MSc Transport, Infrastructure and Logistics

Programme Navigator 2019

General Information

Programme	*MSc Transport, Infrastructure and Logistics (MSc TIL)*
Provided by Delft University of Technology	*Faculty of Civil Engineering and Geosciences* *Faculty of Technology, Policy and Management* *Faculty of Mechanical, Maritime and Materials Engineering*
General information	*www.tudelft.nl/en/student/faculties/ceg-student-portal/education/ master/transport-infrastructure-logistics/*
Course guide	*studyguide.tudelft.nl*
Course schedules	*timetables.tudelft.nl*
Programme Director	*dr.ir. Dingena Schott*
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Programme Navigator & MSc TIL website	*dr. Jaap Vleugel*
Version	*1.3, Oktober 30, 2019 (**updates on p. 8, 22, 24, 41-42**)*

Programme 2019-20

Category	*EC*
Courses:	*75*
Fundamentals	23
Specialisations	27
Electives	25
Projects and Thesis	*45*
Projects	15
Thesis	30
Total	***120***

Content

Programme

Courses			75

Fundamentals			23
Transportation Modelling			6
Quantitative Methods for Logistics			5
Statistical Analysis of Choice Behaviour			5
TIL Research and Design Methods			7

Specialisations							27
Policy		**Design**		**Operations**		**Engineering**	
Infrastructure and Environment Method Module	3	Airport Planning and Optimization	3	Traffic Flow Modelling and Control Part 1	6	Freight Transportation Systems: Analysis and Modelling	5
Urban Sustainability	3	Airport Operations	4	Intelligent Vehicles for Safe + Efficient Traffic: Design + Assessment	4	Dynamics of Material and Equipment Interaction	4
People, Movement and Public Space	3	Planning and Operations of Public Transport Systems	6	Traffic Flow Modelling and Control Part 2	4	Multi-Machine Coordination for Logistics	3
Urban Regions, Transport and Economics	4	Advanced Transportation Modelling	4	Automotive Human Factors	3	Advanced Operations and Production Management	5
Assessment of Transport Infrastructure and Systems	4	Railway Operations and Control	4	System Analysis and Simulation	5	Decision Making in Multi Modal Transport Systems	5
Advanced Evaluation Methods for Transport Decision-making	5	Travel Behaviour Research	5	Simulation Master Class	5	Logistics and Supply Chain Innovations	5
Innovations in Transport and Logistics	5	TIL Programming Assignment	1				

Electives	25	*Transport & Planning*	*Transport & Logistics*	*Transport Engineering & Logistics*
Control & Operations		*Urbanism*	*Other TIL fields*	*Free Electives*

Projects and Thesis	45

Projects	15
TIL Research Project	5
TIL Design Project	10

Thesis	30
TIL Thesis	30

Courses and projects provided by:

- MSc Civil Engineering
- MSc COSEM
- MSc Mechanical Engineering
- MSc TIL
- MSc Aerospace Engineering
- MSc Architecture
- Other TIL fields

1 2 3 Courses

Course type	EC
Fundamentals	23
Specialisations	27
Electives	25
Total	**75**

Fundamentals	23
Transportation Modelling	6
Quantitative Methods for Logistics	5
Statistical Analysis of Choice Behaviour	5
TIL Research and Design Methods	7

Specialisations							27
Policy		**Design**		**Operations**		**Engineering**	
Infrastructure and Environment Method Module	3	Airport Planning and Optimization	3	Traffic Flow Modelling and Control Part 1	6	Freight Transportation Systems: Analysis and Modelling	5
Urban Sustainability	3	Airport Operations	4	Intelligent Vehicles for Safe + Efficient Traffic: Design + Assessment	4	Dynamics of Material and Equipment Interaction	4
People, Movement and Public Space	3	Planning and Operations of Public Transport Systems	6	Traffic Flow Modelling and Control Part 2	4	Multi-Machine Coordination for Logistics	3
Urban Regions, Transport and Economics	4	Advanced Transportation Modelling	4	Automotive Human Factors	3	Advanced Operations and Production Management	5
Assessment of Transport Infrastructure and Systems	4	Railway Operations and Control	4	System Analysis and Simulation	5	Decision Making in Multi Modal Transport Systems	5
Advanced Evaluation Methods for Transport Decision-making	5	Travel Behaviour Research	5	Simulation Master Class	5	Logistics and Supply Chain Innovations	5
Innovations in Transport and Logistics	5	TIL Programming Assignment	1				

Electives	25	Transport & Planning		Transport & Logistics		Transport Engin. & Logistics	
		>= 1 course	+	>= 1 course	+	>= 1 course	+
External		Urbanism		Other TIL fields		Free electives & projects	
Control & Operations >= 1 course	or	Urbanism >= 1 course	or	Other TIL fields >= 1 course		optional	

Courses provided by:
- ■ MSc Civil Engineering
- ■ MSc COSEM
- ■ MSc Mechanical Engineering
- ■ MSc TIL
- ■ MSc Aerospace Engineering
- ■ MSc Architecture

1 Fundamentals

	Course	EC	new	2018
CIE4801-18	Transport Modelling	6		
ME44206	Quantitative methods for logistics	5		ME44205
SEN1221	Statistical Analysis of Choice Behaviour	5	*name*	
TIL4030-16	TIL Research and Design Methods	7		
	Total	23		

Compulsory

Year 1	Q1	Q2	Q3	Q4
	TIL4030-16 [7] TIL Research and Design Methods [2] [5]	SEN1221 [5] Statistical Analysis of Choice Behaviour		TIL5050-20P1 [2] TIL Design Project
	CIE4801-18 [6] Transport Modeling			
	ME44205 [5] Quantitative methods for logistics			

Year 2	Q1	Q2	Q3	Q4
			TIL5060 TIL Thesis	[30]
	TIL4020-20 [5] TIL Research Project		TIL4020-20 [5] TIL Research Project	
	TIL5050-20P1 [2] [8] TIL5050-20P2 TIL Design Project	TIL5050-20P1 [2] [8] TIL5050-20P2 TIL Design Project	TIL5050-20P1 [2] [8] TIL5050-20P2 TIL Design Project	TIL5050-20P1 [2] [8] TIL5050-20P2 TIL Design Project

Courses and projects provided by:

