IMPERIAL

PGT Programmes Overview

MSc Design Engineering

MSc Design with Behaviour Science

MSc Cleantech Innovation | with The Grantham Institute

MRes Design Engineering

Academic Year 2024-25

Dyson School of
Design Engineering

1. Welcome and introduction to the department

Studying at The Dyson School of Design Engineering

Embark on the next chapter of your academic journey with the Dyson School of Design Engineering at Imperial. We are thrilled to introduce our four innovative new courses. Our diverse offerings reflect the dynamic and cutting-edge nature of design engineering at our institution. Discover diverse career paths, ranging from delving into transdisciplinary design engineering research to shaping the future as cleantech innovators in our latest MSc programs.

Our Principles

In 2012 Imperial and Imperial College Union agreed 'Our Principles'. This series of commitments was developed by academic and support staff in partnership with undergraduate and postgraduate students and Imperial College Union.

Imperial will provide through its staff:

- A world class education embedded in a research environment
- Advice, guidance and support
- The opportunity for students to contribute to the evaluation and development of programmes and services

Imperial will provide students with:

- Clear programme information and assessment criteria
- Clear and fair academic regulations, policies and procedures
- Details of full programme costs and financial support
- An appropriate and inclusive framework for study, learning and research

Imperial students should:

- Take responsibility for managing their own learning
- Engage with Imperial to review and enhance provision
- Respect, and contribute to, the Imperial community

The Imperial College Students' Union will:

- Support all students through the provision of independent academic and welfare assistance
- Encourage student participation in all aspects of Imperial
- Provide a range of clubs, societies, student-led projects and social activities throughout the year
- Represent the interests of students at local, national and international level

www.imperial.ac.uk/students/our-principles

Welcome from the Graduate School

Welcome to Imperial and the Graduate School!

The Graduate School is responsible for the postgraduate experience at Imperial and we work closely with Imperial College Union to ensure that when decisions are being made, which affect your time at Imperial, your voice is heard.

Another important aspect of our role is to offer you a free and exciting range of professional development opportunities which you can access wherever you are in the world.

Our team of tutors have a variety of research and other career experiences. We understand the importance of developing professional skills and our programmes will help you to progress in your academic studies and research and will prepare you for your future career. Whether you wish to pursue a career in academia, industry or something completely different, professional development training will improve your personal impact. You will also get to meet students from other Departments when attending our courses.

The Graduate School runs exciting competitions throughout the year which are an opportunity to broaden your knowledge as well as to meet other students and have fun.

Our primary way to communicate with you will be through our monthly e-newsletter and our weekly professional skills email bulletins. However, do check our website, blog and social media platforms to keep up to date with all the latest activities available to you.

Finally, Imperial is an extremely exciting, stimulating and diverse environment in which to work, to study and to research. Should you be successful, do make the most of all that Imperial and your programme has to offer.

1. Introduction to the Department

Welcome from Head of Department Prof. Robert Shorten

It gives me great pleasure to welcome you to the Dyson School of Design Engineering, at Imperial. Founded in 2014 with the aid of a generous donation from the James Dyson Foundation, the School is not only the most recent addition to the Faculty of Engineering at Imperial, but it also represents a significant departure from traditional engineering disciplines in pedagogy, philosophy and in the manner in which engineering design is conceptualised. From a pedagogical perspective, our programmes build heavily on group work activities and collaborative environments, as we believe that this best prepares students for working in industry. From a philosophical perspective, our programmes cut across engineering disciplines, such as mechanical engineering, electrical engineering, chemical engineering, and embrace important aspects of the product design process such as business and economics, psychology, human behaviours, ethics, and design thinking. From a conceptual perspective, at the core of Design Engineering, is the human. Whatever the application, the manner in which people interact with engineered products in deeply embedded in our DNA! Welcome.

Professor Robert Shorten

Head of Design Engineering

Key Contacts

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MSc Design Engineering

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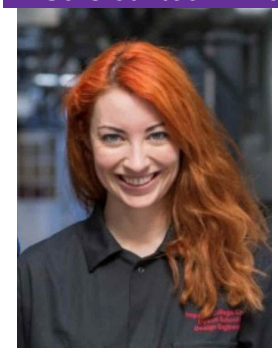
MSc Cleantech Innovation



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UNDAUNTED, Grantham Institute for Climate Change

2. Programmes Information

2. Programmes Information

Programmes Overview

Our transdisciplinary programmes have been designed to equip the next generation of technical innovators with the mindsets and tools of Design Engineers – to support the development of creative and rigorous solutions that have a positive impact on the world.

As part of the broader community at the Dyson School of Design Engineering (the School), the programme connects those with a technical background in a learning environment developed for those passionate about building solutions and grasping opportunities. This action-focused approach aims to build transformational change with engineering and scientific rigour.

Through learning the tools of design, you will learn to gather insights about users and contexts, make sense of complex information, find opportunities for intervention, and develop solutions to tackle the hierarchy of design engineering challenges including performance, systemic, societal, and global challenges. You will also critically learn to explore concepts, build your ideas, and test them in the real world to develop impactful human-centred outputs. The tools of designers are used across every sector and allow for seeing things from different perspectives, solving problems in new ways, and identifying novel opportunities. Design skills are useful across several employment sectors, such as technological innovation, banking and finance, government, medical and scientific research, and the digital economy.

Learning and Teaching Delivery Methods

The School places a strong emphasis on professionally relevant, project-based learning. Students also attend lectures and access online learning resources to support knowledge acquisition. Primarily through project-based learning, but supported with intensive skills development sessions in workshops, studios and labs, group and individual tutorials, group working, and a variety of presentation and peer review formats.

