

## MET: Creating future leaders

The Manufacturing Engineering Tripos is a unique two-year programme that combines technology with management, and theory with application to prepare students for leadership roles in manufacturing and engineering. The course will develop your understanding of how the engineering, financial, organisational and human aspects of firms work. This spans all aspects of the firm, from the design of new products, materials and production technologies, industrial engineering, through to marketing, business strategy and operations management. The course has an international flavour, with many students involved in activities with other European students of manufacturing through the ESTIEM organisation. Students in their 4<sup>th</sup> year also organise an international study tour, and in recent years have visited Scandinavia, Korea, Trinidad & Tobago, Singapore & Malaysia, India, Brazil, China & Japan and the USA.

When students finish the course, they are much sought-after for a wide range of demanding jobs, not only in industry, but also in other branches of engineering, consultancy or commerce. Students are also well placed to start their own companies, having not only gained a thorough understanding of how business works, they have a sense of empowerment and a strong entrepreneurial drive.

The MET course is based in the Institute for Manufacturing (IfM), Alan Reece Building at the West Cambridge site, close to the Department of Computer Science, the Cavendish Laboratory the Department of Chemical Engineering and Biotechnology and the Department of Materials Science and Metallurgy. Our building has dedicated MET lecture rooms, a design studio, a student study room, workshop facilities and a robot laboratory, all for use by the MET students. MET members are treated professionally, and are encouraged to use the large common room space with other members of staff, academics and researchers. MET students recognise that the course is special because of the unique blend of engineering, technology, theory, practical application and professional development that the course offers.

For full details of the course, go to [www.ifm.eng.cam.ac.uk/met/](http://www.ifm.eng.cam.ac.uk/met/)  
e-mail: [met-admin@eng.cam.ac.uk](mailto:met-admin@eng.cam.ac.uk)

### Application and Selection

Selection for MET is based on the candidate's potential to thrive on the course. The qualities being sought include:

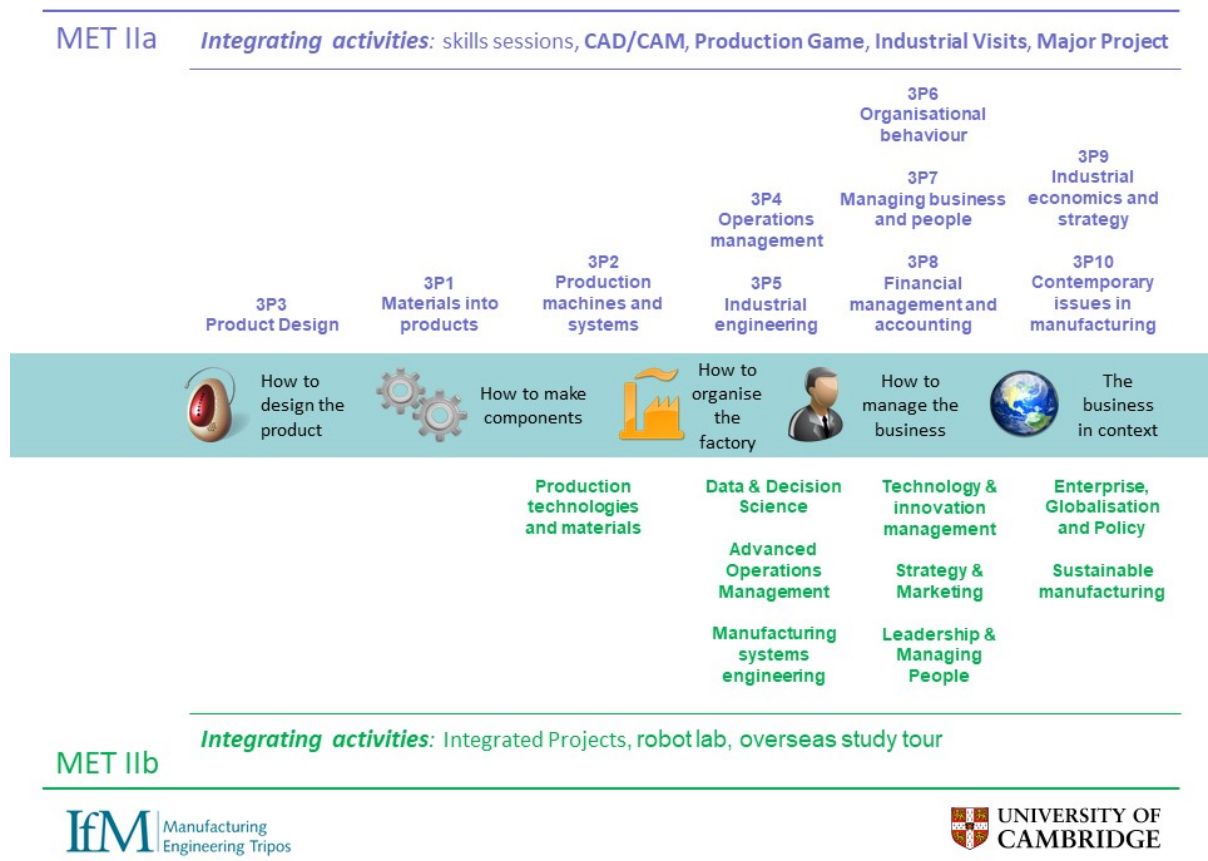
- **Technical knowledge and abilities:** materials, design, production methods
- **Personal skills:** enthusiasm, communication, organisation, teamwork, and an ability to work to tight deadlines
- **Leadership potential:** in industry, management, manufacturing and commerce

