Manufacturing Futures Lab

UCL is shaping the future of manufacturing at its newest campus in east London.

The Manufacturing Futures Laboratory (MFL) is a multi-disciplinary research and teaching hub, driving strategic research and fostering innovative industry collaborations to deliver the sustainable products and manufacturing processes of the future.

Bringing together core expertise from the UCL Faculty of Engineering Sciences and the UCL Faculty of Mathematical & Physical Sciences, MFL focuses on knowledge-based and digitally-enabled manufacturing. Technologies such as 3D printing, synthetic biology and intensified processing will be used to make future-proof products that are sustainable, cost-effective and with innovative functionalities.

New educational programmes have been designed to inspire and train the next generation of engineers and scientists, emphasising hands-on, research-based learning. We're equipping students with the comprehensive skills they'll need to support the UK's success in a new manufacturing era.

Core features

A unique, interdisciplinary research hub:

- Where researchers and students from biochemical, chemical and mechanical engineering and chemistry can develop novel materials and chemicals manufactured via sustainable approaches and advanced therapies impacting a range of sectors.
- Open to industry and the local community as a location for extra-curricular schools activities, training, support for start-up ventures, summer residential courses, and events.

Research-led teaching to create a multi-skilled future workforce:

- An emphasis on experiential learning, innovation, enterprise and the wider regulatory environment.
- Programmes spanning nanoscale manufacturing, stem cell and gene therapy, and nature-inspired engineering, as well as leveraging wider UCL research strengths in 'big data' analytics, artificial intelligence, process monitoring and control technologies, and multi-scale modelling.

Focusing UCL's world-class research strengths in:

- Bio-based manufacturing of biopharmaceutical and cellular therapies.
- Sustainable and energy-efficient manufacturing of chemicals and materials.
- Nanoengineering for healthcare sensors, resource-efficient prototyping and energy-efficient systems.
- Continuous and intensified processing of chemicals and materials;
- Nature-inspired chemical engineering.
- Next-generation responsive and functional materials.

Fast facts

Faculties: Engineering Sciences; Mathematical & Physical Sciences

Leadership: Professor Asterios Gavriilidis, Professor Helen Hailes, Professor Gary Lye, Professor Manish Tiwari

Buildings: Marshgate

Focus areas: Biochemical Engineering, Chemical Engineering, Mechanical Engineering, Chemistry

Facilities:

Six research pods, 250m^2 each:

- Continuous Processing and Automation
- Intensified Processing
- Laser Based Diagnostics and Manufacturing
- Future Bio / Pharmaceutical Manufacture
- Soft Materials and Bio-Based Manufacture
- Analytical Laboratory

Specialist equipment including:

- Automated high throughput experimental platforms
- Autonomous laboratory flow reactors
- Chemical analysis instruments
- Controlled environment cabinets
- Nanofabrication tools
- Materials characterisation instruments
- Technical scale reactors

Academic Programmes

- MSc Chemical Sustainability
- MSc Manufacturing Innovation and Enterprise
- MSc Future Manufacturing and Nanoscale Engineering
- MSc Nature-Inspired Solutions
- MSc Digital Manufacturing of Advanced Materials
- MSc Manufacture and Commercialisation of Stem Cell and Gene Therapies

Inside the MFL at UCL East

Meeting the challenge of a new manufacturing era

- Driving research and development in a range of areas from healthcare to energy to consumer and specialty products at the forefront of efforts to future-proof manufacturing and train future industry leaders.
- Leveraging the potential of digitisation, artificial intelligence, robotics, and additive manufacturing to boost performance, shape new business models, and drive sustainable growth.
- Building agility and innovation into the manufacturing industry of the future, and responsiveness to real-world contexts.
- Future-proofing manufacturing for a carbon-constrained world to withstand environmental 'mega forces' like population growth, climate change, and scarcity of material resources and water.
- Enabling British industry to sharpen its competitive edge.

Building on UCL excellence for manufacturing discovery

- Drawing on a rich range of engineering and science disciplines within UCL's Faculties of Engineering Sciences and Mathematical & Physical Sciences; an ideal foundation for creating future manufacturing solutions.
- Rooted in UCL's international reputation in these disciplines which derives from a desire to understand how scientific discoveries can be converted into commercially viable products, on a truly global scale, to meet real-world problems.

Harnessing disciplinary strengths to deliver cleaner, smarter, more sustainable products

- Working across traditional science and engineering disciplines and from the microscopic to the macroscale.
- Exploring the frontiers of big data analytics, future energy technologies (e.g. clean hydrogen production), micro/nanoscale engineering, nature-inspired engineering, bio-molecular assembly, novel materials, digital and automated process technologies and multi-scale modelling.
- Supporting the development of completely new materials with exciting properties, and new products using digital manufacturing technologies, organic synthesis and synthetic biology.
- Facilitating robust scale-up and product consistency.
- Delivering products which can be manufactured sustainably, such as renewable raw materials, with cost effective technologies drawing on circular economy approaches facilitating the recycling and reuse of waste products, and reducing the CO_2 footprint of (bio) chemical transformations.

Developing the manufacturing leaders of the future

- Programmes benefitting from UCL's cutting-edge teaching methods developed through the Integrated Engineering Programme.
- Developing the rich skillset future engineers need - creativity, design, teamwork, practical skills, knowledge of emerging technologies and the fundamentals of science and mathematics.
- A philosophy of making and experimentation at the core of our approach, foregrounding group-working and a research-based curriculum, fostering a solutions-oriented mindset.
- Committed to increasing the number of young people studying engineering and creating a diverse engineering workforce, by supporting developments in primary and secondary education, investing in widening participation, and creating stronger links between vocational and HE routes into engineering.

Investment options

Capital funding opportunities

- Funding of named specialist research and teaching facilities.

Funding for people and posts

- Support thought leadership and pioneering research through funding for endowed academic posts.
- Train the manufacturing workforce of the future through scholarships.

Project funding and strategic initiatives

- Opportunities for partnership with industry leaders to research, catalyse, apply and drive global impact in future manufacturing.
- Opportunities could include capacity building and talent development initiatives, research projects, study groups and more.

Impact

Student impact: Expanding educational opportunities for aspiring manufacturing engineers and scientists, providing them with a comprehensive, future-proofed, career-ready skillset.

UCL impact: Building a dedicated hub for manufacturing research and innovation on a greater scale than is possible in Bloomsbury.

London impact: Supporting skills development and job creation in the local community in east London.

Industry impact: Conducting research that will have a deep impact across the chemical, life sciences, energy and electronics sectors, working in close collaboration with industry and engaging end users.

UK impact: Delivering novel and sustainable manufacturing technologies that are indispensable for enhancing the UK's global economic competitiveness in healthcare, energy and other sectors, and boosting our industrial productivity.

Global impact: Delivering research which will have significant beneficial environmental, economic and societal impacts in areas such as climate change, scarcity of materials and health.