Typical class sizes will range from 20-90 students and will involve the following:

- Authentic project-based learning (APBL): You will work on engaging real-world projects based on core, industrially relevant challenges, potentially collaborating with industrial partners, and using a range of Design Engineering process methodologies.

- Team-Based Working: You will work in teams to support your knowledge acquisition in dynamic and challenging transdisciplinary projects with multiple types of interactions, which will include Peer Review.

- Technology Enhanced Learning: All core module and programme materials are available via Blackboard. You will have direct access to an extensive range of specialist software (Matlab, Solidworks, Adobe CC etc.) and online learning opportunities through Imperial.

- Presentations: Multiple formats integrating verbal, visual, video and physical artefact content to build your communication skills to a wide audience, and support assessment.

- Workshops and labs: You will have facilitated access to relevant workshops, as well as tutor and self-directed work in support of APBL across a wide range of facilities upon passing all the required safety training and inductions.

- Lectures: Talks to deliver key content for modules, including input from a range of external speakers and experts from the Imperial, providing overviews of key concepts and facilitating learning. Typically lectures are given to the whole cohort.

- Guest lectures: Curated talks by external experts from diverse real-world organisations, monitored for relevance and depth by module leaders

- Tutorials: Group and individual formats to support APBL, understanding and skills development. Tutorials can take place both individually (such as with a personal tutor or project supervisor), or in groups (such as during project work, workshops or peer development).

- Immersive experiences: Visits or immersive experiences (e.g. Sprints / Hackathons) at real-world organisation

- Independent Study: All modules involve an aspect of individual and team-based study time to develop work and ideas.

2.1. MSc Design Engineering

Aims, Objectives and Learning Outcomes

This programme will provide you with an enhanced background in engineering or related fields with advanced skills and knowledge in design methods, systems thinking, innovation, and entrepreneurship through a range of project-based learning modules including those linked to the industry and administered by the programme staff or generated by students, which will produce engineers who are able to understand the needs of users in their context, identify opportunities, solve problems creatively, assess the impact of the proposed solutions through user testing, and take their solution from the early stages of design right through to the market. To this end, the programme has a particularly strong focus on the communication and translation of engineering in the world today.

Upon successful completion of the programme, you will be able to:

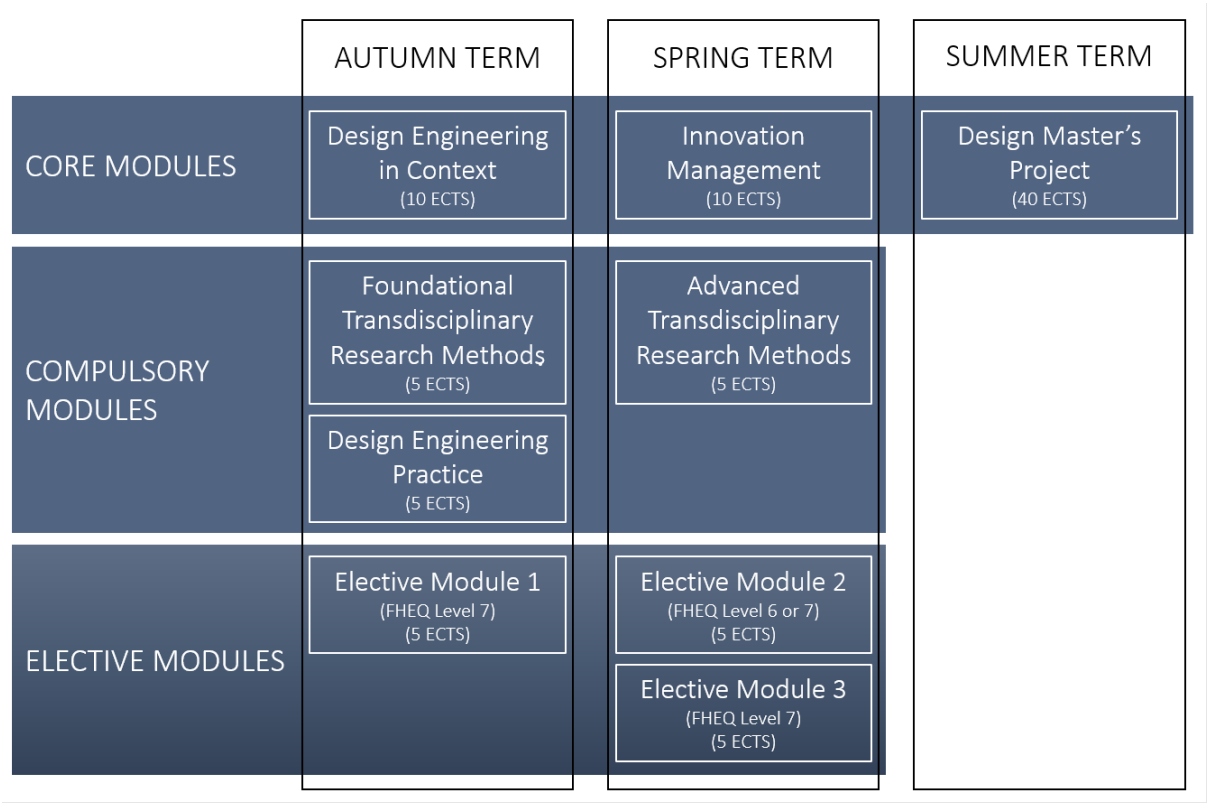
1. *Design Engineering Methods:* Select appropriate design engineering processes, methods, techniques, tools, and user research and apply them with high levels of skill and creativity.
2. *Contextual Evaluation & Impact Analysis:* Develop strategies to evaluate contexts and systems that are complex or ambiguous calculate, measure, and monitor the impact of design work across scales.
3. *Design Engineering Mindset:* Synthesise new knowledge, understanding, and skills in effective ways to develop strategies for working with uncertainty and ambiguity.
4. Communications: Communicate effectively using a range of media directed to a variety of relevant stakeholders.
5. *Team Working:* Demonstrate individual responsibilities of managing and contributing in effective and diverse teams.
6. *Professional Identity:* Reflect on personal development to define an evolving individual skill set, professional identity, and context of operation.
7. *Integrated Design Engineering:* Employ an integrated design engineering approach to diverse scenarios including systems design and engineering, and design engineering processes.
8. *Creativity & Design:* Integrate principles and methodologies of creativity within a diverse range of design engineering projects to achieve distinctive outcomes.
9. *Prototyping:* Build prototypes of innovative products, services, and systems that enable effective evaluation, iteration, and communication.
10. *Enterprise:* Apply methodologies and methods in innovation, entrepreneurship, business, and project management in relation to design engineering.

