

THE IMPLEMENTATION REGULATIONS

2012-2013

**MASTER OF SCIENCE
CHEMICAL ENGINEERING**

DELFT UNIVERSITY OF TECHNOLOGY

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Article 1 – The study load

The study load for the Master's degree programme is 120 credits. None of the components of the programme may have formed part of the Bachelor's degree programme.

Article 2 – Tracks and Specializations

1. The programme comprises the following tracks:
 - Molecular Engineering,
 - Process Engineering,
 - Nuclear Science & Engineering.
2. The core programme of each track comprises 90 credits and is the same for each student:
 - Obligatory core modules (15 credits),
 - Obligatory track modules (15 credits),
 - Obligatory design modules (20 credits),
 - MSc thesis project (40 credits).The obligatory modules are listed in articles 5 - 7.
3. Combining the core programme with 30 credits Scientific and Social Orientation (elective part) completes the master programme. The student may opt for:
 - Research and Development,
 - Study Abroad,
 - Education,
 - Entrepreneurship,
 - Technology in Sustainable Development,
 - Management of Technology,
 - Double degree.Details are listed in article 8.

Article 3 – The composition

1. The study programme is compiled in the following way:
 - a. In the first year: core subjects, subjects belonging to the chosen track, electives, an internship or design project.
 - b. In the second year: an internship or design project, electives, and MSc thesis project of 40 credits linked to the track. The MSc thesis project consists of a research project, a thesis, a summary of the thesis and a final presentation.

Article 4 – Registering the track and compiling the examination programme

1. Students are responsible for registering the track of their choice.
2. Any amendments made to the approved examination programme or to the approved graduation commission should be presented to the board of examiners.
3. Students who opt for a Scientific and Social Orientation other than Research and Development must have approval in advance. Students who opt for Research and Development must have approval of the industrial internship in advance.
4. The student should at least have completed the following modules before starting the MSc Thesis Project:
 - a. the obligatory core and track modules,
 - b. the design project and/or industrial internship.

Article 5 – The Molecular Engineering track

1. The Molecular Engineering track has the following specialisations (ChemE):
 - Product and Process Engineering,
 - Catalysis Engineering,
 - Nano-Structured Materials,
 - Materials for Energy Conversion and Storage,
 - Self Assembling Systems,
 - Opto-electronic Materials,
 - Nano-Organic Chemistry.
2. Additional to the list mentioned under 1. the student may choose another option for his/her thesis work. However, this choice has to be approved by the board of examiners before the start of the project.
3. The core programme consists of the following course modules:

Code	Course Module	Credits
	Obligatory Core Modules	15
CH3131	Applied Numerical Mathematics	6
CH3141	Molecular Thermodynamics	6
CH3151	Molecular Transport Phenomena	3
	Obligatory Track Modules	15
CH3011	Interfacial Engineering	3
CH3161	Synthesis Strategies and Methods in Nanochemical Engineering	6
CH3531	Functional Ceramics	3
CH3641	Molecular Quantum Mechanics and Spectroscopy	3
	Obligatory Design Modules	20
CH3804	Product & Process Design	5
WM0320TU	Ethics and Engineering	3
CH3843	Design project	12
CH3901	MSc Thesis work	40

Article 6 – The Process Engineering track

1. The Process Engineering track has the following specialisations (ChemE):
 - Product and Process Engineering,
 - Catalysis Engineering,
 - Nano-Structured Materials,
 - Materials for Energy Conversion and Storage,
 - Self Assembling Systems,
 - Opto-electronic Materials,
 - Nano-Organic Chemistry,
 - Transport Phenomena.
2. Additional to the list mentioned under 1. the student may choose another options for his/her thesis work. However, this choice has to be approved by the board of examiners before the start of the project.
3. The core programme consists of the following course modules:

Code	Course Module	Credits
	Obligatory Core Modules	15
CH3131	Applied Numerical Mathematics	6
CH3141	Molecular Thermodynamics	6
CH3151	Molecular Transport Phenomena	3
	Obligatory Track Modules	15
CH3042	Process Dynamics & Control	6
CH3052	Applied Transport Phenomena	3
CH3681	Reactors & Kinetics	6
	Obligatory Design Modules	20
CH3804	Product & Process Design	5
WM0320TU	Ethics and Engineering	3
CH3843	Design project	12
CH3901	MSc Thesis work	40

Article 7 – The Nuclear Science & Engineering track

1. The Nuclear Science & Technology track has the following specialisations (R³):
 - Radiation and Isotopes for Health,
 - Fundamental aspects of Materials and Energy,
 - Radiation Detection & Matter,
 - Physics of Nuclear Reactors.
2. Additional to the list mentioned under 1. the student may choose another option for his/her thesis work. However, this choice has to be approved by the board of examiners before the start of the project.
3. The core programme consists of the following course modules:

Code	Course Module	Credits
	Obligatory Core Modules	15
CH3131	Applied Numerical Mathematics	6
CH3141	Molecular Thermodynamics	6
CH3151	Molecular Transport Phenomena	3
	Obligatory Track Modules	15
CH3771	Nuclear Chemistry	6
CH3782	Chemistry of the Nuclear Fuel Cycle	3
CH3792	Nuclear Science	6
	Obligatory Design Modules	20
CH3804	Product & Process Design	5
WM0320TU	Ethics and Engineering	3
CH3843	Design project	12
CH3901	MSc Thesis work	40

Article 8 – Scientific and Social Orientation

Combining the core programme with 30 credits Scientific and Social Orientation (elective part) completes the master programme. The student may opt for:

1. Research and Development

This programme is especially tailored for students who will work in industry after completing their master education. It consists of:

- Industrial Internship (CH3701, 15 credits),
- Electives (15 credits).

