

BIJLAGE 1

Bijlage 1/
Appendix 1

bij artikel 3.2, eerste lid, van de Onderwijs- en Examenregeling Masteropleidingen Industrial and Applied Mathematics, Computer Science and Engineering, Embedded Systems and Data Science & Artificial Intelligence.

a. Inhoud van de opleiding en van het daaraan verbonden examen

Master Industrial and Applied Mathematics

De opleiding bestaat uit verplichte onderwijsseenheden, kernkeuzevakken, specialistische keuzevakken en vrije keuzevakken, zoals beschreven in onderstaande tabel en bijbehorende voetnoten. Een individueel examenprogramma bestaat uit een selectie van deze onderwijsseenheden en vakken. Beide verplichte onderwijsseenheden maken deel uit van een examenprogramma, alsmede tenminste vier kernkeuzevakken. Een examenprogramma bevat tenminste 120 studiepunten, waarbij de kernkeuzevakken en specialistische keuzevakken samen tenminste 55 studiepunten bedragen. De vakken binnen een examenprogramma mogen inhoudelijk niet substantieel overlappen.

Kwartaal	Code	Onderwijsseenheid	SP
Verplichte onderwijsseenheden			35
1-2	2MMR10	Professional Portfolio	5
3-4	2MMR30	Final Project	30
kernkeuzevakken			
1	2MMC10	Cryptology	5
1	2MMD10	Optimization	5
1	2MMN10	Scientific computing	5
1	2MMS10	Probability and stochastics 1	5
2	2MMA10	Applied functional analysis	5
2	2MMS90	Sequential and Nonparametric Statistics	5
Speciale keuzevakken¹			
1	2IMA10	Advanced algorithms	5
1	2MMA70	Differential geometry for image processing	5
1	EME40	Practical educational research (workshops) ²	2.5
2	2DMI10	Applied cryptography	5
2	2MMD20	Multilinear algebra and applications	5
2	2MMN20	Scientific programming	5

APPENDIX 1

to Article 3.2, paragraph 1 of the Program and Examination Regulations for the Master’s Degree Programs in Industrial and Applied Mathematics, Computer Science and Engineering, Embedded Systems and Data Science & Artificial Intelligence.

Content of the degree program and related final examination

Master Industrial and Applied Mathematics

The degree program comprises mandatory study components, core electives, special electives, and free electives, as described in the table below and its footnotes. An individual program of examinations consists of a selection of these study components and courses. Both mandatory study components are part of a program of examinations, as well as at least four core electives. A program of examinations contains at least 120 credits, with at least 55 credits worth of core electives and special electives. The courses of a program of examinations may not exhibit substantive overlap.

Quarter	Code	Study component	CR
Mandatory study components			35
1-2	2MMR10	Professional Portfolio	5
3-4	2MMR30	Final Project	30
Core electives			
1	2MMC10	Cryptology	5
1	2MMD10	Optimization	5
1	2MMN10	Scientific computing	5
1	2MMS10	Probability and stochastics 1	5
2	2MMA10	Applied functional analysis	5
2	2MMS90	Sequential and Nonparametric Statistics	5
Special Electives¹			
1	2IMA10	Advanced algorithms	5
1	2MMA70	Differential geometry for image processing	5
1	EME40	Practical educational research (workshops) ²	2.5
2	2DMI10	Applied cryptography	5
2	2MMD20	Multilinear algebra and applications	5
2	2MMN20	Scientific programming	5

2	2MMN40	Introduction to Molecular Modeling and Simulation	5
2	2MMS30	Probability and stochastics 2	5
2	5LMA0	Model reduction	5
3	2IMA25	Exact Algorithms for NP-hard Problems	5
3	2DMI00	Cryptographic protocols	5
3	2MMA20	Partial differential equations	5
2	2MMA80	Mathematics of Neural Networks	5
3	2MMD30	Graphs and algorithms	5
3	2MMS40	Stochastic networks	5
3	2MMS80	Statistical learning theory	5
4	2MMA40	Evolution equations	5
4	2MMD40	Integer programming	5
4	2MMD50	Algebraic combinatorics	5
4	2MMN30	Scientific computing in PDE	5
4	2MMS20	Statistics for big data	5
4	2MMS50	Stochastic decision theory	5
4	2MMS60	Random graphs	5
	2MMR40	Research topic 1	5
	2MMR50	Research topic 2	5
	2MMR60	Research topic 3	5
	EME35	Learning on the job ²	5
	EME41	Practical educational research (project) ²	7.5
Vrije keuzevakken³			
	2MMR20	Internship	15
	SFC640	Academic Writing	5

¹ Naast de in de tabel genoemde onderdelen mogen alle Master courses van Mastermath en advanced courses van Mastermath opgevoerd worden als specialistische keuzevakken.

² Deze drie vakken vormen tezamen Pakket 4 – Professionalization and Research van de Eindhoven School of Education, en mogen alle drie tezamen gekozen worden mits Pakket 1 – Oriënterend en Pakket 2 – Verdiepend al binnen de bacheloropleiding voltooid zijn, en tevens alle vakken van Pakket 3 – Modern STEM Onderwijs opgenomen worden als vrije keuzevakken.