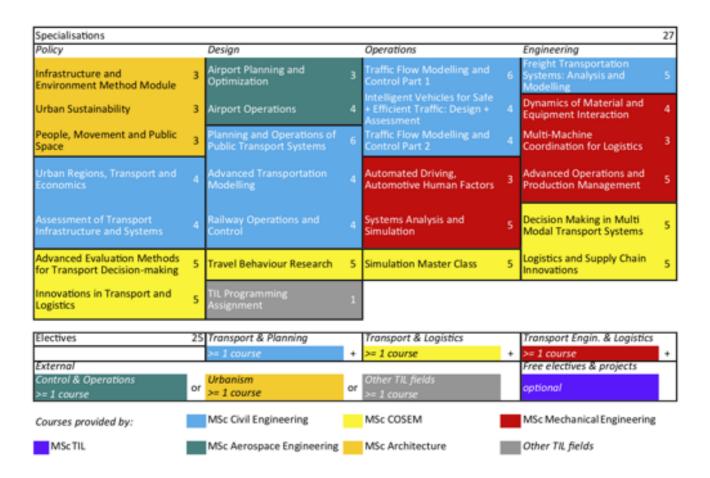|	
TIL	MSc Transport, Infrastructure & Logistics
CIE	MSc Civil Engineering
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2 Specialisations

There are 4 specialisations (27 EC):
P – Policy: Infrastructure, Planning and Environment
D – Design: Transport Systems and Networks
O – Operations: Traffic, Technology and Control
E – Engineering: Transport, Logistics and Supply Chains
Choose 1 specialisation

We understand that it is not always straightforward to choose the most suitable Specialisation. To help you decide, we organize a yearly Specialisation Event, where these are discussed together with other main courses, such as the TIL Design project. The date and time of this event are published on the MSc TIL website. You can find the TIL Toolboxes on pages 41-42 of this document.
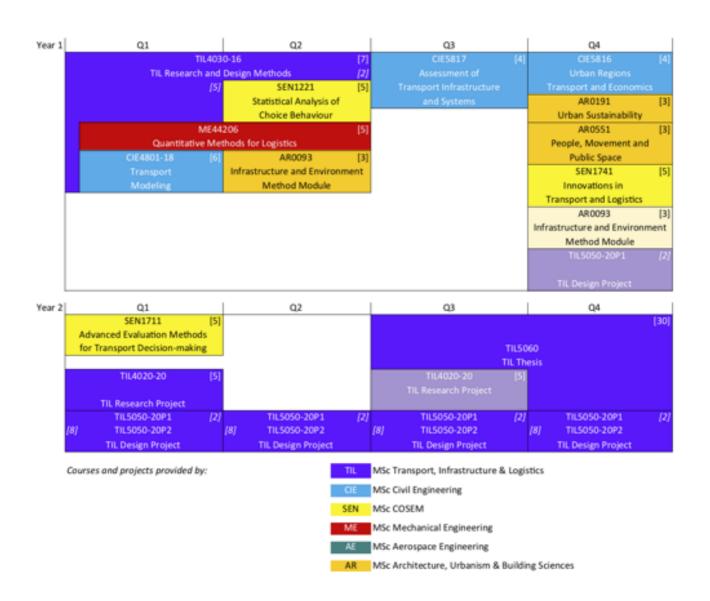
You can also make an appointment with the TIL Programme Coordinator to match you preferences with the available options.

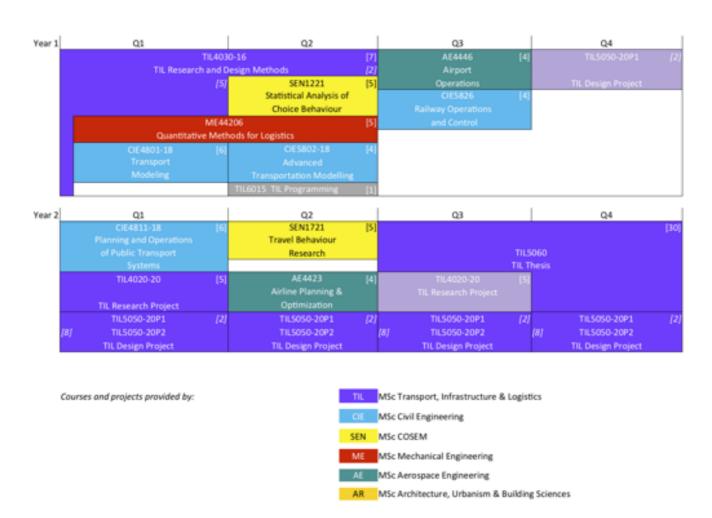Finally, you can also choose more than one specialisation.

Specialisations							27
Policy		**Design**		**Operations**		**Engineering**	
Infrastructure and Environment Method Module	3	Airport Planning and Optimization	3	Traffic Flow Modelling and Control Part 1	6	Freight Transportation Systems: Analysis and Modelling	5
Urban Sustainability	3	Airport Operations	4	Intelligent Vehicles for Safe + Efficient Traffic: Design + Assessment	4	Dynamics of Material and Equipment Interaction	4
People, Movement and Public Space	3	Planning and Operations of Public Transport Systems	6	Traffic Flow Modelling and Control Part 2	4	Multi-Machine Coordination for Logistics	3
Urban Regions, Transport and Economics	4	Advanced Transportation Modelling	4	Automated Driving, Automotive Human Factors	3	Advanced Operations and Production Management	5
Assessment of Transport Infrastructure and Systems	4	Railway Operations and Control	4	Systems Analysis and Simulation	5	Decision Making in Multi Modal Transport Systems	5
Advanced Evaluation Methods for Transport Decision-making	5	Travel Behaviour Research	5	Simulation Master Class	5	Logistics and Supply Chain Innovations	5
Innovations in Transport and Logistics	5	TIL Programming Assignment	1				

Electives	25	Transport & Planning		Transport & Logistics		Transport Engin. & Logistics	
		>= 1 course	+	>= 1 course	+	>= 1 course	+
External						Free electives & projects	
Control & Operations		Urbanism		Other TIL fields		optional	
>= 1 course	or	>= 1 course	or	>= 1 course			

Courses provided by:
- ▇ MSc Civil Engineering
- ▇ MSc COSEM
- ▇ MSc Mechanical Engineering
- ▇ MSc TIL
- ▇ MSc Aerospace Engineering
- ▇ MSc Architecture
- ▇ Other TIL fields

2.1 Specialisation P – Policy: Infrastructure, Planning & Environment

	Course	EC	new	2018
AR0093	Infrastructure and Environment Method Module	3		
AR0191	Urban Sustainability (TiSD)	3		
AR0551	People, Movement and Public Space	3		
CIE5816	Urban Regions, Transport and Economics	4		
CIE5817	Assessment of Transport Infrastructure and Systems	4		
SEN1711	Advanced Evaluation Methods for Transport Policy Decision-making	5		
SEN1741	Innovations in Transport and Logistics	5	course	
	Total	27		

In a chosen specialisation all courses are compulsory

2.2 Specialisation D – Design: Transport Systems & Networks

	Course	EC	new	2018
AE4423	Airline Planning & Optimization	3	*name*	4
AE4446	Airport Operations	4		
CIE4811-18	Planning and Operations of Public Transport Systems	6		
CIE5802-18	Advanced Transportation Modelling	4		
CIE5826	Railway Operations and Control	4		
SEN1721	Travel Behaviour Research	5		
TIL6015	TIL Programming Assignment	1	*course*	
	Total	27		

