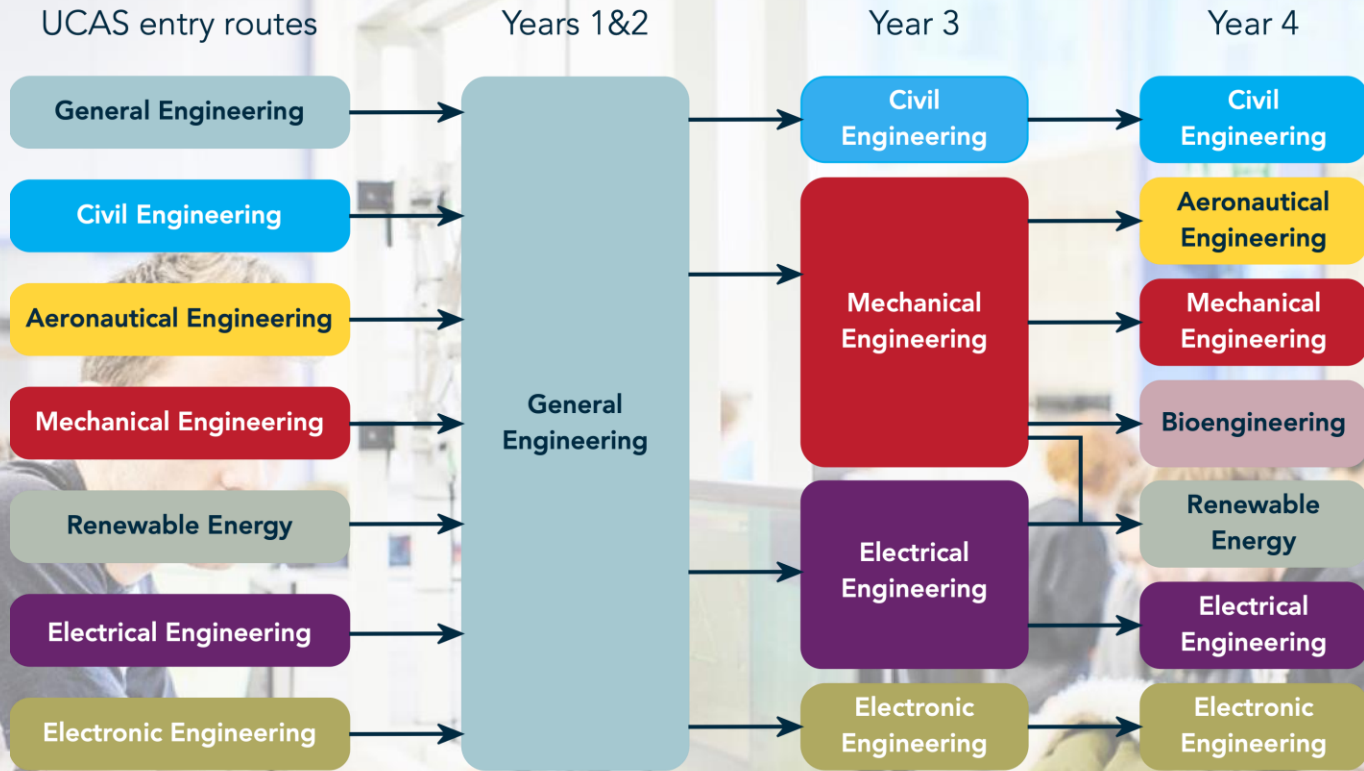
Why General Engineering?



We believe that real engineering problems are highly multi-disciplinary

Philosophy of the Department, not just the Programme

We believe that students should make an informed decision about their future.



BEng

MEng



Being the unsure seventeen-year-old I was, I saw my future in Electrical/Electronic Engineering.

Four years later, I'm studying the Aeronautical stream and looking for a career in racing car aerodynamics!

I don't know of many courses out there that would have allowed me to do that.

James Marriott
Engineering Graduate



Solid Mechanics & Structures

Core knowledge for Mechanical and Civil Engineers

Stress/strain
Material failure
Structures
Beams
Equilibrium

Exam

Thermodynamics & Fluid Mechanics

Essential knowledge for Mechanical Engineers

1st and 2nd laws
Static & dynamic fluids
Dimensional Analysis

Exam

Electronic & Electrical Systems

Fundamentals for Electrical / Electronic Engineers

Digital & analogue electronics
Electrostatics
Electromagnetism

Exam

Engineering Practice

Underpinning skills and practical experience

Laboratories
Sketching
CAD
Programming
Design
Teamwork

Coursework

Mathematics for Engineers

Mathematics is a core Engineering tool

Matrices/vectors
Complex numbers
Differentiation
Integration
Linear Algebra

Homework & Exam

Free Elective

Take a subject from across the University

History?
Language?
Maths?
Physics?
Law?
Languages? (Engineering)