³ Naast de in de tabel genoemde onderdelen mogen keuzevakken op masterniveau als vrije keuzevakken gekozen worden (onder voorwaarden), evenals bachelorvakken (onder voorwaarden). Zie artikel j van deze bijlage voor de precieze voorwaarden.

2	2MMN40	Introduction to Molecular Modeling and Simulation	5
2	2MMS30	Probability and stochastics 2	5
2	5LMA0	Model reduction	5
3	2IMA25	Exact Algorithms for NP-hard Problems	5
3	2DMI00	Cryptographic protocols	5
3	2MMA20	Partial differential equations	5
2	2MMA80	Mathematics of Neural Networks	5
3	2MMD30	Graphs and algorithms	5
3	2MMS40	Stochastic networks	5
3	2MMS80	Statistical learning theory	5
4	2MMA40	Evolution equations	5
4	2MMD40	Integer programming	5
4	2MMD50	Algebraic combinatorics	5
4	2MMN30	Scientific computing in PDE	5
4	2MMS20	Statistics for big data	5
4	2MMS50	Stochastic decision theory	5
4	2MMS60	Random graphs	5
	2MMR40	Research topic 1	5
	2MMR50	Research topic 2	5
	2MMR60	Research topic 3	5
	EME35	Learning on the job ²	5
	EME41	Practical educational research (project) ²	7.5
Free electives³			
	2MMR20	Internship	15
	SFC640	Academic Writing	5

¹ In addition to the study components mentioned in the table, Master courses of Mastermath and advanced courses of Mastermath may also be chosen as special electives.

² These three courses constitute Package 4 – Professionalization and Research of Eindhoven School of Education, and may be chosen all three together provided that Package 1 – Oriënterend and Package 2 – Verdiepend have been completed in the Bachelor program, and also all courses of Package 3 – Modern STEM Education are included as free elective courses.

³ In addition to the study components mentioned in the table, courses at master level can be chosen as free electives (conditions apply), as well as some bachelor courses (conditions apply). See Article j of this appendix for the exact conditions.

Studenten van **cohort 2020 en eerder** mogen het kernkeuzevak *2MMS90 Sequential and nonparametric statistics* vervangen door *2MMS70 Statistical analysis methods*, naast 2MMS70 als kernkeuzevak mag 2MMS90 als specialistisch keuzevak gekozen worden.

De volgende onderwijsseenheden zijn aangemerkt als specialistische keuzevakken voor studenten van **cohort 2020 en eerder**:

Code	Onderwijseenheid
2MMA30	Modeling and perturbation methods
2MMC30	Coding Theory

De volgende onderwijsseenheid is aangemerkt als specialistisch

Code	Onderwijseenheid
2DD23	Time series analysis and forecasting

keuzevakken voor studenten van **cohort 2019 en eerder**.

De volgende onderwijsseenheden zijn aangemerkt als kernkeuzevakken voor studenten van **cohort 2017 of eerder**:

Kwartiel	Code	Onderwijseenheid	SP
1	2MMC10	Cryptology	5
1	2MMD10	Optimization	5
1	2MMN10	Scientific computing	5
1	2MMS10	Probability and stochastics 1	5
2	2MMA10	Applied functional analysis	5

Deze studenten mogen een kernkeuzevak vervangen door een specialistisch keuzevak.

Students from **cohort 2020 and earlier** can replace the core course *2MMS90 Sequential and nonparametric statistics* with *2MMS70 Statistical analysis methods*, in addition to 2MMS70 as core course they are allowed to take 2MMS90 as special elective.

The following study components are marked as special elective for students from **cohort 2020 and earlier**:

Code	Study component
2MMA30	Modeling and perturbation methods
2MMC30	Coding Theory

The following study component is marked as a special elective for students

Code	Study component
2DD23	Time series analysis and forecasting

from **cohort 2019 and earlier**.

The following study components are marked as core elective for students from **cohort 2017 and earlier**:

Quarter	code	Study Component	CR
1	2MMC10	Cryptology	5
1	2MMD10	Optimization	5
1	2MMN10	Scientific computing	5
1	2MMS10	Probability and stochastics 1	5
2	2MMA10	Applied functional analysis	5

These students may replace one of their core electives by a special elective.

Master Computer Science and Engineering

De opleiding bestaat uit verplichte onderwijsseenheden, een kern van *foundational* en *deepening* vakken uit de drie *focus areas* **algorithms & theory, architecture & systems**, en **software & analytics**, specialistische keuzevakken, een seminar en vrije keuzevakken, zoals beschreven in onderstaande tabel en bijbehorende voetnoten.

Master Computer Science and Engineering

The degree program comprises mandatory study components, a core of *foundational* and *deepening* courses from the three *focus areas* **algorithms & theory, architecture & systems**, and, **software & analytics**, specialization electives, a seminar, free electives as described below, in the tables and its footnotes.