In a chosen specialisation all courses are compulsory

Year 1

	Q1	Q2	Q3	Q4
	TIL4030-16 [7] TIL Research and Design Methods [2]		AE4446 [4] Airport Operations	TIL5050-20P1 [2] TIL Design Project
	[5]	SEN1221 [5] Statistical Analysis of Choice Behaviour	CIE5826 [4] Railway Operations and Control	
	ME44206 [5] Quantitative Methods for Logistics			
	CIE4801-18 [6] Transport Modeling	CIE5802-18 [4] Advanced Transportation Modelling		
		TIL6015 TIL Programming [1]		

Year 2

	Q1	Q2	Q3	Q4
	CIE4811-18 [6] Planning and Operations of Public Transport Systems	SEN1721 [5] Travel Behaviour Research		[30]
	TIL4020-20 [5] TIL Research Project	AE4423 [4] Airline Planning & Optimization	TIL4020-20 [5] TIL Research Project	TIL5060 TIL Thesis
	TIL5050-20P1 [2] TIL5050-20P2 [8] TIL Design Project	TIL5050-20P1 [2] TIL5050-20P2 [8] TIL Design Project	TIL5050-20P1 [2] TIL5050-20P2 [8] TIL Design Project	TIL5050-20P1 [2] TIL5050-20P2 TIL Design Project

Courses and projects provided by:

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ME	MSc Mechanical Engineering
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2.3 Specialisation O – Operations: Traffic, Technology & Control

	Course	EC new	2018
CIE4825	Traffic Flow Modelling and Control Part 1	6	
CIE5805-18	Intelligent Vehicles for Safe + Efficient Traffic: D+A	4	
CIE5821	Traffic Flow Modelling and Control Part 2	4	
ME41000	Automotive Human Factors	3	name
ME44305	System Analysis and Simulation	5	
SEN9110	Simulation Master Class	5	
	Total	27	

In a chosen specialisation all courses are compulsory

Year 1

	Q1	Q2	Q3	Q4
	TIL4030-16 [7] TIL Research and Design Methods [2]		ME44305 [5] System Analysis and Simulation	
	[5]	SEN1221 [5] Statistical Analysis of Choice Behaviour	CIE5821 [4] Traffic Flow Modelling and Control Part 2	CIE5805-18 [4] Intelligent Vehicles for Safe + Efficient Traffic: Design+Assessment
	ME44206 [5] Quantitative Methods for Logistics			ME41000 [3] Automotive Human Factors
	CIE4801-18 [6] Transport Modeling	CIE4825 [6] Traffic Flow Modelling and Control Part 1		TIL5050-20P1 [2] TIL Design Project

Year 2

	Q1	Q2	Q3	Q4
	SEN9110 [5] Simulation Master Class			[30]
	TIL4020-20 [5] TIL Research Project		TIL5060 TIL Thesis	
			TIL4020-20 [5] TIL Research Project	
	TIL5050-20P1 [2] [8] TIL5050-20P2 TIL Design Project	TIL5050-20P1 [2] [8] TIL5050-20P2 TIL Design Project	TIL5050-20P1 [2] [8] TIL5050-20P2 TIL Design Project	TIL5050-20P1 [2] [8] TIL5050-20P2 TIL Design Project

Courses and projects provided by:

TIL	MSc Transport, Infrastructure & Logistics
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2.4 Specialisation E – Engineering: Transport, Logistics & Supply Chains

	Course	EC new	2018	EC
CIE5830	Freight Transportation Systems: Analysis and Modelling	5		
ME44101	Dynamics of Material and Equipment Interaction	4	ME44100	3
ME44300	Multi-Machine Coordination for Logistics	3 *name*		
ME44311	Advanced Operations and Production Management	5	ME44300	6
SEN9710	Decision Making in Multi Modal Transport Systems	5		
SEN9720	Logistics and Supply Chain Innovations	5		
	Total	27		

In a chosen specialisation all courses are compulsory

Courses and projects provided by:

- **TIL** — MSc Transport, Infrastructure & Logistics
- **CIE** — MSc Civil Engineering
- **SEN** — MSc COSEM
- **ME** — MSc Mechanical Engineering
- **AE** — MSc Aerospace Engineering
- **AR** — MSc Architecture, Urbanism & Building Sciences

3 Electives

There are 5 categories of electives:	*Choose*
Electives T&P - Transport and Planning	*at least 1 course*
Electives T&L - Transport and Logistics	*at least 1 course*
Electives TEL - Transport Engineering and Logistics	*at least 1 course*
External electives Electives C&O - Control and Operations Electives U - Urbanism Electives TIL - Other TIL fields	*at least 1 course*
Free Electives	*Optional*

Civil Engineering		Systems Engineering		Mechanical Engineering		External		Free electives	
Planning and Operations of Public Transport Systems	6	Institutional Economics for Design in Socio-technical Systems	3	Dynamics of Material and Equipment Interaction	4	Air Traffic Management	4	Free electives	
Traffic Flow Modelling and Control Part 1	6	Law and Institutions	5	Structural Design with FEM	4	Airline Planning and Optimization	3	TIL Programming / Matlab	2
Empirical Analysis for Transport and Planning	6	Advanced Evaluation Methods for Transport Decision-making	5	Integration Project Multi-Machine Systems	5	Airport Operations	4	TIL Scientific Assignment	7
Emerging Topics for Transport & Planning	4	Travel Behaviour Research	5	Discrete Element Method (DEM) Simulation	4	Airline Scheduling Exercise	2		
Advanced Transportation Modelling	4	Innovations in Transport and Logistics	5	Reliability and Maintenance of Transport Equipment	3	Infrastructure and Environment Method Module	3		
Railway Traffic Management	4	Simulation Master Class	5	Operations & Maintenance	3	Urban Sustainability	3		
Intelligent Vehicles for Safe+Efficient Traffic: Design+Assessment	4	Decision Making in Multi-modal Transport Systems	5	Drive and Energy Systems	3	People, Movement and Public Space	3		
Traffic Safety	4	Logistics and Supply Chain Innovations	5	Multi-Machine Coordination for Logistics	3	Workshop Cross Domain 'City of the Future'	3		
Resilient Transport Systems	4	Supply Chain Gaming	5	System Analysis and Simulation	5	Seminar Cross Domain 'City of the Future'	6		
Urban Regions, Transport and Economics	4	Transport Safety	4	Advanced Operations and Production Management	5	Legal and Governance	7		
Assessment of Transport Infrastructure and Systems	4					Ports and Waterways 1	4		
Traffic Flow Modelling and Control Part 2	4					Ports and Waterways 2	4		
Active modes: Traffic and Transport	4					Elements of Railway Engineering	4		
Advanced Public Transport Modelling and Operations	4					Automotive Human Factors	3		
Railway Operations and Control	4					Intelligent Vehicles	4		
Freight Transportation Systems: Analysis and Modelling	5					Shipping Management	5		
						Decision Theory/Expert Judgement	6		
						Risk Analysis	6		
						Ethics of Transportation	3		

