

OPERATIONS MANAGEMENT & LOGISTICS

TU/e

EINDHOVEN
UNIVERSITY OF
TECHNOLOGY

OUTLINE OF THE OPERATIONS MANAGEMENT & LOGISTICS MASTER

The Operations Management and Logistics (OML) master's program at TU/e has the following characteristics:

1. The program has a workload of 120 ECTS. Each student can do all his/her core courses, track core courses, and specialization electives in the first year. This holds for both students starting in September and students starting in February.
2. The standard size of the master thesis work is 30 ECTS (including the research proposal), together with a separate literature study of 5 ECTS, which a student can do while being abroad. Next to this the second year allows for an international semester of up to 25 ECTS or an international research project of 15 ECTS.
3. The OML program has 4 thematic tracks that consist of courses that belong together and master thesis subjects for which those courses are relevant. Each thematic track contains core courses and specialization electives. The students must take all track core courses and courses with a workload of at least 10 ECTS from the list of specialization electives, which leaves room for free electives -in addition to the ones to be followed during the international semester- (if a student takes the nominal number of courses, free TU/e electives with a workload of at least 15 ECTS can be followed from programs other than OML). Each thematic track has a track coordinator. The specialization electives can focus on methodologies or on operational processes related to the track, allowing for a selection towards a master thesis topic. On top of that, the elective space (specialization and free) in all tracks allows students to choose a package of courses focusing on artificial intelligence methods. It is also possible for a student to have a 'free track'. A free track is used for e.g., excellent students in order to make their programs extra attractive and extra challenging. Students are coupled to tracks and mentors before the end of their first quarter.
4. The OML master's program contains core courses (general and track specific) which represent all disciplinary groups contributing to the master program, i.e., i) human performance management, ii) information systems, and iii) operations, planning, accounting, and control. Each OML student will have followed at least one course from each of the disciplinary groups within OML.
5. A methodological basis, with explicit attention to artificial intelligence, and design competency is provided in the IE Master Operations Management & Logistics, via (track) core courses. The design issues show differences between tracks and therefore there are special design courses for each track, whereas there is a common methodology course.

Outline of the OML Master

Core Courses (All tracks):

- 1JM110 Research Methods
- 1BM110 Data Analytics for Business Intelligence
- 1-out-of-2:** 1JM11 Performance Enhancement
OR 1JM50 Implementing and Adapting to AI in Organizations

The students also need to acquire sufficient knowledge in financing and accounting. This can be obtained from 1CM270 Integrated Financial & Operations Management, as well as the BSc courses (such as the current 1CK40 AND "1CK80 or 1CK90"), or a course during the international semester.

Furthermore, the students need to have sufficient knowledge in operations planning and control as well as information systems at the start of the program, as this knowledge is a pre-requisite in some courses. The students missing this knowledge are strongly recommended to follow a homologation course (such as 1CVK00 and 1BVK00) which will consume from the free elective space.

Tracks:

The OML Master defines tracks based on typical operational processes towards which the knowledge generated within OML field is directed. The systems in these domains show important differences that pose different questions and priorities, which require different types of models and solution methods. Accordingly, we propose different sets of track core and specialization elective courses for those tracks based on the approaches that are most relevant for them. We also provide design courses in each track core that are tailored towards the needs of the track.

The OML Master provides the following five tracks:

- Track 1: Services
- Track 2: Supply Chains
- Track 3: Manufacturing and Maintenance
- Track 4: Transport and Mobility
- Track 5: Special/Free Track

We would like to emphasize that despite this differentiation, our program remains as one OML MSc program with tracks rather than five different OML MSc programs. The basic idea with the tracks is to guide students from the beginning in order to help them choose the most relevant courses for their Master's projects, rather than forcing them to make binding early decisions. Indeed, it is possible for a student who is matched with a mentor to change his/her track at a later stage subject to the mentor's approval, as long as the general conditions stated in the specific OML design choices are met.

Track 1: Services

Companies delivering services (such as banking, insurance, IT, healthcare, consulting, energy, etc. and governmental organizations) offer value propositions that are primarily intangible. Advanced economies of developed countries are characterized by a significant share of the economic output produced by these companies. The services track focuses on methods, techniques and tools for designing value-driven, high-quality, cost-effective service solutions that meet customer demands. The students in the services track are equipped with the necessary skills and knowledge to systematically integrate business goals, processes, data, infrastructure, and people. The main topics of OML within the services track include service engineering, AI-driven decision support, digitally-enabled business models, business process management, digital transformation, process mining, enterprise architecture, and human performance.