Homework & Exam

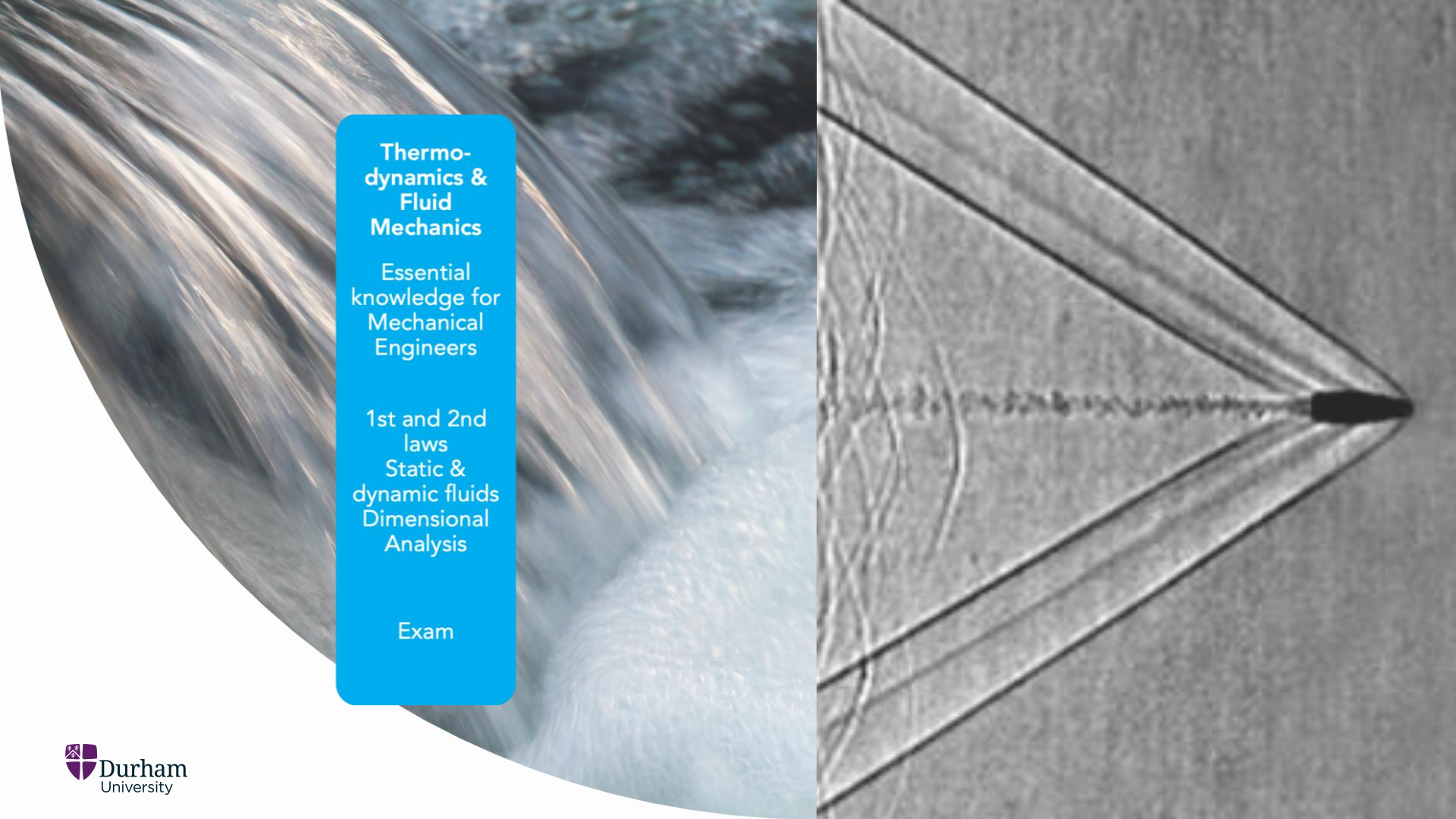


**Solid
Mechanics &
Structures**

Core
knowledge for
Mechanical and
Civil Engineers

Stress/strain
Material
failure
Structures
Beams
Equilibrium

Exam



**Thermo-
dynamics &
Fluid
Mechanics**

Essential
knowledge for
Mechanical
Engineers

1st and 2nd
laws
Static &
dynamic fluids
Dimensional
Analysis

Exam

A photograph of three students in a laboratory setting. They are gathered around a workbench, focused on a task involving electronic components and wiring. In the background, there are various pieces of laboratory equipment, including what appears to be an oscilloscope and other electronic test gear. The students are dressed in casual attire, and the overall atmosphere is one of collaborative learning and technical work.

Electronic & Electrical Systems

Fundamentals for Electrical / Electronic Engineers

Digital & analogue electronics
Electrostatics
Electro-magnetism

Exam



Engineering Practice

Underpinning skills and practical experience

Laboratories
Sketching
CAD
Programming
Design
Teamwork

Coursework

$$\text{Slip}_{(s)} = \frac{N_s - N_i}{N_s}$$

Warning

Strobes (STROBE) are used in this lab.

Form a member of staff if this may cause any problems.

$$\text{Slip} = \frac{\Delta \omega}{\omega_s}$$

Mathematics for Engineers

Mathematics is a core Engineering tool

Matrices/
vectors
Complex numbers
Differentiation
Integration
Linear Algebra

Homework & Exam

Solid Mechanics & Structures

Core knowledge for Mechanical and Civil Engineers

Stress/strain
Material failure
Structures
Beams
Equilibrium

Exam

Thermodynamics & Fluid Mechanics

Essential knowledge for Mechanical Engineers

1st and 2nd laws
Static & dynamic fluids
Dimensional Analysis

Exam

Electronic & Electrical Systems

Fundamentals for Electrical / Electronic Engineers

Digital & analogue electronics
Electrostatics
Electromagnetism

Exam

Engineering Practice

Underpinning skills and practical experience

Laboratories
Sketching
CAD
Programming
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Teamwork

Coursework

Mathematics for Engineers

Mathematics is a core Engineering tool

Matrices/vectors
Complex numbers
Differentiation
Integration
Linear Algebra

Homework & Exam

Free Elective

Take a subject from across the University

History?
Language?
Maths?
Physics?
Law?
Languages? (Engineering)

Homework & Exam



1,200 hrs

you are expected to spend 1,200 hours on your studies over a year.

Durham University runs a term system with one examination period per year.



Term 1

10 Weeks

Lectures

Seminars

Laboratories

CAD

Sketching

Coursework

Term 2

10 Weeks

Lectures

Seminars

Laboratories

Engineering Design

Programming

Coursework

Term 3

9 Weeks

Revision

Examinations

Practical Engineering Skills Course (post exams)

Lectures

Are the primary way that new content is delivered to our students – taking notes, completing prepared materials, solving example problems, emphasising applications, etc.