Programme structure

The full-time programme is taken over 12 months, with a single-entry point per year at the beginning of October.

A mapping of the programme is shown below. The programme begins in the Autumn term with core modules that will introduce you to the key skills and methods of a design engineer, exploring how to synthesise scientific knowledge and skills into impactful human-centred solutions. As you move into the Spring term you will be able to deepen your core skills whilst also selecting from a range of elective subjects to allow you to develop expertise in areas related most closely to your interests. In the Summer you will focus on your Master's project, which provides a substantial opportunity for self-directed working and developing an in-depth design project to cultivate your new interests and practices in design engineering. Master's

projects can be generated by the supervisor or yourself (with the support of an academic supervisor), with these advertised in the second half of the Autumn term. Here you will rank your project preferences from the list of supervisor-generated projects and write a short statement of motivation (unless you already have an agreed self-generated project with academic supervisor and module lead support). Project allocation will then be done by the module lead, based on maximising top preferences, information provided in supporting statements and academic loading.



You will study all core and compulsory modules, and then select one elective from the list below in the Autumn term and two electives in the Spring term.

Core modules	
Design Engineering in Context	This module uses multiple tools of design and innovation and explores the utilisation of such tools in several contexts including human-centred design, sustainability, and inclusivity in design with an emphasis on practical solutions.
Innovation Management	This module aims to lay the foundation for taking an innovative solution through a strategy development process and assessing opportunities and potential threats prior to positioning a venture within a competitive or uncontested market
Design Master's Project	In this module, you will conduct a substantial solo Design Engineering project, representing the culmination of your journey over the past two terms. You will use your acquired knowledge, skills and attitude to bring to fruition a deep-dive project.

Compulsory modules

Three modules are shared across postgraduate programmes in the Design Engineering department as a field of common knowledge for Design Engineers and in support of the other modules offered.

Design Engineering Practice	This module introduces design engineering approaches to resolve complex engineering challenges and will equip you with methods and tools to develop innovative solutions, i.e. a systematic approach used to reach the desired solution to a problem.
Foundational Transdisciplinary Research Methods	This module will teach you the basics of transdisciplinary mixed methods research (tMM), which includes objective and subjective assessments of problems at hand and bridges domains of natural/biomedical sciences and the social/human sciences.
Advanced Transdisciplinary Research Methods	This module will enable you to gain an advanced understanding and apply state-of-the-art transdisciplinary mixed methods (tMM) approaches to solving complex problems, including multimodality and data triangulation.

Electives (Specialist Design modules) - List available in section 2.5.

From the list, you will select:

- In Autumn term: 1 module (at Level 7)
- In Spring term: 2 modules,
    - either both at Level 7
    - or one at Level 6.

2.2. MSc Design with Behaviour Science

Aims, Objectives and Learning Outcomes

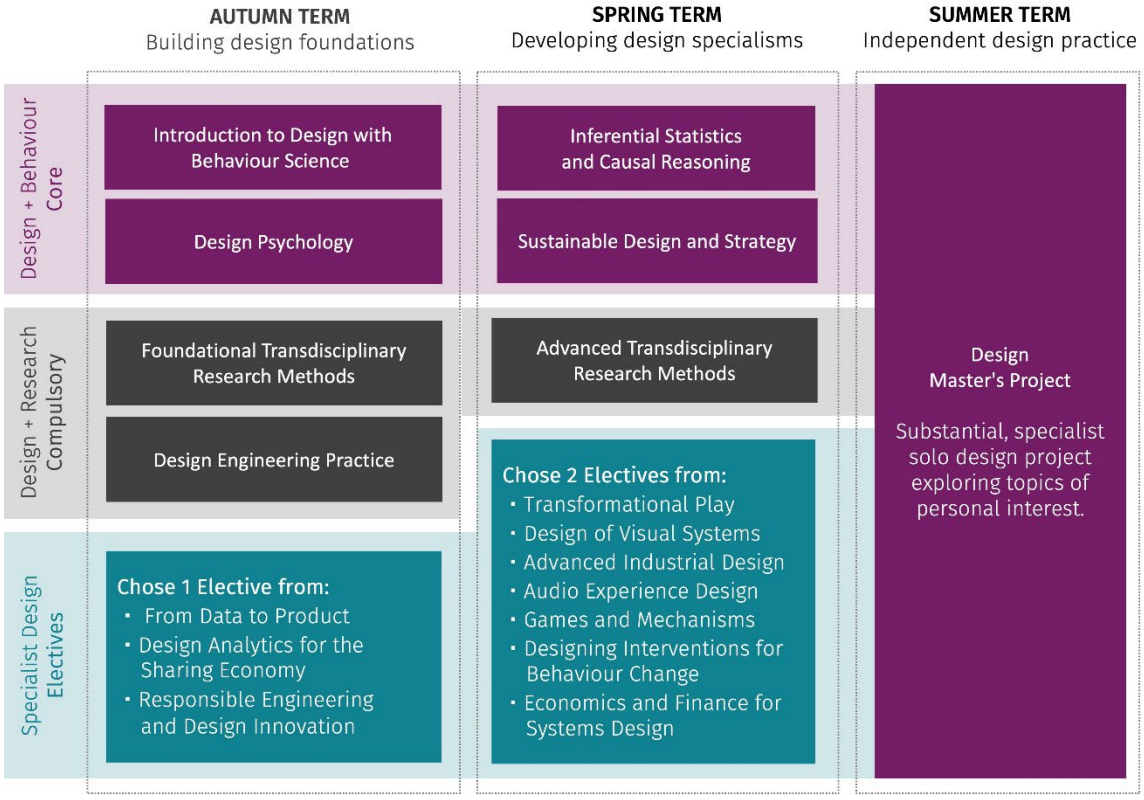
Understanding human behaviour is critical in the development of effective products and strategies. In this programme, you will explore how to incorporate theory, research and practices in behaviour science into the design of positive outcomes. This will involve learning to understand, develop, and monitor behavioural design interventions through gathering design-led insights and using design-led tools, developing an in-depth understanding of users in their context, and honing your ability to integrate knowledge across disciplines.