Aerospace Engineering / Architecture / Other TIL (External column side labels)

Courses and projects provided by:

■ MSc Civil Engineering   ■ MSc COSEM   ■ MSc Mechanical Engineering   ■ MSc Aerospace Engineering   ■ MSc Transport, Infrastructure and Logistics
■ TPM Service Education   ■ MSc Architecture

3.1 Electives T&P – Transport & Planning

	Course	EC new	2018	EC
CIE4811-18	Planning and Operations of Public Transport Systems	6		
CIE4825	Traffic Flow Modelling and Control Part 1	6		
CIE4831-18	Empirical Analysis for Transport and Planning	6		
CIE4845	Emerging Topics for Transport & Planning	4		
CIE5802-18	Advanced Transportation Modelling	4		
CIE5803-18	Railway Traffic Management	4		
CIE5805-18	Intelligent Vehicles for Safe+Efficient Traffic: Design+Assessme	4		
CIE5810-19	Traffic Safety	4	CIE5810-18	
CIE5815	Resilient Transport Systems	4		
CIE5816	Urban Regions, Transport and Economics	4		
CIE5817	Assessment of Transport Infrastructure and Systems	4		
CIE5821	Traffic Flow Modelling and Control Part 2	4		
CIE5822	Active modes: Traffic and Transport	4		
CIE5825	Advanced Public Transport Modelling and Operations	4		
CIE5826	Railway Operations and Control	4		
CIE5830	Freight Transportation Systems: Analysis and Modelling	5		

Choose at least 1 course, not already chosen as part of specialisation

Q1	Q2	Q3	Q4
(D) CIE4811-18 [6] Planning and Operations of Public Transport Systems	(O) CIE4825 [6] Traffic Flow Modelling and Control Part 1	CIE5815 [4] Resilient Transport Systems	(D) CIE4845 [4] Emerging Topics for Transport & Planning
	(D) CIE5802-18 [4] Advanced Transportation Modelling	(P) CIE5817 [4] Assessment of Transport Infrastructure and Systems	(P) CIE5816 [4] Urban Regions, Transport and Economics
	CIE5810-19 [4] Traffic Safety	(O) CIE5821 [4] Traffic Flow Modelling and Control Part 2	(O) CIE5805-18 [4] Intelligent Vehicles for Safe + Efficient Traffic: Design + Assessment
	CIE4831-18 [6] Empirical Analysis for Transport & Planning	CIE5822 [4] Active modes: Traffic and Transport	CIE5803-18 [4] Railway Traffic Management
		CIE5825 [4] Advanced Public Transport Modelling and Operations	
		(D) CIE5826 [4] Railway Operations and Control	
		(E) CIE5830 [5] Freight Transportation Systems: Analysis and Modelling	

Courses provided by:

CIE	MSc Civil Engineering Track Transport & Planning	(P)	Course is part of Specialisation P
		(D)	Course is part of Specialisation D
		(O)	Course is part of Specialisation O
		(E)	Course is part of Specialisation E

3.2 Electives T&L – Transport & Logistics

	Course	EC new	2018
SEN1131	Institutional Economics for Design in Socio-technical Systems	3	
SEN1151	Law and Institutions	5	
SEN1711	Advanced Evaluation Methods for Transport Decision-making	5	
SEN1721	Travel Behaviour Research	5	
SEN1741	Innovations in Transport and Logistics	5	
SEN9110	Simulation Master Class	5	
SEN9710	Decision Making in Multi-modal Transport Systems	5	*name*
SEN9720	Logistics and Supply Chain Innovations	5	
SEN9725	Supply Chain Gaming	5	
TPM004a	Transport Safety	4	

Choose at least 1 course, not already chosen as part of specialisation

Q1	Q2	Q3	Q4
SEN1131 [3]	(D) SEN1721 [5]	SEN1151 [5]	SEN1741 [5]
Institutional Economics for Design in Socio-technical Systems	Travel Behaviour Research	Law and Institutions	Innovations in Transport and Logistics
(P) SEN1711 [5]	(E) SEN9710 [5]		
Advanced Evaluation Methods for Transport Decision-making	Decision Making in Multi-modal Transport Systems		
(E) SEN9720 [5]	SEN9725 [5]		
Logistics and Supply Chain Innovations	Supply Chain Gaming		
(O) SEN9110 [5]			
Simulation Master Class			
TPM004a [4]			
Transport Safety			

Courses provided by:

SEN	MSc COSEM		(P)	Course is part of Specialisation P
	Track Transport & Logistics		(D)	Course is part of Specialisation D
			(O)	Course is part of Specialisation O
			(E)	Course is part of Specialisation E

3.3 Electives TEL – Transport Engineering & Logistics

Course		EC	new	2018	Remark
ME44101	Dynamics of Material and Equipment Interaction	4		ME44100	
ME44105	Structural Design with FEM	4			
ME44110	Integration Project Multi-Machine Systems	5			uses ME44105
ME44115	Discrete Element Method (DEM) Simulation	4			uses ME44100
ME44125	Reliability and Maintenance of Transport Equipment	3			uses ME44105
ME44200	Operations & Maintenance	3	name		
ME44210	Drive and Energy Systems	3			
ME44300	Multi-Machine Coordination for Logistics	3	name		
ME44305	System Analysis and Simulation	5			
ME44311	Advanced Operations and Production Management	5		ME44310	

Choose at least 1 course, not already chosen as part of specialisation

Q1	Q2	Q3	Q4
ME44210 [3] Drive and Energy Systems	ME44105 [4] Structural Design with FEM	(E) ME44200 [3] Operations & Maintenance	(E) ME44300 [3] Multi-Machine Coordination for Logistics
ME44101 [4] Dynamics of Material and Equipment Interaction		ME44115 [4] Discrete Element Method (DEM) Simulation	
		ME44125 [3] Reliability and Maintenance of Transport Equipment	
		ME44110 [5] Integration Project Multi-Machine Systems	
		(O) ME44305 [5] System Analysis and Simulation	
		(E) ME44311 [5] Advanced Operations and Production Management	

Courses provided by:

ME	MSc Mechanical Engineering Track Transport Engineering & Logistics	(P)	Course is part of Specialisation P
		(D)	Course is part of Specialisation D
		(O)	Course is part of Specialisation O
		(E)	Course is part of Specialisation E

3.4 External electives

There are 3 options:
Electives C&O – Control and Operations
Electives U - Urbanism
Electives TIL – Other TIL fields
Choose at least 1 course, not already chosen as part of specialisation