Solid Mechanics & Structures

Core knowledge for Mechanical and Civil Engineers

Stress/strain
Material failure
Structures
Beams
Equilibrium

Exam

Thermodynamics & Fluid Mechanics

Essential knowledge for Mechanical Engineers

1st and 2nd laws
Static & dynamic fluids
Dimensional Analysis

Exam

Electronic & Electrical Systems

Fundamentals for Electrical / Electronic Engineers

Digital & analogue electronics
Electrostatics
Electromagnetism

Exam



Reinforce

taught content
through hands-on
experience

2 hours

of lab activity per
week for the first
three years of
your degree

Experts

guided &
challenged by
area-specific
research post-
graduates

Engineering
Practice

Underpinning
skills and
practical
experience

Laboratories
Sketching
CAD
Programming
Design
Teamwork

Coursework

Ground-up

we don't assume any prior knowledge when teaching programming or Computer Aided Design (CAD).

Great if you've done some before, but you won't be left behind if you haven't.

Engineering Practice

Underpinning skills and practical experience

Laboratories
Sketching
CAD
Programming
Design
Teamwork

Coursework

Engineering Practice

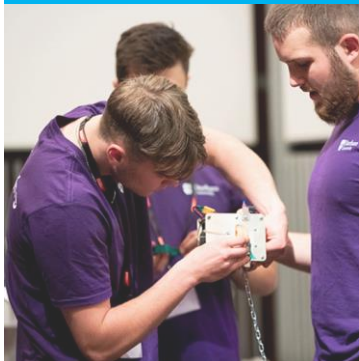
Underpinning skills and practical experience

Laboratories
Sketching
CAD
Programming
Design
Teamwork

Coursework

Engineering Design

solve a challenge set by the Institution of Mechanical Engineers (IMechE)



1st

Durham students have won both the regional & national IMechE design competitions



Supervision

you will work with a Professional Engineer and an Academic who help to guide your projects



460

hours

of Engineering design over the degree

Apply

the taught material to a real engineering problem and develop you teamworking and problem solving skills

PEAC

All Durham Engineers complete a practical skills course at the end of the 1st year.

This is a chance to get hands-on experience in machining, welding, etc.

Engineering Practice

Underpinning skills and practical experience

Laboratories
Sketching
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Design
Teamwork

Coursework

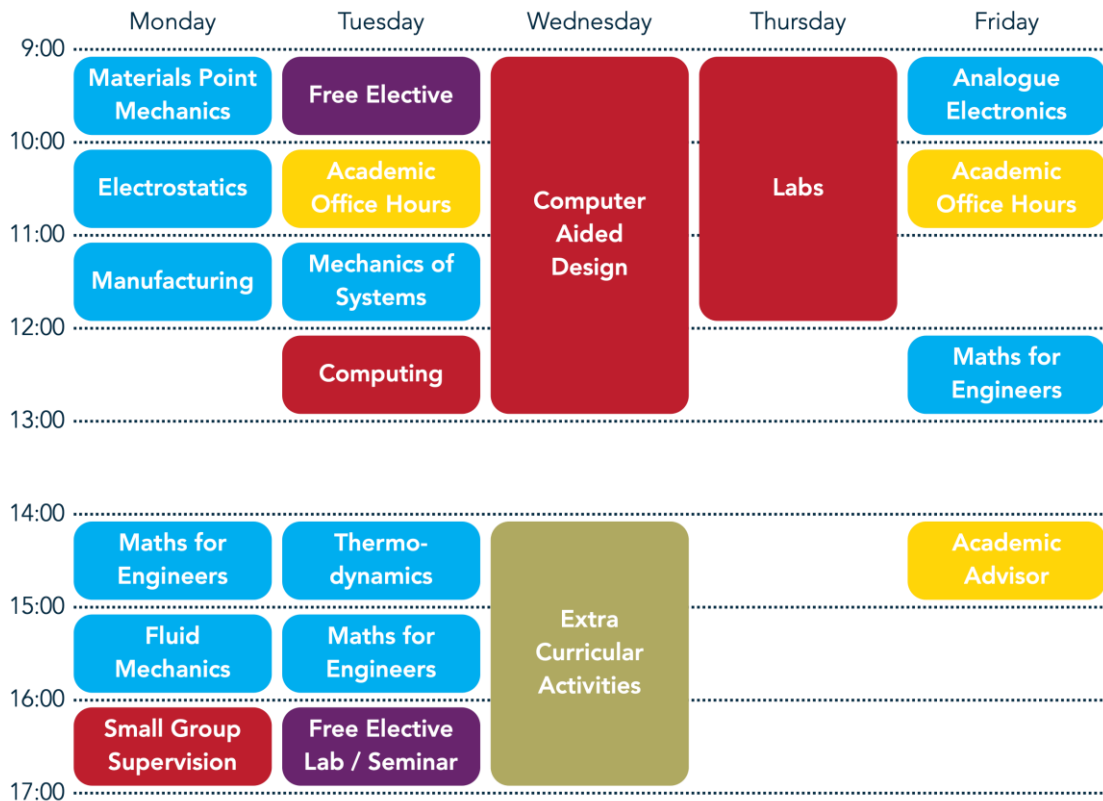


20 hours
1st Year Engineers have around 20 hours per week of contact time.

5+ hours
of practical activity or Engineering design per week.



12 hours
of lectures per week - roughly two per module.