Upon successful completion of the programme, you will be able to:

1. *Design Engineering Methods:* Select appropriate design engineering processes, methods, techniques, tools, and user research and apply them with high levels of skill and creativity.
2. *Contextual Evaluation & Impact Analysis:* Develop strategies to evaluate contexts and systems that are complex or ambiguous calculate, measure, and monitor the impact of design work across scales.
3. *Design Engineering Mindset:* Synthesise new knowledge, understanding, and skills in effective ways to develop strategies for working with uncertainty and ambiguity.
4. *Communications:* Communicate effectively using a range of media directed to a variety of relevant stakeholders.
5. *Team Working:* Demonstrate individual responsibilities of managing and contributing in effective and diverse teams.
6. *Professional Identity:* Reflect on personal development to define an evolving individual skill set, professional identity, and context of operation.
7. *Behaviour Science:* Analyse and apply social and behavioural science principles to develop human-centred design processes and outcomes.
8. *Quantitative Analytical Skills:* Evaluate, compare, and justify analytical methods, as well as apply and interpret statistical results to solve impactful problems.
9. *Qualitative Analytical Skills:* Gather, interpret, and synthesise findings from primary and secondary research, identify strengths and weaknesses of different approaches and apply them appropriately.
10. *Research Design:* Design and develop rigorous design and research processes for gathering a range of human insights.

Programme structure

The full-time programme is taken over 12 months, with a single-entry point per year at the beginning of October. You will study all Core and Compulsory modules, then select electives from the list.



(Note that elective modules may change)

Core modules (Design + Behaviour)	
Introduction to Design with Behaviour Science	Behavioural insights are increasingly recognised as a key component for developing services, products and technologies that benefit humans, yet represent a challenging process. Design-led insights can provide a strategic lens to apply behavioural insights through its embrace of ambiguity and user context, resulting in powerful tools for research and innovation. This module will introduce the combined principles of behaviour science and design-led insights. Via a series of case studies, you will learn to apply a design lens to behavioural insights, and will be encouraged to think critically about what problem is being solved, how, and for whom.
Design Psychology	Design and innovation place particular emphasis on human factors, or the study of the way humans behave physically and psychologically in relation to certain environments, products, or services. Understanding humans requires basic knowledge in psychology, which is the scientific study of the human mind and its functions, and specifically those impacting behaviours in a given context. This module provides you with basic tools to consider human behaviour and experience to affect impactful design solutions to global challenges.

Inferential Statistics and Causal Reasoning	This module provides a strong emphasis on application of commonly used inferential statistics approaches for social and behavioural sciences. You will learn about different modes of data and common tests and analyses (including, but not limited to, t-test, ANOVA, correlation, regression, and generalised linear modelling), as well as data cleaning and preparation techniques. You will also learn how to choose a suitable analysis for a given problem, as well as conduct appropriate reporting practices. Practical application experience will be developed via joint exercises using a variety of statistical packages (e.g., SPSS, R, Matlab). Causal reasoning, such as inference, induction, and deduction, will be taught and applied. Upon completion, you will be able to analyse results from experimental and observational test data by adopting principles underlying null hypothesis significance testing, and understand underlying modelling assumptions.
Sustainable Design and Strategy	In this module, you will explore how to design for positive impact, and preferable futures. This aims to provide an understanding of the tools and techniques available to implement sustainable design and provide knowledge of the methods a company can employ to reduce environmental impacts, promote sustainable practices and build resilient propositions. Alongside this you will learn about key business practices and build the skills to develop persuasive value propositions and communicate them effectively. Ultimately this will equip you to identify opportunities for change, implement meaningful interventions and monitor the impacts.
Design Master's Project	In the Summer term, you will conduct a substantial solo Design Engineering project, representing the culmination of your journey over the past two terms. You will use your acquired knowledge, skills and attitude to bring to fruition a deep-dive project. You will have a high degree of choice of project topic based on outline briefs defined by an academic, an industry partner or a brief written by yourself. This allows for specialism building on your evolving interests, and as such, project types might cover a very wide range from theoretical research to projects with significant iterative physical prototyping.