Track 2: Supply Chains

Products and services are supplied to end customers through proper functioning of supply chains, which are systems of organizations, resources, people, activities and information. High customer expectations, fast-changing markets, unforeseen events, and competition are the main challenges that all global supply chains are facing. Supply chain management has the power to overcome these challenges and boost customer service, reduce operating costs and improve financial standing of companies. The students in the supply chain track are equipped with the necessary skills and knowledge to achieve a fundamental understanding of supply chain management from a global perspective, with emphasis on leveraging the effects of the operations on business performance and objectives. The main topics of OML within the supply chain track include multi-echelon inventory optimization, AI-driven decision support, business process optimization, supply chain operations design, collaboration/competition, demand and supply uncertainty management, and human performance.

Track 3: Manufacturing and Maintenance

In the age of smart industry, the developments in manufacturing technologies and automation, combined with the advances in data and AI technologies, lead to a change in how production planning and control decisions are made. There is also an increasing trend in digitized after-sales services offered by the manufacturers of the equipment used in production and service. Combined with the ambition to be more sustainable, flexible, resilient and cost-effective, these trends create new challenges for decision makers. The students in the manufacturing and maintenance track are equipped with the necessary skills and knowledge

to address these challenges. The main topics of OML within the manufacturing and maintenance track include data-driven production planning and control, AI-driven decision support, business process optimization, AI-driven process management, digital and sustainable factories, collaborative manufacturing, design and real-time control of material handling systems, predictive maintenance, service control towers, and human performance.

Track 4: Transport and Mobility

Transport and mobility are critical parts of any modern economy and one of the most important human activities worldwide. Today, our society and economy are facing an increasing transport demand, for both people and goods. With the increased availability of rich datasets and employing Artificial Intelligence, managing these flows creates new challenges that require new

planning, organization, and operation strategies in the area of transportation. The transportation track provides students with the necessary knowledge and skills to deal with these challenges. The main topics of OML within the transport and mobility track include business models, network design, scheduling and routing optimization, last-mile logistics, car sharing, on-demand transportation, intermodal traffic management, and demand management, using data analytics, the application of machine learning and AI on these topics, and human performance.

Track 5: Special/Free Track

This track is meant for excellent (honors) students who want to design their own master program, in close collaboration with the personal mentor, to be approved by Research Director IE (in case of Honors program)/ Program Managers (in case of dual degree).

TRACK 1: SERVICES

Track core courses:	Track specialization electives: (choose at least 10 ECTS - in addition to track core courses -)
1BM20 Business Analysis for Information Technology Systems	<ul style="list-style-type: none"> • All courses listed as possible (track) core courses, but not selected by student • 1BM10 E-business • 1BM120 Decision Making with Artificial and Computational Intelligence • 1BM130 Design of AI-Driven Business Operations • 1CM40 Retail Operations • 1CM190 Health Care Operations Planning (2.5 ECTS) • 1CM200 Warehouse Operations Management (2.5 ECTS) • 1CM220 Robust Policies for OM Problems (2.5 ECTS) • 1CM270 Integrated Financial and Operations Management • 1JM21 Designing Effective Performance Management Systems • 1JM30 Managing Team Dynamics and Team Performance • 1JM40 Behavioral Operations Management • 1ZM31 Multivariate Statistics • 1ZM55 Service Innovation Management • 1ZM65 System Dynamics • 2DI66 Advanced Simulation
<p>1-out-of-2: 1BM05 Business Process Management OR 1BM140 Engineering knowledge-intensive business processes</p> <p>1-out-of-3: 1CM10 Modeling & Analysis of Manufacturing Systems OR 1CM100 Multi-Echelon Inventory Management OR 1CM120 Advanced Maintenance and Service Logistics</p> <p>1BM100 Design of Service Operations</p>	

TRACK 2: SUPPLY CHAINS

Track core courses:	Track specialization electives: (choose at least 10 ECTS - in addition to track core courses -)
<p>1CM100 Multi-Echelon Inventory Management</p> <p>1-out-of-2: 1CM10 Modeling & Analysis of Manufacturing Systems OR 1CM40 Retail Operations</p> <p>1-out-of-2: 1BM05 Business Process Management OR 1BM20 Business Analysis for Information Technology Systems</p> <p>1CM140 Design of Operations Planning and Control Systems.</p>	<ul style="list-style-type: none"> • All courses listed as possible (track) core courses, but not selected by student • 1BM120 Decision Making with Artificial and Computational Intelligence • 1BM130 Design of AI-Driven Business Operations • 1BM140 Engineering Knowledge-Intensive Business Processes • 1CM36 Game Theory with applications to supply chain management • 1CM110 Decision Making in Transport and Mobility • 1CM120 Advanced Maintenance and Service Logistics • 1CM150 Advanced Planning and Scheduling Systems • 1CM170 Sustainable Supply Chains • 1CM200 Warehouse Operations Management (2.5 ECTS) • 1CM220 Robust Policies for OM Problems (2.5 ECTS) • 1CM240 AI for Logistics and its Interfaces • 1CM270 Integrated Financial and Operations Management • 1JM21 Designing Effective Performance Management Systems • 1JM30 Managing Team Dynamics and Team Performance • 1JM40 Behavioral Operations Management • 0LM120 Perspectives on medical technology • 1ZM31 Multivariate Statistics • 1ZM65 System Dynamics • 2DI66 Advanced Simulation