Solid Mechanics & Structures 2

Dynamics, Vibrations, Mechanics of static systems, Shear & torsion, Trusses and frames, Stresses in solids

Exam & Coursework

Thermodynamics & Fluid Mechanics 2

Steam cycles, Refrigeration, Gas mixtures & combustion, Viscous fluid flow, Heat transfer & heat exchangers

Exam & Coursework

Electronics 2

Analogue circuits, Digital electronics, Logic & microprocessor design, Measurements and signal processing

Exam & Coursework

Electrical Engineering 2

System stability & control, Electro-magnetism, AC circuit analysis, Electrical Machines

Exam & Coursework

Engineering Design 2

Concept generation, Embodiment & detailed design

Sustainability

Risk & contingency

Teamwork

Coursework

Engineering Mathematics

Probability & statistics

Data analysis

Numerical methods for Engineering problems

Exam & Coursework

Challenge

solve a complex
Engineering problem
over the course of
the year

5-6 students

with different interests
work together to solve
a multi-disciplinary
problem

Skills

problem solving,
teamworking, report
writing, presenting,
critical analysis,
etc.

**Engineering
Design 2**

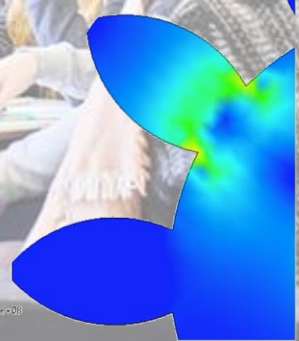
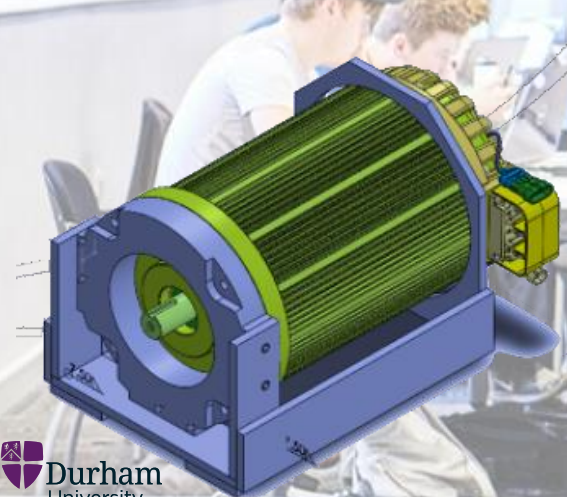
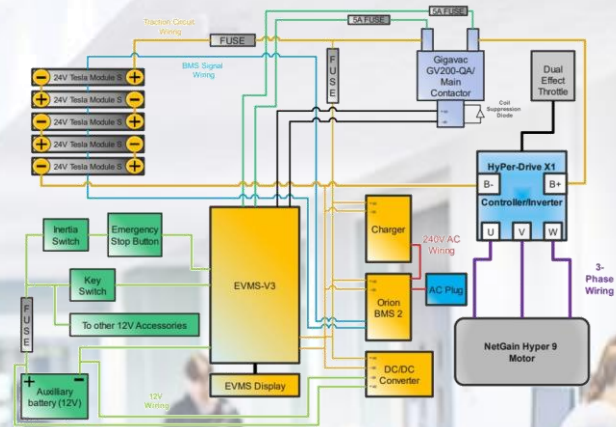
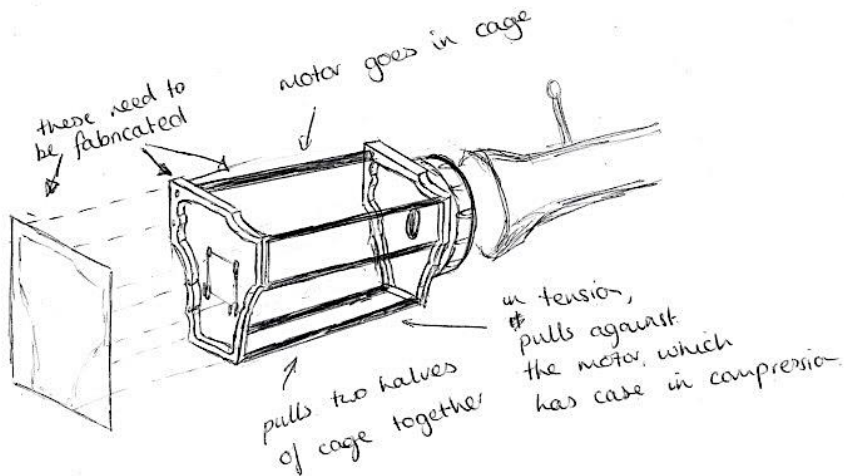
Concept
generation,
Embodiment
& detailed
design