Compulsory modules (Design + Research)

Three modules are shared across postgraduate programmes in the Design Engineering department as a field of common knowledge for Design Engineers and in support of the other modules offered.

Design Engineering Practice	This module introduces design engineering approaches to resolve complex engineering challenges and will equip you with methods and tools to develop innovative solutions, i.e. a systematic approach used to reach the desired solution to a problem.
Foundational Transdisciplinary Research Methods	This module will teach you the basics of transdisciplinary mixed methods research (tMM), which includes objective and subjective assessments of problems at hand and bridges domains of natural/biomedical sciences and the social/human sciences.
Advanced Transdisciplinary Research Methods	This module will enable you to gain an advanced understanding and apply state-of-the-art transdisciplinary mixed methods (tMM) approaches to solving complex problems, including multimodality and data triangulation.

Electives (Specialist Design modules) - List available in section 2.5.

From the list, you will select:

- In Autumn term: 1 module (at Level 7)
- In Spring term: 2 modules,
  - either both at Level 7
  - or one at Level 6.

2.3. MSc Cleantech Innovation

Aims, objectives and outcomes

The MSc in Cleantech Innovation, led by the Dyson School of Design Engineering and the Grantham Institute – Climate Change and the Environment, is designed to educate and train you to develop technological solutions that will deliver a more sustainable future. This course focuses on specific contemporary climate challenge themes, which may include topics such as Agriculture & Food, Clean Energy & Storage, Transportation, Air & Environment, Circular Economy & Industry, Water, Efficiency. The programme is designed to equip you with the knowledge and skills to develop and implement innovation in at least one of these areas.

The Grantham Institute is Imperial's hub for climate change and the environment, and one of Imperial's seven Global Institutes established to promote interdisciplinary working and to meet some of the greatest challenges faced by society. We drive forward discovery, convert innovations into applications, train future leaders and communicate academic knowledge to businesses, industry, and policymakers to help shape their decisions. Grantham Institute also houses a dedicate climate change innovation activity - Undaunted - which includes one of Europe's foremost climate impact accelerator programmes (The Greenhouse). The Dyson School of Design Engineering is the tenth and newest engineering department at Imperial. Our goal is to fuse together design thinking, engineering knowledge and practice, to foster a culture of innovation and enterprise, to help solve global problems with emphasis on sustainability, entrepreneurship, and societal impact.

There is an increasingly pressing need to find novel solutions and new ways to ensure the rapid implementation of existing solutions to prevent us from breaching several "planetary boundaries". Upon successful completion of the programme, you will be able to:

1. *Contextual evaluation & impact analysis:* Collate, critically analyse, and interpret relevant information that helps identify environmental and climate change challenges in a national and international context that can be tackled using engineering knowledge, skills and tools.
2. *Cleantech Innovator's mindset:* Synthesize expertise in cleantech research and design engineering through an innovation project and validate the technology through engaging with different stakeholders and academic experts.
3. *Team Working:* Develop your ability to work in transdisciplinary teams to leverage different problem-solving approaches for difficult environmental challenges.
4. *Professional Identity:* Reflect and evolve on professional identity in the context of being a cleantech innovator.
5. *Prototyping:* Build clean technology iteratively through design engineering tools and optimise technology through engaging the research community and to develop methods to allow transfer cleantech from lab to applied context.
6. *Cleantech Entrepreneur:* Critically analyse the current state of the cleantech industry and its potential impact on society and the environment to explore the role of innovation and entrepreneurship in developing climate-resilient solutions.
7. *Business Model Innovation:* Develop new innovative approaches how cleantech innovations can be introduced into organizations through the development, communication and deployment of business models, business plans, networking and negotiating skills.
8. *Impact:* Design strategies to calculate, measure and monitor environmental and societal impact of cleantech innovation
9. *Systems thinking:* Apply systems thinking to extract the interrelatedness of social, economic, and environmental aspects climate change.

Programme Structure

The MSc in Cleantech Innovation offers intensive teamwork experience, like a typical early-stage start-up. The curriculum is be project-focused, where learning and teaching are done by way of practical innovation and entrepreneurship challenges set to small groups of students, who work individually and in teams in a self-directed, but supported, manner. You will be assigned to your team at the start of the programme and work with that team on the Cleantech Innovation Project over terms 1 to 3.