Q1	Q2	Q3	Q4
AR8003TU [5] Legal and Governance	(D) AE4423-19 [3] Airline Planning and Optimization	(D) AE4446 [4] Airport Operations	(O) ME41000 [3] Automotive Human Factors
CIE4330 [4] Ports and Waterways 1	AE4321-15 [4] Air Traffic Management		CIE5306 [4] Ports and Waterways 2
WI4052 [6] Risk Analysis		WI4138 [6] Decision Theory/Expert Judgement	
AE4427 [2] Airline Scheduling Exercise	ME41105 [4] Automotive Human Factors	WM1301TU [3] Ethics of Transportation	(P) AR0093 [3] Infrastructure & Environment Method Module
	(P) AR0093 [3] Infrastructure & Environment Method Module		(P) AR0191 [3] Urban Sustainability
AR3CS010 [3] People, Movement and Public Space AR3CS020 [6] Workshop Cross Domain 'City of the Future'			(P) AR0551 [3] People, Movement and Public Space

Courses provided by:

AE	MSc Aerospace Engineering, Track Control & Operations
AR	AR Electives
CIE	CEG Electives
ME	3mE Electives
	TPM Service education

(P)   Course is part of Specialisation P
(D)   Course is part of Specialisation D
(O)   Course is part of Specialisation O
(E)   Course is part of Specialisation E

3.4.1 Electives C&O – Control & Operations

	Course	EC new	2018
AE4321-15	Air Traffic Management	4	
AE4423-19	Airline Planning and Optimization	4	AE4423
AE4427*	Airline Scheduling Exercise	2	
AE4446	Airport Operations	4	

*Prerequisite: AE4423

Choose at least 1 course, not already chosen as part of specialisation
Optional if at least 1 course of Electives U or Electives TIL has been chosen

Q1	Q2	Q3	Q4
AE4427 [2]	(D) AE4423-19 [4]	(D) AE4446 [4]	
Airline Scheduling Exercise	Airline Planning and Optimization	Airport Operations	
	AE4321-15 [4]		
	Air Traffic Management		

Courses provided by:

AE — MSc Aerospace Engineering
Track Control & Operations

(P) Course is part of Specialisation P
(D) Course is part of Specialisation D
(O) Course is part of Specialisation O
(E) Course is part of Specialisation E

3.4.2 Electives U – Urbanism

Course		EC new	2018	EC
AR0093	Infrastructure and Environment Method Module	3		
AR0191	Urban Sustainability	3		
AR0551	People, Movement and Public Space	3		
AR3CS010	Workshop Cross Domain 'City of the Future'	3		
AR3CS020	Seminar Cross Domain 'City of the Future'	6		
AR8003TU	Legal and Governance	5	AR8002TU	7

Choose at least 1 course, not already chosen as part of specialisation
Optional if at least 1 course of Electives C&O or Electives TIL has been chosen

Q1		Q2		Q3	Q4	
AR8003TU [7]	(P)	AR0093 [3]			(P)	AR0093 [3]
Legal and		Infrastructure & Environment				Infrastructure & Environment
Governance		Method Module				Method Module
AR3CS010 [3]					(P)	AR0191 [3]
Workshop Cross Domain 'City of the Future'						Urban
AR3CS020 [6]						Sustainability
Cross Domain 'City of the Future'					(P)	AR0551 [3]
						People, Movement and
						Public Space

Courses provided by:

AR	MSc Architecture, Urbanism & Building Science	(P)	Course is part of Specialisation P
	AR Electives	(D)	Course is part of Specialisation D
		(O)	Course is part of Specialisation O
		(E)	Course is part of Specialisation E

3.4.3 Electives TIL – Other TIL fields

	Course	*EC*	*new*	*2018*
CIE4330	Ports and Waterways 1	4		
CIE5306	Ports and Waterways 2	4		
CIE4874	Elements of Railway Engineering	4	*course*	
ME41000	Automotive Human Factors	3		
ME41105	Intelligent Vehicles	4		
MT44070	Shipping Management	5		
WI4138	Decision Theory/Expert Judgement	6	*course*	
WI4052	Risk Analysis	6	*course*	
WM1301TU	Ethics of Transportation	3		

Choose at least 1 course, not already chosen as part of specialisation
Optional if at least 1 course of Electives C&O or Electives U has been chosen

Courses provided by:

CIE	CEG Electives	ME	3mE Electives

(P) Course is part of Specialisation P
(D) Course is part of Specialisation D
(O) Course is part of Specialisation O
(E) Course is part of Specialisation E

TPM Service Education

3.5 Free electives

Courses and projects at master level provided by:

Free electives must NOT include:
- courses with significant overlap with other courses in the examination programme
- language courses

Optional

3.5.1 Free Electives

Course		EC	new	2018
	Free electives			
TIL6010	TIL Programming / Matlab	2		
TIL6015	TIL Programming / Assignment	1	*course*	
TIL6020	TIL Scientific Assignment	7		

Optional

Internships

An internship can be part of your free electives. You are free to choose one, provided you arrange everything in communication with and after acceptance of your application forms by the Internship Office. Visit their web page for more information.

Q1	Q2	Q3	Q4
Free elective	Free elective	Free elective	Free elective
TIL6020 [7]	TIL6020 [7]	TIL6020 [7]	TIL6020 [7]
TIL Scientific Assignment	TIL Scientific Assignment	TIL Scientific Assignment	TIL Scientific Assignment
TIL6010 [2]	TIL6015 [1]		
TIL Programming / Matlab	TIL Programming / Assignment		

Practicals provided by:

   MSc Transport, Infrastructure and Logistics

4 5 Projects and Thesis

Projects		
TIL4020-20	TIL Research Project	5
TIL5050-20	TIL Design Project	10

Thesis		
TIL5060	TIL Thesis	30

4 Projects

a. Course year 2019-20

Project		EC
TIL4020-16	TIL Research Project	3
TIL5050-12	TIL Design Project *	7
	Total	10

*A Design Project asks for special preparation. Visit the MSc TIL website, Brightspace and contact the Course Coordinator for optimal scheduling of this course in your individual master programme.

b. Course year 2020-21

Project		EC new	2018+2019	EC
TIL4020-20	TIL Research Project	5	TIL4020-16	3
TIL5050-20	TIL Design Project *		TIL5050-12	7
TIL5050-20 P1	Proposal	2		
TIL5050-20 P2	Project	8		
	Total	15		10

* Project proposal is written in one of the preceding quarters
Acceptance of enrollment (each individually):
✓ 1. form received 4 weeks before start of project quarter
✓ 2. filled in form shows at least 45 EC
✓ 3. TIL4030-16 is completely fulfilled
Use the course manual

Compulsory

TIL5050-20 P1 and P2
Module P1 starts with finding a commissioner, topic, writing a PVS and following a few lectures. P2 is the real project. It will usually follow in the next quarter, after acceptance of your PVS.

*The enrolment procedure and planning of the course will change compared to course year 2019-20 to reflect the changed structure of this course.