Sustainability

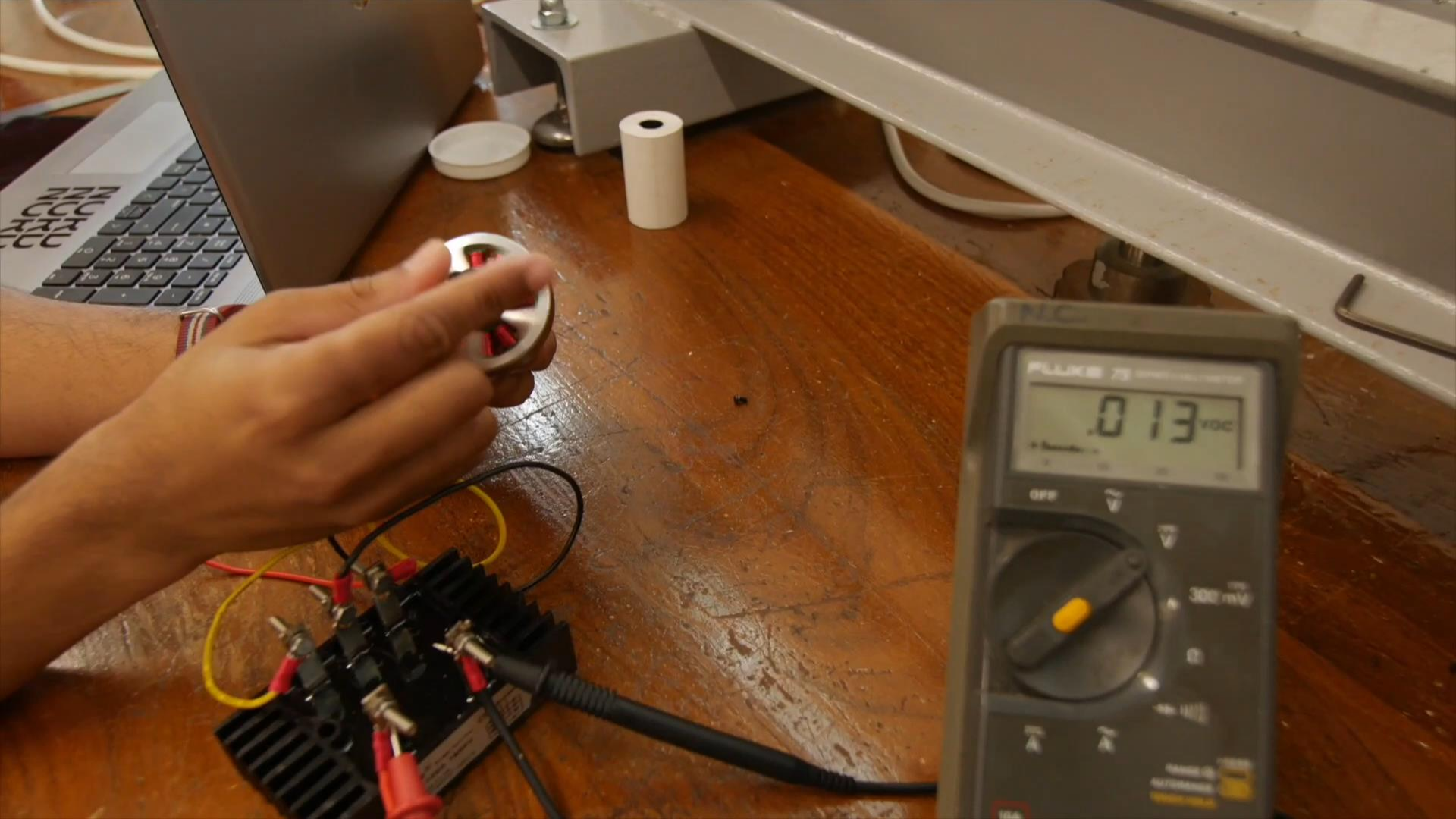
Risk &
contingency

Teamwork

Coursework



- Engineering Design 2
- Concept generation, Embodiment & detailed design
- Sustainability
- Risk & contingency
- Teamwork
- Coursework



FLUX 75
0.13 VDC

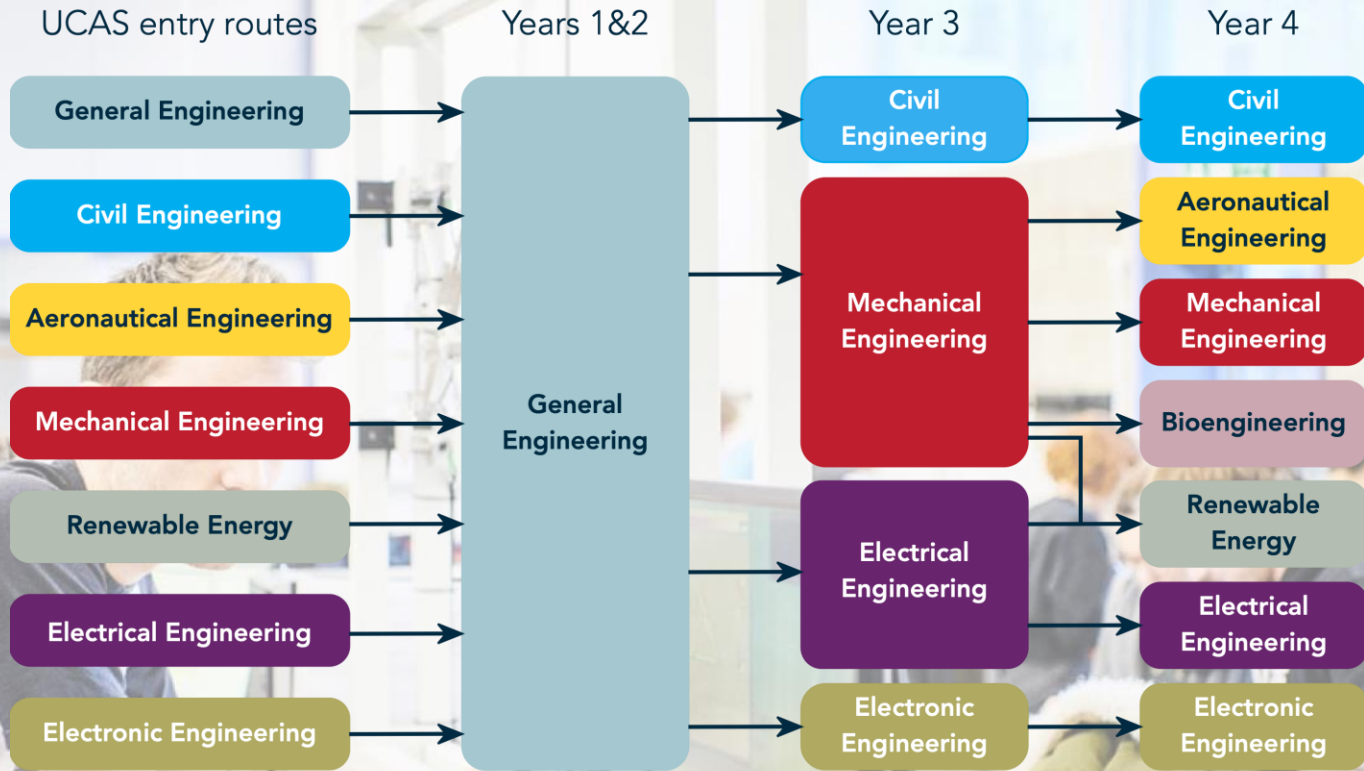
OFF
V
300 mV
A
A



Workshops

Fully-equipped Department-based workshops fully staffed by expert technicians who support students to see their ideas come into reality.