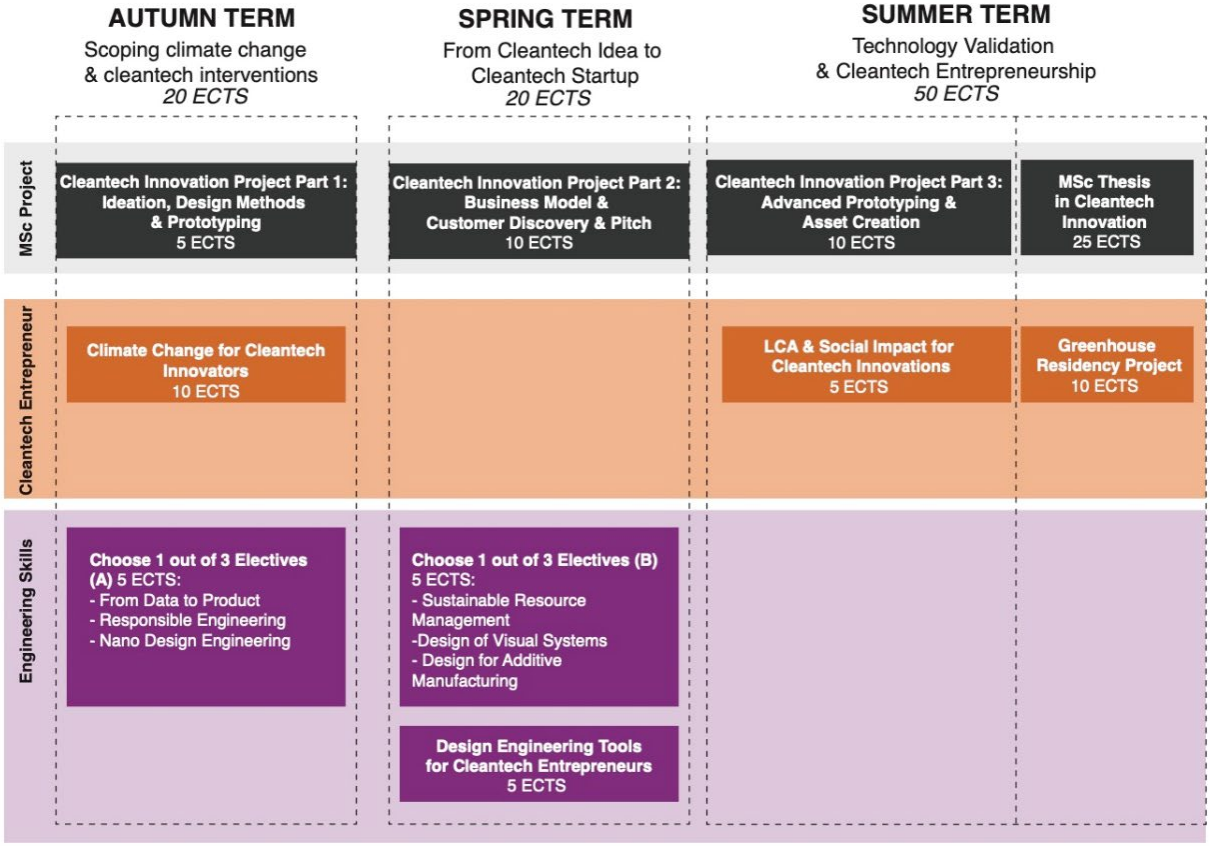
The taught component of the programme is delivered over three academic terms. Over the summer period, you will complete a thesis on your Team Project and submit a self-reflection portfolio as part of a Greenhouse Residency Project (accelerator programme at Undaunted).

Over the first two terms, you will gain an understanding of the climate change challenges, environmental problems affecting different contexts, and foundational clean technology in the seven impact areas. You will learn progressively about the different stages of the entrepreneurship journey, including ideation & prototyping; business model; customer discovery; and pitching. Simultaneously, you will learn skills in design engineering, which will enable you to conclude your innovation project as part of the annual design showcase of the Dyson School of Design Engineering. In the last term, culminating at the end of August, you will submit an MSc Thesis and collaborate on an eight-week residency project with a start-up of the Greenhouse Accelerator.

The programme directors and teaching fellows will be your coaches, and they will facilitate learning across technical, team and individual efficacy dimensions, and will be present to support and guide you in your teamwork throughout the year, through tutorials, group sessions and informal discussions.

The content reflects the contemporary and relevant entrepreneurship skills necessary for developing cleantech innovation and launching a start-up. There is balance of learning and teaching, individual and group work to realize impactful cleantech innovation across seven impact areas, taught by cleantech experts at Imperial. Case study methodology and class-based discussions are used to strengthen your conceptual, analytical, and problem-solving skills in real situations. In addition, there are regular seminars by external expert speakers from cleantech ventures.

In addition, there will be seminars and events held with our Climate Change and Innovation community, the Dyson School for Design Engineering community and with the Grantham Institute - Climate Change and the Environment networks. There will be other cohort activities designed for you including inter-cohort activities with related masters across Imperial. Experts from different cleantech research groups will be engaged to deliver timely input through tutorials, lab visits and technical consultations. Depending on topics, we expect experts to be sourced from the vast network of affiliates of the Grantham Institute, the Dyson School of Design Engineering, Civil & Environmental Engineering, Chemical Engineering, and Materials, Earth Science and Engineering & Enterprise Lab among others. A townhall style networking event will be held the start of October to offer a possibility for potential collaborators to meet.



You will be based at the Dyson School of Design Engineering (DSDE) at South Kensington campus, where the Grantham Institute – Climate Change and the Environment is also located. You will have access to facilities at the Dyson School of Design Engineering Workshops (ACE) to support your innovation.

Upon completion, you will be equipped with the skills to enter employment in a range of roles in the cleantech sector and environmental engineering industry, or continue your start-ups, join other cleantech start-ups, or take on consultancy roles. Roles in product management of cleantech and environmental engineering companies and within companies focusing on sustainable engineering and sustainable product design will be relevant.

2.4. MRes Design Engineering Research

Aims, Objectives and Learning Outcomes

The vision of the MRes in Design Engineering Research is to produce world-class students in transdisciplinary design engineering research. Here, Design Engineering integrates analysis, behavioural insights and creative practices to build better futures. In this programme, we will equip you with core skills on Design Engineering Practice, Transdisciplinary Research Skills and Modelling and Simulation tools towards enabling the execution of a societally critical research project. Alongside 2 electives which deepen your subject area specific domain, and working with world-leading subject area experts, you will gain deep insight and experience in the research process; well placing students for onward PhD study or industrial research positions.