TRACK 3: MANUFACTURING AND MAINTENANCE

Track core courses:	Track specialization electives: (choose at least 10 ECTS - in addition to track core courses -)
<p>1-out-of-2: 1CM10 Modeling & Analysis of Manufacturing Systems OR 1CM120 Advanced Maintenance and Service Logistics</p> <p>1-out-of-4: 1CM10 Modeling & Analysis of Manufacturing Systems OR 1CM120 Advanced Maintenance and Service Logistics OR 1CM100 Multi-Echelon Inventory Management OR 1CM160 Manufacturing Technology</p> <p>Note: choice under 1. and 2. should be different</p> <p>1-out-of-2: 1BM05 Business Process Management OR 1BM140 Engineering knowledge-intensive business processes</p> <p>1CM140 Design of Operations Planning and Control systems</p>	<ul style="list-style-type: none"> • All courses listed as possible (track) core courses, but not selected by student • 1BM20 Business Analysis for Information Technology Systems • 1BM120 Decision Making with Artificial and Computational Intelligence • 1BM130 Design of AI-Driven Business Operations • 1CM36 Game Theory with applications to supply chain management • 1CM150 Advanced Planning and Scheduling Systems • 1CM170 Sustainable Supply Chains • 1CM200 Warehouse Operations Management (2.5 ECTS) • 1CM220 Robust Policies for OM Problems (2.5 ECTS) • 1CM270 Integrated Financial and Operations Management • 1JM21 Designing Effective Performance Management Systems • 1JM30 Managing Team Dynamics and Team Performance • 1JM40 Behavioral Operations Management • 1ZM31 Multivariate Statistics • 2DI66 Advanced Simulation

TRACK 4: TRANSPORT AND MOBILITY

Track core courses:	Track specialization electives: (choose at least 10 ECTS - in addition to track core courses -)
1CM110 Decision Making in Transport and Mobility	<ul style="list-style-type: none"> • All courses listed as possible (track) core courses, but not selected by student • 1BM05 Business Process Management • 1BM120 Decision Making with Artificial and Computational Intelligence • 1BM130 Design of AI-Driven Business Operations • 1CM10 Modeling & Analysis of Manufacturing Systems • 1CM36 Game Theory with applications to supply chain management • 1CM40 Retail Operations • 1CM100 Multi-Echelon Inventory Management • 1CM170 Sustainable Supply Chains • 1CM200 Warehouse Operations Management (2.5 ECTS) • 1CM220 Robust Policies for OM Problems (2.5 ECTS) • 1CM270 Integrated Financial and Operations Management • 1JM21 Designing Effective Performance Management Systems • 1JM40 Behavioral Operations Management • 1ZM31 Multivariate Statistics • 2DI66 Advanced Simulation
1BM20 Business Analysis for Information Technology Systems	
1-out-of-2: 1CM240 AI for logistics and its interfaces OR 1CM260 Large-scale optimization in transportation and mobility	
1CM130 Design for Transport and Logistics	

AI METHODS PACKAGE

All tracks allow students to choose an artificial intelligence methods package that, on top of core course 1BM110, consists of the following courses:

- 1BM120 Decision Making with Artificial and Computational Intelligence
- 1BM130 Design of AI-Driven Business Operations

MASTER'S THESIS

The thesis consists of three elements: i) Literature survey (5 ECTS), ii) project proposal (0 ECTS), and iii) thesis project (30 ECTS). The literature survey is evaluated with a grade out of 10. The project proposal is to be conducted as the first part of a thesis project and it is evaluated on a GO/NO-GO basis.

PROGRAM OVERVIEW OPERATIONS MANAGEMENT & LOGISTICS

Program Year 1			
Q1	Q2	Q3	Q4
Core + Track Core Courses (35 ECTS)			
Specialization Electives (10 ECTS)			
Free Electives (15 ECTS)			
Program Year 2			
Q1	Q2	Q3	Q4
1ML05			
International Semester and/or Electives		Graduation Project 1.M96	



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