The course coordinator will assist you with all relevant process and content questions. He will also help you with the PVS. More information can be found in the course manual, on Brightspace and on the MSc TIL website.
An update will follow at the beginning of 2020.

5 Thesis

Project		EC	new	2018
TIL5060	TIL Thesis	30		

Compulsory

Year 1	Q1	Q2	Q3	Q4
				TIL5050-20P1 [2] TIL Design Project

Year 2	Q1	Q2	Q3	Q4
			TIL5060 TIL Thesis	[30]
	TIL4020-20 [5] TIL Research Project		TIL4020-20 [5] TIL Research Project	
	TIL5050-20P [2] [8] TIL5050-20P2 TIL Design Project	TIL5050-20P [2] [8] LS050-20P2 TIL Design Project	TIL5050-20P1 [2] [8] TIL5050-20P2 TIL Design Project	TIL5050-20P [2] [8] LS050-20P2 TIL Design Project

Courses and projects provided by: TIL   MSc Transport, Infrastructure & Logistics

Programme Overview MSc Transport, Infrastructure and Logistics 2019-20

Courses (75 EC)

1 Fundamentals (23 EC)

Code	Course
CIE4801-18	Transport Modelling
ME44206	Quantitative Methods for Logistics
SEN1221	Statistical Analysis of Choice Behaviour
TIL4030-16	TIL Research and Design Methods

2 Specialisations (27 EC) (1 specialisation)

2.1 Specialisation P – Policy: Infrastructure, Planning and Environment

Code	Course
AR0093	Infrastructure and Environment Method Module
AR0191	Urban Sustainability
AR0551	People, Movement and Public Space
CIE5816	Urban Regions Transport and Economics
CIE5817	Assessment of Transport Infrastructure and Systems
SEN1711	Advanced Evaluation Methods for Transport Policy Decision-making
SEN1741	Innovations in Transport and Logistics

2.2 Specialisation D: Design Transport Systems and Networks

Code	Course
AE4423-19	Airline Planning & Optimization
AE4446	Airport Operations
CIE4811-18	Planning and Operations of Public Transport Systems
CIE5802-18	Advanced Transportation Modelling
CIE5826	Railway Operations and Control
SEN1721	Travel Behaviour Research
TIL6015	TIL Programming / Assignment

2.3 Specialisation O – Operations: Traffic, Technology & Control

Code	Course
CIE4825	Traffic Flow Modelling and Control Part 1
CIE5805-18	Intelligent Vehicles for Safe + Efficient Traffic: Design + Assessment
CIE5821	Traffic Flow Modelling and Control Part 2
ME41000	Automotive Human Factors
ME44305	System Analysis and Simulation
SEN9110	Simulation Master Class

2.4 Specialisation E – Engineering: Transport, Logistics & Supply Chains

Code	Course
CIE5830	Freight Transportation Systems: Analysis and Modelling
ME44101	Dynamics of Material and Equipment Interaction
ME44300	Multi-Machine Coordination Logistics
ME44311	Advanced Operations and Production Management
SEN9710	Decision Making in Multi-modal Transport Systems
SEN9720	Logistics and Supply Chain Innovations

3 Electives (25 EC)

3.1 Electives T&P – Transport & Planning (at least 1 course)

Code	Course
CIE4811-18	Planning and Operation of Public Transport Systems
CIE4825	Traffic Flow Modelling and Control Part 1
CIE4831-18	Empirical Analysis for Transport and Planning
CIE4845	Emerging Topics for Transport & Planning
CIE5802-18	Advanced Transportation Modelling
CIE5803-18	Railway Traffic Management
CIE5805-18	Intelligent Vehicles for Safe and Efficient Traffic: Design and Assessment
CIE5810-19	Traffic Safety
CIE5815	Resilient Transport Systems
CIE5816	Urban Regions Transport and Economics
CIE5817	Assessment of Transport Infrastructure and Systems
CIE5821	Traffic Flow Modelling and Control Part 2
CIE5822	Active modes: Traffic and Transport

CIE4825	Advanced Public Transport Modelling and Operations
CIE5826	Railway Operations and Control
CIE5830	Freight Transportation Systems: Analysis and Modelling

3.2 Electives T&L – Transport and Logistics (at least 1 course)

SEN1131	Institutional Economics for Design in Socio-technical Systems
SEN1151	Law and Institutions
SEN1711	Advanced Evaluation Methods for Transport Decision-making
SEN1721	Travel Behaviour Research
SEN1741	Innovations in Transport and Logistics
SEN9110	Simulation Master Class
SEN9710	Decision Making in Multi-modal Transport Systems
SEN9720	Logistics and Supply Chain Innovations
SEN9725	Supply Chain Gaming
TPM004a	Transport Safety

3.3 Electives TEL – Transportation Engineering and Logistics (at least 1 course)

ME44101	Dynamics of Material and Equipment Interaction
ME44105	Structural Design with FEM
ME44110	Integration Project for Multi-Machine Systems
ME44115	Discrete Element Method (DEM) Simulation
ME44125	Reliability and Maintenance of Transport Equipment
ME44200	Operations and Maintenance
ME44210	Drive and Energy Systems
ME44300	Multi-Machine Coordination for Logistics
ME44305	System Analysis and Simulation
ME44311	Advanced Operations and Production Management

3.4 External electives (at least 1 course)

3.4.1 Electives C&O – Control and Operations

AE4321-15	Air Traffic Management
AE4427	Airline Scheduling Exercise
AE4446	Airport Operations

3.4.2 Electives U – Urbanism

AR0093	Infrastructure and Environment Method Module
AR0191	Urban Sustainability
AR0551	People, Movement and Public Space
AR3CS010	Workshop Cross Domain 'City of the Future'
AR3CS020	Seminar Cross Domain 'City of the Future'
AR8003TU	Legal and Governance

3.4.3 Electives TIL – Other TIL fields

CIE4330	Ports and Waterways 1
CIE5306	Ports and Waterways 2
CIE4874	Elements of Railway Engineering
ME41000	Automotive Human Factors
ME41105	Intelligent Vehicles
ME44070	Shipping Management
WM1301TU	Ethics of Transportation
WI4052	Risk Analysis
WI4138	Decision Theory/Expert Judgement

3.5 Free electives (*optional*)

3.5.1 Free Electives

	Free electives
TIL6010	TIL Programming/Matlab
TIL6015	TIL Programming/Assignment
TIL6020	TIL Scientific Assignment

Projects and Thesis (45 EC)

4 5 Projects and Thesis

TIL4020-20	TIL Research Project
TIL5050-20	TIL Design Project
TIL5060	TIL Thesis

Extras

A   Annotations
   A.1 Technology in Sustainable Development
   A.2 Entrepreneurship
   A.3 Infrastructure and Environment Design
   A.4 Integral Design and Management
   A.5 Rail