We believe that students should make an informed decision about their future.



BEng

MEng



Every year our students publish their research at conferences and in journals – this is a real legacy!

Energy Efficient and Adaptive Design for Wireless Power Transfer in Electric Vehicles

Xiaolin Mou, Oliver Groling, Andrew Gallant and Hongjian Sun
School of Engineering and Computing Sciences, Durham University, Durham, UK
Email: hongjian.sun@durham.ac.uk

Abstract—Wireless power transfer (WPT) could revolutionize global transportation and accelerate growth in the Electric Vehicle (EV) market, offering an attractive alternative to cabled

In general, WPT requires accurate alignment between the transmitter and receiver coils. The latter one is mounted on the EV to power and operate various devices.

This poses two main technical challenges:

- Standardization of transmitter (TX) & receiver (RX) coil dimensions to ensure compatibility with a wide range of EV models.
- Compensating for driver behaviour, since misalignment between TX and RX coils is inevitable in both static and dynamic charging.

The misalignment issue is critical since the electromagnetic energy in conventional MRC-WPT rapidly decays with distance between coils. Lateral and angular misalignment analysis for inductive coupling WPT has been examined by



ELSEVIER

Contents lists available at ScienceDirect

Engineering Analysis with Boundary Elements

journal homepage: www.elsevier.com/locate/enganabo



Boundary element simulation of fatigue crack growth in multi-site damage

R.J. Price, J. Trevelyan*

School of Engineering and Computing Sciences, Durham University, South Road, Durham DH1 1LE, UK

ARTICLE INFO

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Keywords:
Dual BEM
Fracture
Fatigue
Multi-site damage

ABSTRACT

This paper presents an efficient and automatic scheme for modelling the growth of multiple cracks through a two-dimensional domain under fatigue loading based on linear elastic fracture mechanics. The dual boundary element method is applied to perform an analysis of the cracked domain and the J -integral technique is used to compute stress intensity factors. Incremental crack propagation directions are evaluated using the maximum principal stress criterion and a combined predictor-corrector algorithm implemented for propagation angle and increment length. Criteria are presented to control the mesh used on the slower growing cracks in the domain, improving computational efficiency and accuracy by the use of virtual crack tips to avoid the need for severe mesh grading. Results are presented for several geometries with multi-site damage, and sensitivity to incremental crack length is investigated. The scheme demonstrates considerable advantages over the finite element method for this application due to simplicity of meshing, and over other boundary element formulations for modelling domains with large ranges of crack growth rates.



Dissertation Project

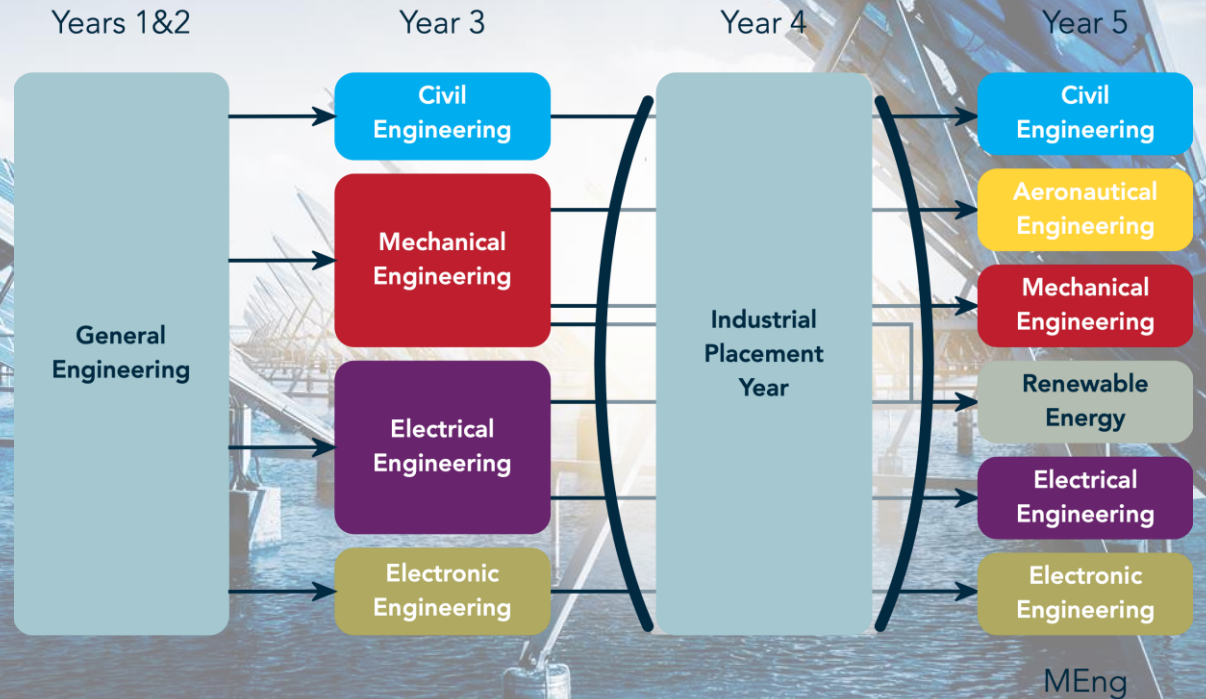
work one-to-one with a world-leading academic on a real, unsolved engineering problem

contribute to our outstanding research

Coursework & Oral Exam

Industrial Placement Year

Boost your employability prospects and experience the life of a professional engineer



BEng with a placement year (3+1) is available as well



The 12 months work experience I gained during the placement year put me ahead of others applying for graduate roles.