Therefore, upon successful completion of the programme, you will be able to:

1. *Design Engineering Methods:* Select appropriate design engineering processes, methods, techniques, tools, and user research and apply them with high levels of skill and creativity.
2. *Contextual Evaluation & Impact Analysis:* Develop strategies to evaluate contexts and systems that are complex or ambiguous calculate, measure, and monitor the impact of design work across scales.
3. *Design Engineering Mindset:* Synthesise new knowledge, understanding, and skills in effective ways to develop strategies for working with uncertainty and ambiguity.
4. *Communications:* Communicate effectively using a range of media directed to a variety of relevant stakeholders.
5. *Team Working:* Demonstrate individual responsibilities of managing and contributing to effective and diverse teams.
6. *Professional Identity:* Reflect on personal development to define an evolving individual skill set, professional identity, and context of operation.
7. *Modelling and simulation:* Analyse complex systems and create mathematical descriptions of these with modelling and simulation approaches.
8. *Uncertainty in complex systems*: Evaluate simulation results with a probabilistic lens towards proposing optimal system solutions.
9. *Research skills*: Evaluate the state-of-the-art in design engineering research towards creating and executing a research plan which solves a complex design engineering problem.
10. *Scientific rigour*: Generate new research insights through the execution of a design engineering research project, with research hypothesis rigorously validated

Students exiting with a PG Certificate in Design Engineering Research will have accomplished at least learning objectives 1, 3 and 4.

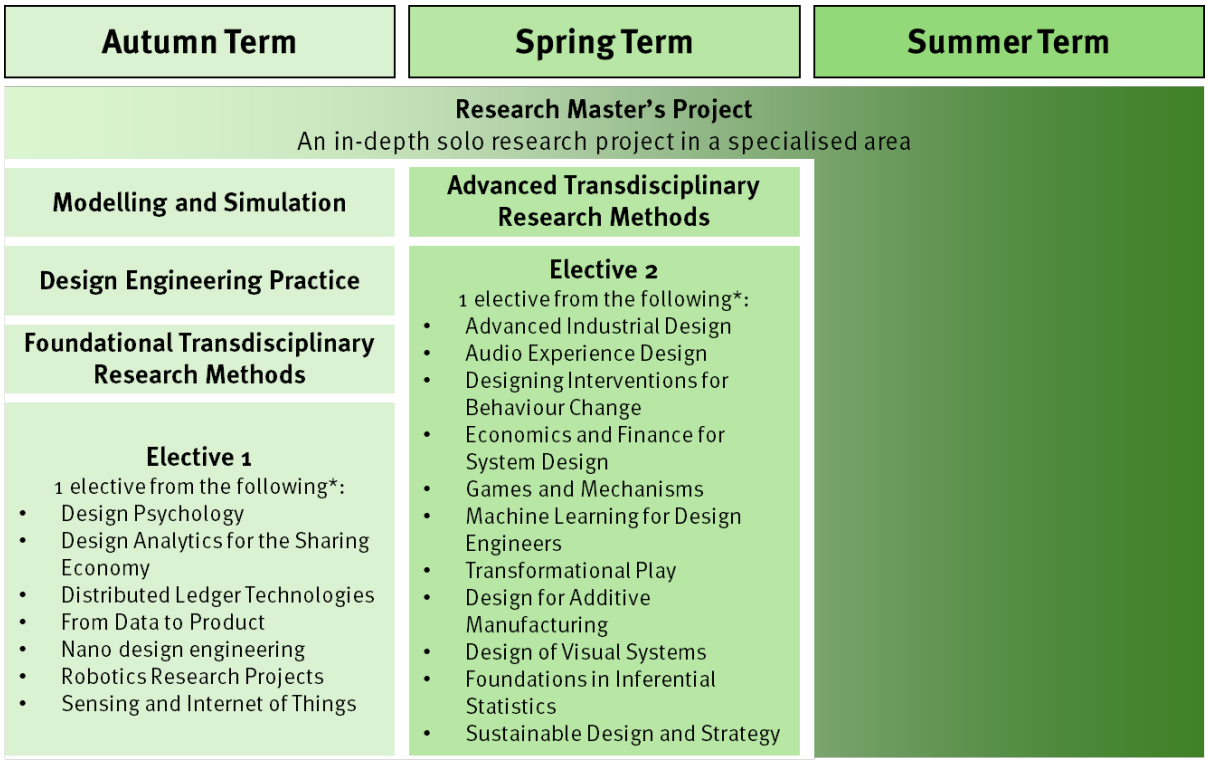
Students exiting with a PG Diploma in Design Engineering Research will have accomplished at least learning outcomes 1, 2, 3, 4 and 5.

Programme structure

You will take five core modules to form the foundations of your MRes, equipping you with an understanding of Design engineering practices, skills needed to model and simulate complex systems, and transdisciplinary research skills (foundational and advanced). In addition to our

core modules, you will deepen your subject-area knowledge with two exciting optional modules in the Autumn and Spring term respectively. At least one of these optional modules must be FHEQ level 7.

These taught elements then culminate in the execution of a novel piece of Design Engineering research with the Research Master's Project, which spans the entire programme, allowing sufficient time to critically understand the state-of-the-art in that field, plan and execution of a programme of research and ultimately create new insights. Projects can be generated by the supervisor or by you (with the support of an academic supervisor and approved by the module lead). During the execution of the Research Master's Project, there will be opportunities to present your work to leading industry stakeholders from our industrial advisory board, as well as large public outreach events (The Great Exhibition Road Festival).