B   Honours Programme Master
   B.1 Honours Programme Master

C   Schakel- en convergentieprogramma's
   C.1 Schakelprogramma HBO (Bridging Programme)
   C.2 Schakelminor WO (Bridging Minor Programme)
   C.3 Convergentieprogramma WO (Convergence Programme)

A Annotations

Overview

A.1 Annotation Technology in Sustainable Development
A.2 Annotation Entrepreneurship
A.3 Annotation Infrastructure and Environment Design (*changed*)
A.4 Annotation Integral Design and Management (*completely changed*)
A.5 Annotation Railway Systems (*changed*)

A.1 Technology in Sustainable Development

	Course	EC	remarks	2018
WM0939TU	Engineering for Sustainable Development	5		
	Electives Design, Analysis and Tools >=3	10		
	Electives Organisation and Society >=3			
	Total	15		
TIL5060	*Focus in* Thesis	(30)		

Read TER MSc TIL Chapter 2 for details

Optional

A.2 Entrepreneurship

	Course	EC	remarks	2018
WM4001TU	Entrepreneurship Annotation Week	2		
	Electives	13		
	Total	15		
TIL5060	*Focus in* Thesis	(30)		

Read TER MSc TIL Chapter 2 for details

Optional

A.3 Infrastructure and Environment Design

	Course	EC	remarks	2018
	Compulsory			
AR0086	Infrastructure and Environment Design *	12		
AR0093	Infrastructure and Environment Method Module *	3		
	Electives	3/12		
	Total	*15*		
TIL5060	*Focus in* TIL Thesis Project	(30)		

Read TER MSc TIL Chapter 2 for details

* Choose either AR0086 or AR0093

Optional

A.4 Integral Design and Management

	Course	EC	remarks	2018
	Compulsory			
CIE4120	Information Systems for the Construction Industry	4		
CIE4381	Engineering Asset Management	4		
	Electives	>=7		
CIE4100	Materials and ecological engineering	4	*new*	
CIE4130	Probabilistic design and risk management	4	*new*	
CIE4170	Constructive technology for civil engineering projects	4	*new*	
CIE4391	Quantitative asset modelling	4	*new*	
CIE4395	Risk and variability in geo-engineering	4	*new*	
CIE4491	Urban drainage and water management	4	*new*	
CIE5830	Freight transport systems: analysis and modelling	5	*new*	
CIE5981	Forms of Collaboration in Civil Engineering	4	*new*	
CME2210	Open design & construction management	4	*new*	
	Total	15		
TIL5050-20	*Focus in* TIL Design Project	(10)		(7)
	Other project mentioned in Article 11 c.	>= 7		
TIL5060	*Focus in* Thesis	(30)		

Read TER MSc TIL Chapter 2 for details

Optional

A.5 Railway Systems

MSc TIL Programme Navigator 2019 - Page 33 boven

A.5 Railway Systems

	Course	EC	remarks	2018
	Compulsory			
CIE4874	Elements of Railway Engineering	4		
CIE5826	Railway Operations and Control	4		
	Electives	>=7	14 EC without project	
CIE4811-18	Planning and Operations of Public Transport Systems	6		
CIE4870	Structural Design of Railway Track	4		
CIE4871	Design and Maintenance of Railway Vehicles	4		
CIE4873	Wheel-rail Interface	4		
CIE5803-18	Railway Traffic Management	4	uses CIE4811-18	
CIE5871	Capita selecta railway and road structures	4	*new*	
CIE5874	Life-cycle performance by design of railway assets	4		
CIE5875	Railway Asset Management	4		
TPM004a	Transport Safety	4		
	Total	15	22 EC without project	
TIL5050-12	*Focus in TIL* Design Project	(10)		
	Other project mentioned in Article 12 c.	>= 7		
TIL5060	*Focus in* Thesis	(30)		

Read TER MSc TIL Chapter 2 for details

Optional

B　Honours Programme Master

B.1　Honours Programme Master

	Course or project	EC	remarks	2018
UD2010	Critical Reflection on Technology	5		
TIL6020	TIL Scientific Assignment	7	HPM MSc TIL specific	
	Thematically consistent set of Electives	8	Individual programme	
	Total <u>*on top of MSc-programme*</u>	20		

Read TER MSc TIL Chapter 2 for details

Optional

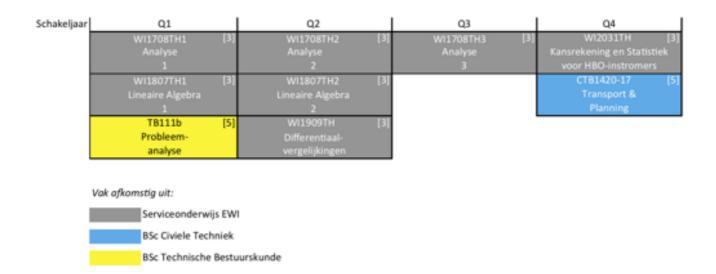## C　Schakel- en convergentieprogramma's

Overview

Schakelprogramma HBO (Bridging Programme)
Schakelminor WO (Bridging Minor Programme)
Convergentieprogramma WO (Convergence Programme)

C.1 Schakelprogramma HBO

Vak		EC	opmerking	2018
CTB1420-17	Transport & Planning	5		
TB111b	Probleemanalyse	5		
WI1708TH1	Analyse 1	3		
WI1708TH2	Analyse 2	3		
WI1708TH3	Analyse 3	3		
WI1807TH1	Lineaire Algebra 1	3		
WI1807TH2	Lineaire Algebra 2	3		
WI1909TH	Differentiaalvergelijkingen	3		
WI2031TH	Kansrekening en statistiek voor hbo-instromers	3		
	Totaal	31		

Verplicht af te ronden vóór aanvang MSc-opleiding

More information in TER Article 15.

Schakeljaar	Q1	Q2	Q3	Q4
	WI1708TH1 [3] Analyse 1	WI1708TH2 [3] Analyse 2	WI1708TH3 [3] Analyse 3	WI2031TH [3] Kansrekening en Statistiek voor HBO-instromers
	WI1807TH1 [3] Lineaire Algebra 1	WI1807TH2 [3] Lineaire Algebra 2		CTB1420-17 [5] Transport & Planning
	TB111b [5] Probleem-analyse	WI1909TH [3] Differentiaal-vergelijkingen		

Vak afkomstig uit:

- Serviceonderwijs EWI
- BSc Civiele Techniek
- BSc Technische Bestuurskunde

C.2 Schakelminor WO

Vak		EC	opmerking	2018
CT-Mi-184-16	*Schakelminor TIL voor BK en IO*			
CT3008-14	Minorproject	5		
CTB2200	Kansrekening en Statistiek	3		
TB131a	Analyse en Differentiaalvergelijkingen	5		
TB132a	Lineaire Algebra en Differentiaalvergelijkingen	5		
TB141Ta	Transport 1	5		
TB241Ta	Logistiek 2	5		
TIL3010	Introductie Transport, Infrastructuur en Logistiek	2		
	Totaal	22		

Verplicht af te ronden vóór aanvang MSc-opleiding

More information in TER Article 16.