It allowed me to develop several key skillsets such as time management, and effective writing as well as technical skills learnt specific to the industry in which I worked.

I was also able to apply these skills to my final year of dissertation project, resulting in a very positive outcome.

William Greenway
Recent graduate



Other activities

- Over 200 different societies to join
- Opportunities to play for one of over 500 sports teams across 18 different sports
- Take part in one of 60 student theatre productions every year
- Volunteer with a choice of over 40 local community projects
- Raise money for a range of 120 charities

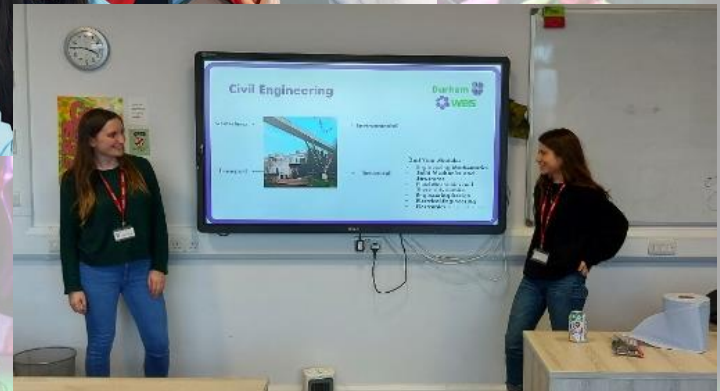


Smashing Stereotypes –
This is what an engineer looks like



Krystina Pearson-Rampeearee CEng
MRAeS FWES FRSA MIET – Senior
Systems Engineer, BAE Systems

 @aviateher
 @K_Ramps



3,000km

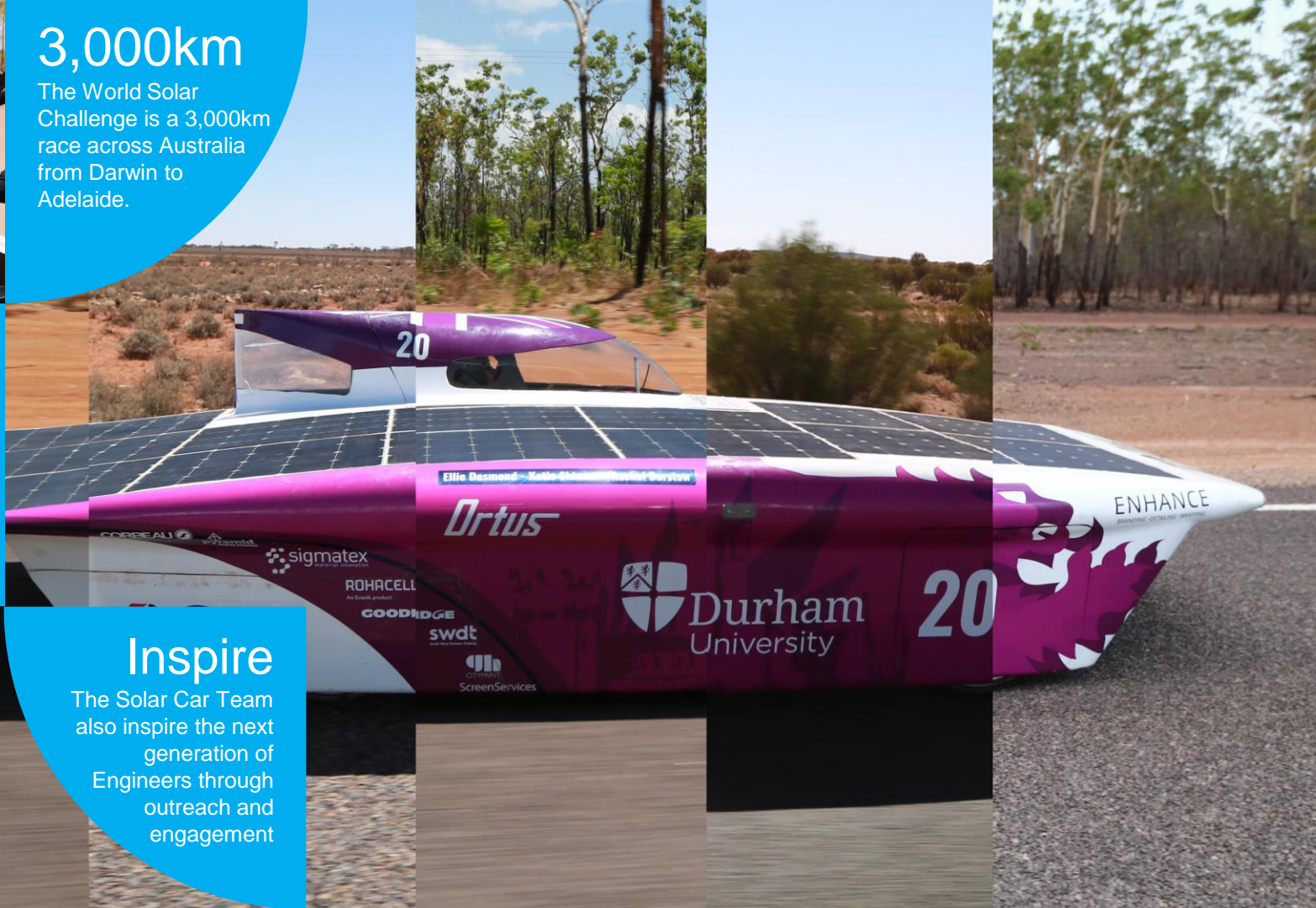
The World Solar Challenge is a 3,000km race across Australia from Darwin to Adelaide.