All candidates must complete an application form and we will also look at your academic track record and your reference from your Director of Studies. All candidates will be invited for a short interview. Applications are also welcomed from second-year students reading Chemical Engineering and other related science based Tripos. If you are interested in applying, please complete the application form and return it to the IfM Teaching Office by **Monday 5 June 2023** at the latest. Interviews will be held **mid June 2023** (after IB exams); other times by arrangement. We will let you know the result of your application soon after the IB examination results are known. The application form is available here: <http://www.ifm.eng.cam.ac.uk/education/met/application/>

Current MET students are always happy to provide a student view of the course, and list of contacts is given at the end of this document.

# Academic structure of the course

MET is very different to other Engineering options. The course provides a sound theoretical basis in manufacturing technology, manufacturing engineering and business management, coupled with the repeated experience of putting theory into practice via a series of projects. MET students develop valuable skills in leadership, problem solving, team working, communication - 'making things happen' - which ensure they are highly prized by employers. MET demands hard work, teamwork and initiative. The course generates a high level of esprit de corps and an ethos of self reliance, resulting in a strong sense of group identity - and fun! The graphic below aims to summarise the core content of both MET IIA and MET IIB.



## 3rd Year: MET IIA

The first year of the course is Cambridge-based and consists of ten modules with integrated coursework. The modules reflect the range of technical, managerial and contextual issues relevant in modern manufacturing firms and are summarised below.

A distinctive feature of the course is the Business Skills Development Programme which includes visits to leading firms, master-classes (e.g. in industrial design, patents and Intellectual Property), and personal skills development (e.g. team-working, presentation skills, time-management).

The course follows normal Cambridge terms, and has the standard undergraduate structure of supervisions. You will be based at the Alan Reece building for at least half of each week. Some blocks of lectures will take place at Trumpington Street, allowing easy access to central facilities such as libraries. Students are also offered the opportunity to gain workshop experience.

### 3rd Year modules:

Module number	Module Title	Module Scope
3P1	Materials into Products	From microstructure to mechanical property: manufacturing process optimisation for all classes of solids
3P2	Production Machines and Systems	The specification, operation and management of production machines and systems
3P3	Design	Integrating engineering and industrial design in the creation of new products.
3P4	Operations Management	The management of material and information flow in the supply chain
3P5	Industrial Engineering	The design of production flows and operations in manufacturing
3P6	Organisational Behaviour	An introduction to the theory of organisational behaviour
3P7	Managing Business and People	An introduction to the processes involved in starting and running a business.
3P8	Financial and Management Accounting	An introduction to the principles and practice of financial and management accounting.
3P9	Industrial Economics, Strategy and Governance	An introduction to the principles and practice of industrial economics, strategy and corporate governance.
3P10	Contemporary Issues in Manufacturing	(a) Integrative industrial visits to study modern manufacturing practice. (b) Lectures to introduce current topics.

### Integrated coursework: Major design project

The integrated coursework seeks to bring together issues from across the modules, and apply them in a practical way. This includes a major design project, a production simulation and a CAD/CAM and manufacturing exercise.

The major design project is a group project that lasts through the whole year. Groups design a new product and develop a comprehensive business plan. Professional advice is provided on how to set up and finance a small company. Some of the student groups have turned their project into reality, setting up their own companies and going into production. Projects have included the design of a pod for autistic children, a device to enable blind people to sense their environment, a water filtration system for the 3<sup>rd</sup> world, an ergonomic pipette, a novel water pistol, a 3D cinema system for the home and a device to enable deaf people to perform with music. Students are encouraged to build working prototypes to demonstrate the feasibility of their designs. The major design project concludes with a Design Show, featuring all the projects, and attended by industrialists, entrepreneurs and designers. For many students, this is the highlight of the year.