* Note that elective modules may change

The Dyson School of Design Engineering and the MRes in Design Engineering Research places a strong emphasis on professionally relevant and scientifically rigorous project-based learning. Students attend lectures and access online learning resources to support knowledge acquisition. Here, a key element of researcher development, is also the ability to critique the academic literature, identify research gaps and create a plan for testing research hypothesis. Knowledge, intellectual and practical skills relating to our diverse curriculum are developed within a planned sequence of modules and are developed through a variety of learning formats, consummate of design engineering research careers. The programme will therefore be delivered through project-based learning, but supported with intensive skills development sessions in workshops, journal clubs, studios and labs, group and individual tutorials, group working, and a variety of presentation and peer review formats.

2.5. List of Elective (optional) modules for 2024-25

For the Autumn term elective, you will select your elective module at the time of or shortly after your registration for the program.

For the Spring term elective(s), all students will respond to a selection survey during Weeks 5 and 6 of the Autumn term.

Term	Elective module		FHEQ Level
Autumn Term electives	Design Psychology	This module provides you with basic tools to consider human behaviour and experience to affect impactful design solutions to global challenges.	7
	Design Analytics for the Sharing Economy	Collaborative consumption, or the sharing economy as it is also known, refers to businesses that are based on sharing resources and services, as opposed to traditional ownership-based models.	7
	Distributed Ledger Technologies	This module intends to introduce students to the fundamentals of DLTs rigorously. The content will be continuously motivated by the social requirements and contexts of the problems they seek to solve.	7
	From Data to Product	The module focuses on various aspects of data science to design products from data. It first defines and introduces data products, as well as alternative ways to design with data.	7
	Nano Design Engineering	This module will deliver a comprehensive introduction to Nanotechnology for Design Engineers. This course commences with an introduction to how the fundamental physical, electrical and optical properties of materials change on the nanoscale compared to their bulk counterparts.	7
	Responsible Engineering and Design Innovation	This module aims to introduce you to critical ways of thinking about technology products and their impact on individuals, their health and society as a whole. The module explores design techniques for understanding stakeholders' values, and ethical and responsible innovation frameworks.	7
	Robotics Research Projects	Robotics Research Project will provide an overview of the latest research in the field of applied robotics, as well as a hands-on approach to bring critical skills together. This is done in a project-oriented course where students will design mechanical, electrical, and software subsystems of an overall functioning robot.	7
	Sensing and Internet of Things	The module aims to provide students with sufficient tools and techniques to develop software and hardware platforms for the Internet of Things, obtain data from mobile and social sensors,	7

		perform data analysis, perform actuations, and use key insights from data mining.	
	Transformational Play	This module enables students to understand, critique, and create games and playful experiences for entertainment and social issues like health, education, sustainability, or social change.	7
	Modelling and Simulation	This module will give a view of how numeric simulations can be applied to problems in Design Engineering (and some problems selected from physical, biological, and social sciences). An underpinning of numerical methods, algorithms, and analysis tools will complement applications to a range of systems, such as infection modelling and crowd dynamics.	7
Spring Term Electives	Design for Additive Manufacturing	This module provides engineering students with the platform needed to solve future industry challenges, get the most out of 3D printing technology and optimise designs.	7
	Design of Visual Systems	This module aims to provide overall knowledge and understanding of the human visual system, and the technology available for design engineers to acquire, analyse, interpret and exploit visual information gathered with modern electronic components.	7
	Inferential Statistics and Causal Reasoning	This module provides a strong emphasis on the application of commonly used inferential statistics approaches for social and behavioural sciences. You will learn about different modes of data and common tests and analyses (including, but not limited to, t-test, ANOVA, correlation, regression, and generalised linear modelling), as well as data cleaning and preparation techniques.	7
	Sustainable Design and Strategy	This module aims to provide an understanding of the tools and techniques available to implement sustainable design and provide knowledge of the methods a company can employ to reduce environmental impacts, promote sustainable practices and build resilient propositions.	7
	Sustainable Energy Storage Design	This module provides a comprehensive overview of sustainable energy storage devices and systems for design engineers. Students will explore a range of advanced energy storage technologies, including traditional and cutting-edge batteries, novel energy storage concepts, and integrated energy systems for a variety of practical applications such as portable electronics, electric vehicles, renewable energy systems, as well as future innovations such as future mobility, future electronics, human-machine interfaces, etc.	7
	Advanced Industrial Design	This module provides the opportunity to further develop industrial design skills and knowledge to a high professional level alongside gaining an	6

		understanding of significant emerging themes and methodologies within the field.	
	Audio Experience Design	This module is an introduction to audio technology and perception, which includes acoustics, psychoacoustics, digital signal processing, audio recording techniques, audio reproduction techniques, 3D sound synthesis and reproduction and other selected topics.	6
	Designing Interventions for Behaviour Change	This module will develop your competence in scoping, analysing and developing creative interventions for behaviour change. Possible interventions include wearables to improve health, products for more sustainable consumption and policy to improve tech-enabled business models.	6
	Economics and Finance for Systems Design	The module focuses on core principles in micro-economics, accounting, finance, uncertainty modelling, and decision-making needed to assess the economic performance of engineering systems and products.	6
	Games Theory and Mechanism Design	This module aims at giving relevant basics to the students to analyse interaction within systems as games. It introduces the principles to describe agents and the type of games they are involved in.	6
	Machine Learning for Design Engineers	The objective of this module is to de-mystify the topic and expose students, in an accessible manner, to both the basics of machine learning and to some of its most important methods.	6
	Research through Design	Research through design (RtD) describes a mode of research where knowledge is produced through design processes and products. RtD is methodologically distinct from pure creative practice in its aims of generating knowledge, but it also differs from engineering research in that it is process-driven and exploratory, placing emphasis on knowledge instantiated in particular objects and experiences rather than general theories.	6

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