Extra-Curricular

Design, build and race solar-powered vehicles in your spare time

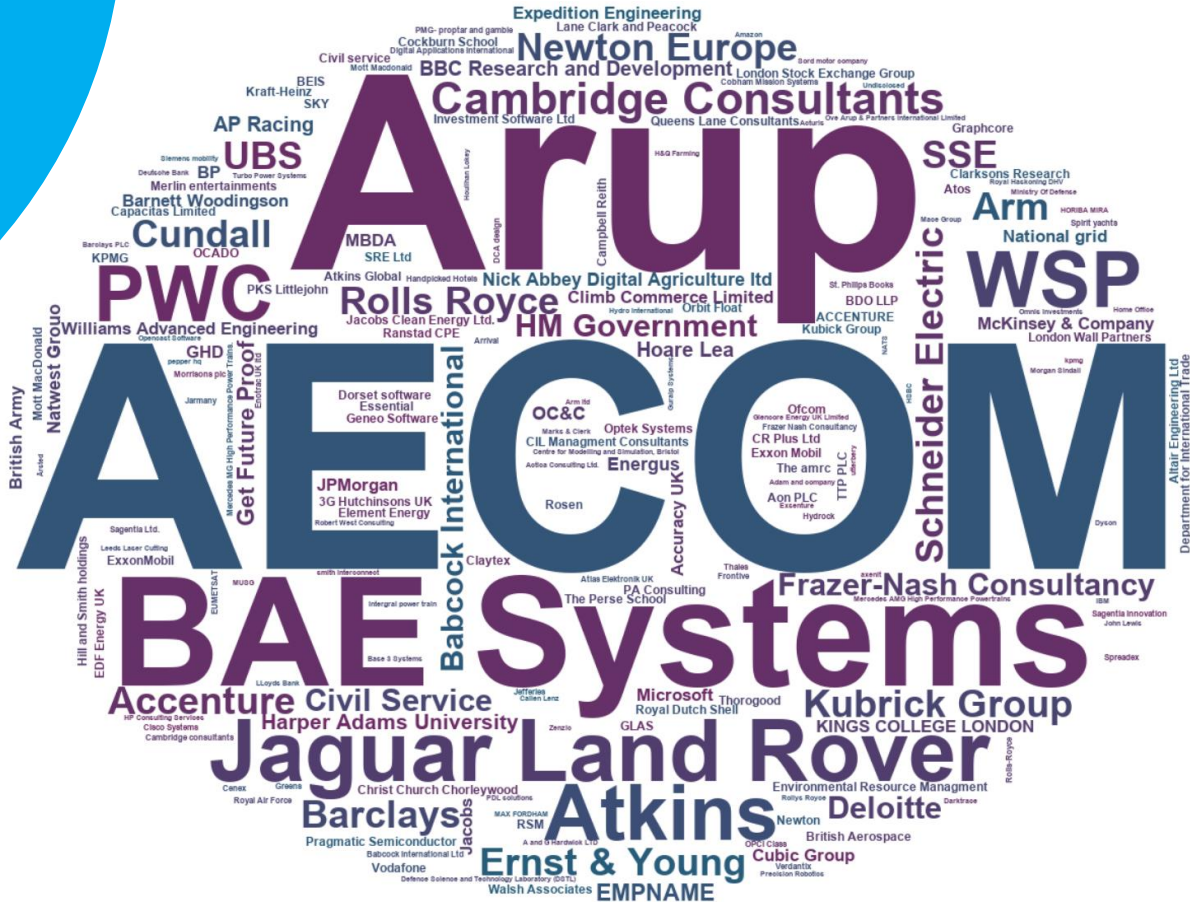
Inspire

The Solar Car Team also inspire the next generation of Engineers through outreach and engagement



Leavers destinations

Over 95% of our graduates are in graduate level paying jobs within 15 months



Applying

- All applications via UCAS
- Selection is based on the UCAS form
- Durham's policy is not to interview

We believe that selecting based on the UCAS form is the fairest and most consistent approach

A*AA

including Maths and one of the list: Biology, Chemistry, Geology or Physics

Equivalencies online*

Access

We are committed to increasing the diversity of our student population through widening participation

What our selectors consider

- Prior and predicted grades
- Personal statement
- Teachers/Academic reference
- Contextual evidence of merit and potential
- Motivation for the degree programme
- Study & other skills

Find out more by attending 'Applying to Durham' session at the Learning and Teaching Centre, TLC 042

A*AA

including Maths and one of the list: Biology, Chemistry, Geology or Physics

Equivalencies online*

Access

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Personal Statements

- Evidence of commitment to Engineering
- What inspired you to apply to study Engineering?
- If you have some relevant work experience, make the most of this. Tell us what you learned...
- We are looking for people who are creative, show originality and who take the initiative
- Tell us about things you have done: creating something, programming, taking things apart, etc.
- Fine to focus on a specific discipline (as long as we offer it)



College Allocation

- We no longer ask you to make a college preference on your UCAS Application Form. The only option listed at UCAS is 'Durham City'
- Your college is NOT linked to your degree subject
- Before we allocate your college, you will be invited to rank the colleges in the order of your preference
- You will be allocated your college in or around May

To find out more visit the Colleges Hub on the top floor of the Teaching and Learning Centre



Studying Engineering at Durham University was the best choice I ever made.

Even though sometimes the course was demanding, the experience of being at Durham has been amazing.

I know that my time at Durham has fully prepared me for whatever the future may hold in my engineering career.

Samantha Brizuela
Graduate at Jaguar Land Rover





Durham
University

Department of Engineering

Undergraduate Degrees

Dr Iddo Amit

Assistant Professor & Admissions Tutor

engineering.admissions@durham.ac.uk

 [@Durham_Eng](https://twitter.com/Durham_Eng)