### Industrial visits

Throughout Michaelmas and Lent terms, students visit 6 firms, representing a diverse section of manufacturing in the UK. This will include: primary processes, automotive, aerospace, electro-mechanical, specialised processes (e.g. Electronics and bio-tech) and FMCG (e.g. Food and consumer goods).

### Business skills development programme

The skills development programme is a structured series of practical workshops designed to develop some of the personal skills critical for success in industry and related employment.

## 4<sup>th</sup> Year: MET IIB

The structure of the final year of the course is very different from a standard undergraduate course. Teaching is organised in intensive modules, interspersed with **periods in industry** normally outside Cambridge doing real industrial projects. Terms are a little longer than standard Cambridge teaching terms, and learning is achieved through seminar-style sessions and practical experience, rather than from formal lectures. MET IIB operates entirely from the new building at West Cambridge.

### 4<sup>th</sup> Year Modules

The modules cover the full range of manufacturing industry, including core modules on practical and operational aspects of manufacturing technologies and operations; operations management at the enterprise level and human resources and management. The lectures are strongly practically-oriented, and are often delivered by leading industrialists. There is also an extended exercise involving the design and build of an automated system to carry out simple assembly tasks.

Module	Scope	Duration
Enterprise, globalisation and policy	Understanding the international context in which manufacturing businesses work	2 days
Production technologies and materials	Current and future practice in selecting and using materials and production technologies	2 weeks
Manufacturing systems engineering	Understanding the operation of automated manufacturing systems	1 week
Sustainable manufacturing	Issues in managing a sustainable global business.	1 week
Data and Decision Science	Understanding how an organisation manages its physical assets (e.g. machinery) to enable efficient supply networks and effective service provision	1 week
Technology and innovation management	Understand the processes of innovation and technology management	1 week
Leadership and Managing People	Understanding the nature of leadership, change management and organising for innovation	1 week
Strategy and marketing	Marketing, brand and business strategies	1 week
Advanced Operations Management	Understand the key issues and challenges involved in the management of industrial operations	1 week

### Industrial projects

Students undertake industrial projects based in leading UK manufacturing firms, which allows students to apply material studied in the modules. In Michaelmas term, pairs or small groups of students undertake a three-day, then a two-week project in industry, normally away from Cambridge, working on a real problem for a company. In Lent term, students are away for 4 weeks working on more substantial projects in industry. In the Easter term, students have the chance to design and run their own 'Long project' that can be based in Cambridge, elsewhere in the UK, or even overseas. Support and guidance is provided throughout all projects, and the Cambridge supervisor keeps in close contact and visits the students in their company. However, it is expected that students will use their own initiative and skills. At the end of each project, the students make a presentation of their findings to the company, to an audience that may include senior managers and shop-floor workers. The full written report is completed a few days later.

Examples of some recent projects are summarised below.

### Examples of recent industrial projects

Company	Project
Coty	Yield improvement in cosmetics manufacture
Rolls Royce	Optimised assembly for Trent XWB aircraft engine
Sea France, Dover	Design of a system for holding motorcycles on ferries
Airbus	Long-term manufacturing strategy for tooling
Mercedes	Design of battery cell production facility.
Linx Printing Technologies, St Ives.	e-commerce feasibility study.
Fitzwilliam Museum, Cambridge	Design of a new coin cabinet for conservators
Holotag, Cambridge Science Park.	Analysis of competitors: Israel and Germany.
Amman, Jordan	PET bottle recycling

### Automation laboratory

The automation laboratory is a practical team exercise, supporting the Manufacturing Systems Engineering module. The module aims to provide the theoretical background and underpinning to the practical session. In the laboratory, students apply the principles of planning automation, CAM/CNC, programming logic controllers, robotics, sensors, pneumatics and mechatronics.

### For more information

For more information, please check out our MET Recruitment Moodle page -

<https://www.vle.cam.ac.uk/course/view.php?id=194761>

Our web pages <https://www.ifm.eng.cam.ac.uk/education/met/> include a summary of the course.

**IfM teaching Office:** The MET Senior Administrator is Mrs Shane Strawson, and she can be contacted via [met-admin@eng.cam.ac.uk](mailto:met-admin@eng.cam.ac.uk)

**Prof Chander Velu:** MET IIA Course Director ([cv236@cam.ac.uk](mailto:cv236@cam.ac.uk) )

**Prof Frank Tietze:** MET IIB Course Director ([ft263@cam.ac.uk](mailto:ft263@cam.ac.uk) )