

## Engineering Tripos Part IIB, 4E16: Operations Management, 2026-27

### Leader

[Dr N Oraiopoulos](#) [1]

### Timing and Structure

Lent term. Assessment: Coursework / 1 Individual Paper 100%

### Aims

The aims of the course are to:

- Reimagine Operations Management as a universal strategic capability applicable to every organisational function (from marketing and HR to finance and product development)
- Equip students to analyse, design, and improve processes across organisational boundaries using modern tools such as process mining, machine learning, digital twins, and generative AI.
- Demonstrate that becoming more efficient, effective, and data-driven is not just a supply chain concern but the competitive advantage that distinguishes high-performing organisations in the AI era.

### Objectives

As specific objectives, by the end of the course students should be able to:

- Apply process analysis and improvement frameworks to any organisational function, not just manufacturing or logistics.
- Evaluate how AI, automation, and digital technologies reshape capacity planning, quality management, and resource allocation.
- Design data-driven operational systems with appropriate KPIs, dashboards, and governance structures.
- Assess the strategic, ethical, and human implications of operational transformation in the digital age.
- Lead cross-functional operational improvement initiatives using contemporary tools and methodologies.

### Content

This course reimagines Operations Management for students navigating an era of AI, digital platforms, and data-driven decision-making. Rather than anchoring only in traditional manufacturing settings, the course treats operations thinking as a universal strategic capability: one that applies to every function, from marketing and HR to finance and product development.

Students will learn to analyse, design, and improve processes across organisational boundaries, leveraging modern tools such as process mining, machine learning, digital twins, and generative AI. The course emphasises that becoming more efficient, effective, and data-driven is not just a supply chain concern. It is the competitive advantage that distinguishes high-performing organisations.

#### Lecture 1: The New Operations Mindset: From Factory Floors to Organisational Ecosystems

- What is a “process” ?
- The shift from cost-centre thinking to value-creation

- Why digital transformation makes OM relevant to every department in an organization
- Framework: Efficiency, Effectiveness, Excellence

### **Lecture 2: Process Analysis in a Digital World: Mapping and Redesigning Workflows**

- Process mapping
- Identifying bottlenecks in service and knowledge-work processes
- Redesigning processes for automation readiness

### **Lecture 3: Capacity, Demand and Resource Allocation**

- Capacity planning for service, digital, and hybrid organisations
- AI-driven demand forecasting
- Workforce capacity

### **Lecture 4: Quality and Continuous Improvement in the AI Age**

- Quality frameworks beyond manufacturing
- Lean and Six Sigma adapted for knowledge work and digital products
- AI-powered quality

### **Lecture 5: Data-Driven Decision Making Across the Organisation**

- Operational KPIs for non-traditional functions
- Building decision-support dashboards and real-time monitoring
- Data governance and the “single source of truth” challenge

### **Lecture 6: Supply Chains: Orchestrating Value Across Ecosystems**

- Internal supply chains
- Platform operations
- Supply chain visibility, digital twins, and AI-enabled risk management

### **Lecture 7: Automation, AI, and the Future of Work Design**

- Intelligent automation, and generative AI in business processes
- Redesigning jobs and workflows for human–AI collaboration
- Change management and upskilling as operations challenges

## **Lecture 8: Leading Operational Transformations: How Strategy, Operations and Culture work together**

- Crafting an operations strategy aligned with business strategy
- Digital transformation as an operations programme
- Building adaptive organisations

### **Further notes**

#### Required readings

All students will be required to read either a case study or a short article before each session. Those will be provided closer to the start of the term.

### **Coursework**

The 4E16 module will be assessed by a written paper, individual (100% of total mark). The individual paper assignment will include a 2,500-3,000 word essay. Students will investigate and report on how data/digital technology/AI has the potential to transform the operations or business model of a particular company or industry of the student's choosing (e.g. healthcare, retail, automotive, engineering). Students are expected to apply the concepts discussed in class and where appropriate, explicitly draw on the articles provided in the module as well as other relevant articles from their own research. The written submission needs to be grounded in the appropriate literature on the topic.

### **Examination Guidelines**

Please refer to [Form & conduct of the examinations](#) [2].

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#### **Links**

[1] <mailto:no245@cam.ac.uk>

[2] <https://teaching26-27.eng.cam.ac.uk/content/form-conduct-examinations>