Profiles Industrial and Applied Mathematics

TU/e
EINDHOVEN UNIVERSITY OF TECHNOLOGY

TUE.NL

At the beginning of the Master's programme Industrial and Applied Mathematics (IAM), students are asked to indicate their interests. In this document, we indicate the most common profiles of the IAM master, and suggest courses that are in line with these profiles. We emphasize that these are mere suggestions. As long as the student's program satisfies the curriculum requirements, they are free to create their own unique profile. The most common specific profiles in the IAM master are:

- Scientific Computing (SC)
- Applied Analysis (AA)
- Applied Differential Geometry (ADG)
- Discrete Algebra and Geometry (DAG)
- Combinatorial Optimization (CO)
- Operations Research (OR)
- Applied Probability (AP)
- Data Science (DS)
- Coding and Cryptology (CC)
- Statistics (ST)

An overview of courses that fit well with each of these profiles is indicated in the table on the next few pages. The letter "x" indicates when the course is strongly recommended with respect to the profile, and the letter "o" indicates the course is a well-suited addition. We tried to check the quarters in which courses are offered. However, we advise you to check the quarters through Osiris, since quarters may have changed.

	Year 1			Year 2		
Q1 + Q2	2MMR10	5	Professional Portfolio	Courses	15	Individual Program
	Core	20	Four Core Courses out of Six	Int/Ex	15	Internship or Exchange
	Courses	5	Individual Program			
Q3 + Q4	Courses	30	Individual Program	2MMR30	30	Final Project

Every programme should oblige the following requirements:

1. The only mandatory courses are 2MMR10 Professional portfolio and 2MMR30 Final project
2. At least 20 ECTS worth of core courses need to be included
3. At least 35 ECTS worth of special electives and/or Mastermath courses need to be included (please note that MasterMath courses may only be offered once in two years, see https://elo.mastermath.nl for details)
4. **At most** three mathematics bachelor courses can be included as free electives, and **only** for homologation, i.e. if such courses are a necessary prerequisite for master courses on your program; the homologation table below contains the prerequisites which have been recognized so far.
5. Please note that you are not allowed to take mathematics courses that are specifically designed for "non-mathematics students".
6. A further requirement for the overall programme is that there should no substantial overlap between the courses within your program.

The exact rules for study programmes are in the Program and Examinations Regulations (PER), which can be found in the online study guide. In case of doubt, refer to the PER of the academic year in which you enrolled in IAM.

COURSES THAT ARE NOT ALLOWED (NOT EXHAUSTIVE)

Name	Code	Reason
Survival Analysis for Data Scientists	2AMS11	
Statistical Learning Theory	2DI70	the version for mathematics students is 2MMS80
Discrete Mathematics	2DME10	
Non-linear optimization	2DME20	the version for mathematics students is 2MMD10
Process modeling and information management	7ZM5M0	overlaps with bachelor course 2WO20

CORE COURSES

Name	Code	Quarter	SC	AA	CO	OR	AP	DS	CC	ST	ADG	DAG
Cryptology	2MMC10	1	o	o	o	o	o	o	x	o		x
Optimization	2MMD10	1	x	o	x	x	x	x	x	x	x	x
Probability and stochastics 1	2MMS10	1	o	o	x	x	x	x	o	x	x	o
Scientific computing	2MMN10	1	x	x	o	o	o	o	o	o	x	
Applied functional analysis	2MMA10	2	x	x	o	o	x	o	o	o	x	o
Sequential and nonparametric statistics	2MMS90	2		o	o	o	o	x		x	o	

SPECIAL ELECTIVES

Name	Code	Quarter	SC	AA	CO	OR	AP	DS	CC	ST	ADG	DAG
Cryptographic protocols	2DMI00	3							x			
Advanced algorithms	2IMA10	1			x	o						x
Exact Algorithms for NP-hard Problems	2IMA25	3			x	o						
Applied cryptography	2DMI10	2							x			o
Partial differential equations	2MMA20	3	x	x							x	
Evolution equations	2MMA40	4	x	x							x	
Differential geometry for image processing	2MMA70	1		o							x	
Mathematics of neural networks	2MMA80	3	x	o				x		o		
Multilinear algebra and applications	2MMD20	2			x				x			x
Graphs and algorithms	2MMD30	3			x	o						x
Integer programming	2MMD40	4			x	o						o
Algebraic combinatorics	2MMD50	4			x				o	o		x
Scientific programming	2MMN20	2	x	x				x		o		
Scientific computing for PDE	2MMN30	4	x	x							x	
Introduction to molecular modeling and simulation (will be taught in 2024-2025)	2MMN40	2	o	o							o	
Research topic 1	2MMR40	1-4	o	o	o	o	o	o	o	o	o	o
Research topic 2	2MMR50	1-4	o	o	o	o	o	o	o	o	o	o
Research topic 3	2MMR60	1-4	o	o	o	o	o	o	o	o	o	o
Probability and stochastics 2	2MMS30	2	o	o	o	x	x	x		x	o	
Stochastic networks	2MMS40	3				x	x	o		o		
Stochastic decision theory	2MMS50	4				x	x	x		o		
Random graphs	2MMS60	4				o	x			o		o
Statistical learning theory	2MMS80	3		o		o	o	x		x	o	
Model reduction	5LMA0	2	o	o							o	

SELECTED FREE ELECTIVES

Name	Code	Quarter	SC	AA	CO	OR	AP	DS	CC	ST	ADG	DAG
Advanced maintenance and service logistics	1CM120	1				o			o			
Foundations of data mining	2AMI10	1						x	x	x		
Introduction to process mining	2IMI35	1						x	o	o		
Advanced process mining	2AMI20	2						x		o		
Visualization	2IMV20	2						x		o		
Game theory with applications to supply chain management	1CM36	3				o						
Time series analysis and forecasting	2DD23	3				x	x	x		x		
Topological Data Analysis	2IMA30	4			x	o		x		o		
Advanced discretization techniques	4EM60	4	o									
Multi-Echelon Inventory Management	1CM100	4				o						
Educational packages from Eindhoven School of Education*												
Internship	2MMR20											

TU/e
EINDHOVEN UNIVERSITY OF TECHNOLOGY

* https://www.tue.nl/en/our-university/departments/eindhoven-school-of-education/education