The choice of electives has to be approved by the board of examiners if less than 9 credits are mentioned on the list of suggested electives or homologation modules.

Suggested electives:

- The obligatory track modules from a second track,
- Modules from the list below.

Code	Course Module	Credits
	Process Engineering Track	
CH3011	Interfacial Engineering	3
CH3062	Multiphase Reactor Engineering	3
CH3072	Separation Processes, Design and Operation	6
CH3082	Chemical Technology	3
CH3101	Heterogeneous Catalysis	3
CH3181	Scale Up / Scale Down	3
CH3291	International Design Contest	3
CH3301	Foreign Excursion Tour TG	3
CH3421	Computational Transport Phenomena	3
CH3562	Nanoparticle Technology	3
CH3621	Process Intensification	6
CH3691	Particle Technology	3
CH3861	Hydro Carbon Processing	3
CH3981	Literature Study	6
	Molecular Engineering Track	
CH3101	Heterogeneous Catalysis	3
CH3301	Foreign Excursion Tour TG	3
CH3562	Nanoparticle Technology	3
CH3651	Structural Characterisation	3
CH3661	Supra-molecular Chemistry	3
CH3671	Molecular Simulations	6
CH3691	Particle Technology	3
CH3861	Hydro Carbon Processing	3
CH3981	Literature Study	6
LM3311	Green Chemistry and Sustainable Technology	3
LM3731	Biocatalysis	6
	Nuclear Science and Engineering Track	
AP3311	Neutrons, X-Rays and Positrons for Studying Microscopic Structures and Dynamics	6
AP3341	Nuclear Reactor Physics	6
AP3371	Radiological Health Physics	6
CH3301	Foreign Excursion Tour TG	3
CH3581	Nuclear Materials	3
CH3681	Reactors and Kinetics	6
CH3762	Practical Radiochemistry	3
CH3981	Literature Study	6

2. Study Abroad

This programme is especially tailored for students who will do a PhD after completing their master education. It consists of a semester, project and/or courses, at a foreign university. The programme has to be approved in advance by the board of examiners.

3. Education (only Dutch students)

The educational programme is aimed at Dutch-speaking students only, because they are oriented towards the Dutch school system and because it includes internships (Schoolpracticum) at Dutch secondary schools. Consequently the educational specialisation modules are taught in Dutch. The programme consists of Basisdeel/Ed1 (30 EC) and Verdiepingsdeel/Ed2 (30 EC).

The minor Education (Basisdeel/Ed1) can be done during the bachelor programme and leads to certification as a tweedegraads secondary school teacher with limited qualification (beperkte bevoegdheid). If a student has done the minor Education, only the Verdiepingsdeel/Ed2 of 30 EC remains for the master programme specialisation. The combination of the minor Education and Ed2 specialisation leads to certification as a fully-qualified eerstegraads (grade-one) secondary school teacher. The certificate will be attached to the master diploma.

Students that did not take the minor Education can follow the Basisdeel/Ed1 specialisation as part of their master programme and then do the Verdiepingsdeel/Ed2 as a post-master course in order to become fully qualified.

The programme should be approved by coordinator, M.A.F.M. Jacobs.

Code	Course Module	Credits
	Education Basis	
SL3031	Didactical Skills	3
SL3041	Orienterende Stage	3
SL3111	Research Methodology in Social Sciences	3
SL3132	Didactics Chemistry 1	2
SL3174	Field Orientation Chemistry A	9
SL3342	Didactics Chemistry 2	4
SL3462	Educational Science	6
	Education Verdieping	
SL3012	Integration SC/SE	3
SL3021	The Designing of Communication and Education Products	6
SL3311	Research of Education	6
SL3381	Didactics Chemistry 3	3
SL3424	Field Orientation Chemistry B	12

4. Entrepreneurship

This programme is especially tailored for students who want to start a compagny work after completing their master education. It consists of:

- Obligatory Entrepreneurship Modules (10 credits),
- Electives (20 credits); at least 14 credits from the list below. Upto 6 credits of regular chemical engineering electives can be chosen

The programme should be approved by the coordinator, S. Tate.