BSc jaar 3		Q1	Q2
TIL3010 Introductie TIL [2]		TB131a [5] Analyse en Differentiaalvergelijkingen	TB132a [5] Lineaire Algebra en Differentiaalvergelijkingen
		TB141Ta [5] Transport 1	CTB2200 [3] Kansrekening en Statistiek
		TB241Ta [5] Logistiek 2	CT3008-14 [5] Minorproject TIL

Vak afkomstig uit:

Minor CT-Mi-127-14 Transport, Infrastructuur en Logistiek

BSc Civiele Techniek

BSc Technische Bestuurskunde

C.3 **Convergentieprogramma WO**

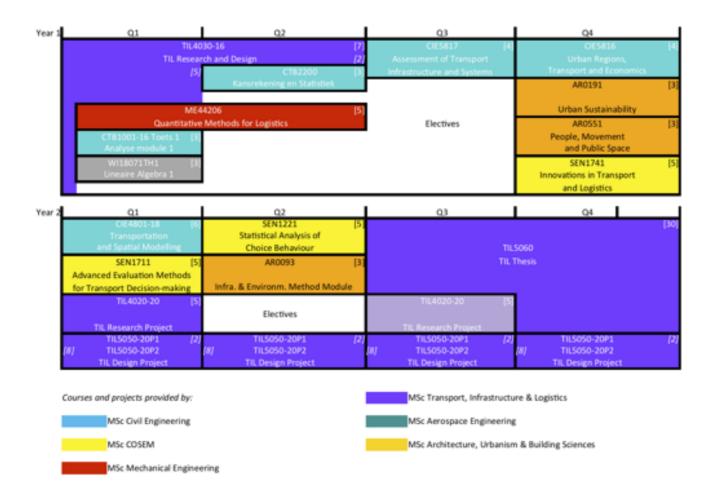|	Vak	Onderdeel	EC nieuw	2018
1 van deze 3	*Analyse*			
CTB1001-16 Toets1	Analyse	Analyse module 1	3	
WBMT1050 Toets 1	Wiskunde 1	Analyse 1 - deeltentamen	3	
WI1708TH1	Analyse 1		3	
1 van deze 3	*Lineaire Algebra*			
CTB1002 Toets 1	Lineaire Algebra	Toets 1	3	
WBMT1051 Toets 1	Wiskunde 2	Lineaire Algebra 1 - deeltentamen	3	
WI1807TH1	Lineaire Algebra 1		3	
1 van deze 3	*Kansrekening en statistiek*			
CTB2200	Kansrekening en statistiek		3	
WBMT2049 Toets 1	Wiskunde 4	Kansrekening en statistiek - Deeltentamen	3	
WI2031TH	Kansrekening en statistiek voor HBO-instromers		3	

<u>*Verplicht op te nemen in vrije keuze MSc-opleiding*</u>

More information in TER Article 17.

C.3.1 Fundamentals

C.3.2 Specialisation P – Policy: Infrastructure, Planning & Environment

C.3.3 Specialisation D – Design: Transport Systems & Networks

Year 1

	Q1	Q2	Q3	Q4
	TIL4030-16 [7] TIL Research and Design Methods [2]		AE4446 [4] Airport Operations	Electives
		[5] CTB2200 [3] Kansrekening en Statistiek	CIE5826 [4] Railway Operations and Control	
		TIL6015 TIL Programming [1]		
	ME44206 [5] Quantitative Methods for Logistics			
	CTB1001-16 Toets 1 [3] Analyse module 1			
	WI18071TH1 [3] Lineaire Algebra 1			

Year 2

	Q1	Q2	Q3	Q4
	CIE4801-18 [6] Transportation and Spatial Modelling	SEN1221 [5] Statistical Analysis of Choice Behaviour	TIL5060 TIL Thesis	[30]
	CIE4811-18 [6] Planning and Operations of Public Transport Systems	CIE5802-09 [4] Advanced Transportation Modelling		
		SEN1721 [5] Travel Behaviour Research		
	TIL4020-20 [5] TIL Research Project	AE4423-19 [3] Airline Planning & Optimization	TIL4020-20 [5] TIL Research Project	
	TIL5050-20P1 [2] [8] TIL5050-20P2 TIL Design Project	TIL5050-20P1 [2] [8] TIL5050-20P2 TIL Design Project	TIL5050-20P1 [2] [8] TIL5050-20P2 TIL Design Project	TIL5050-20P1 [2] [8] TIL5050-20P2 TIL Design Project

Courses and projects provided by:

- MSc Civil Engineering
- MSc COSEM
- MSc Mechanical Engineering
- MSc Transport, Infrastructure & Logistics
- MSc Aerospace Engineering
- MSc Architecture, Urbanism & Building Sciences

C.3.4 Specialisation O – Operations: Traffic, Technology & Control

Year 1

	Q1	Q2	Q3	Q4

- TIL4030-16 TIL Research and Design Methods [7] [2] [5]
- CTB2200 Kansrekening en Statistiek [3]
- ME44305 System Analysis and Simulation [5]
- CIE4821 Traffic Flow Modelling and Control Part 2 [4]
- CIE5805-18 Intelligent Vehicles for Safe + Effici Traffic: Design+Assessment [4]
- ME44206 Quantitative Methods for Logistics [5]
- CT81001-16 Toets 1 Analyse module 1 [3]
- CIE4825 Traffic Flow Modelling and Control Part 1 [6]
- WI18071TH1 Lineaire Algebra 1 [3]
- Electives
- ME41000 Automotive Human Factors [3]

Year 2

	Q1	Q2	Q3	Q4

- CIE4801-18 Transportation and Spatial Modelling [6]
- SEN1221 Statistical Analysis of Choice Behaviour [5]
- TIL5060 TIL Thesis [30]
- SEN9110 Simulation Master Class [5]
- Electives
- TIL4020-20 TIL Research Project [5]
- TIL5050-20P1 / TIL5050-20P2 TIL Design Project [8] [2] (×4)

Courses and projects provided by:

- MSc Civil Engineering
- MSc COSEM
- MSc Mechanical Engineering
- MSc Transport, Infrastructure & Logistics
- MSc Aerospace Engineering
- MSc Architecture, Urbanism & Building Sciences

C.3.5 Specialisation E – Engineering: Transport, Logistics & Supply Chains

Courses and projects provided by:

- MSc Civil Engineering
- MSc COSEM
- MSc Mechanical Engineering
- MSc Transport, Infrastructure & Logistics
- MSc Aerospace Engineering
- MSc Architecture, Urbanism & Building Sciences

Appendix   **Specialisation choice: TIL Toolboxes**