Code	Course Module	Credits
	Obligatory Entrepreneurship Modules	10
WM4001TU	Entrepreneurship Annotation Week	2
WM4003TU	Additional Entrepreneurship Annotation Final Thesis	8
	Suggested Elective Modules	20
ID4315	New Product Commercialization	6
ID5600SET	Smart Energy Products	4
MOT9556	Corporate Entrepreneurship	6
WM0506TU	Writing a Business Plan	6
WM0516TU	Turning Technology into Business	6
WM0521TU	Business Analysis of Entrepreneurship	6
WM0560TU	Essentials of Technology-Based Business	4
WM0563TU	Starting New Ventures	3
WM0617TU	Introduction to High Tech Marketing	4

5. Technology in Sustainable Development

This is a university-wide initiative. Approval of the Master's thesis work and the internship by the coordinator, Dr.ir. G. Korevaar, is required.

It consists of:

- . Internship within a R&D institution with a clear relation to sustainability (CH3701, 15 credits),
- . Colloquium 'Technology in Sustainable Development' (WM0939TU, 5 credits)
- . TiSD cluster-A electives (3-7 credits; see www.tudelft.nl/tisd for the list),
- . TiSD cluster-B electives (3-7 credits; see www.tudelft.nl/tisd for the list).

The thesis project must be focussed on sustainable development or the development of knowledge and technology aimed at a more sustainable future.

6. Management of Technology

Coordinator: dr. R.M. Verburg

This orientation is offered by the faculty of Technology, Policy and Management. The programme consists of either the first semester or the second semester of the MSc Management of Technology. A mixture of courses from both semesters is only permitted if it is a coherent set of modules that is approved by the MoT programme coordinator in advance.

1st SEMESTER MoT Modules (30 EC)

MOT1001, Integration Moment I, 4EC
MOT1411, Technology Dynamics, 4EC
MOT1420, Economic Foundations, 6EC
MOT1460, Corporate Finance, 4EC
MOT1523, Leading and Managing People, 4EC
MOT1530, High-tech Marketing, 4EC
MOT2311, Quantitative Research Methods, 4EC

2nd SEMESTER MoT Modules (30 EC)

MOT1002, Integration Moment II, 4EC
MOT1432, Technology and Strategy, 6EC
MOT1440, Philosophy of Science, 3EC
MOT1450, Decision Making, 6EC
MOT2420, Innovation Management, 6EC
MOT9511, Advanced Project Management, 5EC

7. Students who opt for a **double degree** (second master) and have obtained permission are allowed to spend the Scientific and Social Orientation on modules from the second master programme.

Double degree programmes combining chemical engineering with other master programmes, such as Management of Technology, are always subject to the restrictions imposed by the university. The main restrictions are that the double degree programme comprises at least 180 EC and that there are two identifiable final project reports for both degrees. Formal permission from the deans of the faculties is required.

Article 9 - Honours programme

The Honours programme consists of 30 EC on top of the regular master programme of 120 EC. The full Chemical Engineering programme including the additional honours track should be finished according to schedule. It is an individual programme that contains a 5 EC specially developed course for all TU Delft honours track students plus a 25 EC coherent package of challenging course modules or projects composed by the student.

Access to the honours track and the programme of the honours track should be submitted to the Board of Examiners after approval by the Chemical Engineering programme director Dr. P.J. Hamersma. As a guideline students have to meet the following requirements: bachelor finished in 4 years or less with an average grade of at least 7.5.

Collective Part (5 EC)

WM0355HT, Critical Reflection on Technology, 5EC, obligatory

Individual Part (25 EC)

Article 10 – Bridging and homologation programmes

1. Students who have been admitted on the basis of a Dutch Institute of Higher Education (HBO) Bachelor of Engineering degree Chemical Technology (or equivalent) must, apart from the Master's degree course examination programme, complete a subsidiary programme consisting of the following modules:

Code	Course Module	Credits
	Mathematics	12
4052DIFFVY	Differential Equations	3
4052LINEAY	Linear Algebra	3
WI1708TH1	Analysis 1	3
WI1708TH2	Analysis 2	3
	Mathematics (in English)	15
WI1401LR	Calculus 1	6
WI1403LR	Linear Algebra	5
WI2029LR	Differential Equations	4
	Engineering	16
CH3072	Separation Processes, Design and Operation	6
MST-PT2	Process Technology 2	6
SET3021	Transport Phenomena	4

The Mathematics modules (either in Dutch or English) must be completed before a student can enroll in the master programme, as a bridging minor during the bachelor or as a pre-master bridging programme. The Engineering homologation modules can be done as part of the master programme. Students who wish to start the bridging programme in february should contact the programme coordinator to verify if alternative mathematics modules are offered.

2. Students who have been admitted (for the Molecular Engineering track or the Nuclear Science and Engineering track only) on the basis of a Bachelor of Science university degree must complete a homologation programme consisting of the following engineering modules:

Code	Course Module	Credits
CH3072	Separation Processes, Design and Operation	6
MST-PT2	Process Technology 2	6
SET3021	Transport Phenomena	4

3. Depending on the background of the student the engineering homologation modules fit in the research and development orientation of the programme for 15 credits, either as a replacement for the industrial internship or as (obligatory) electives.

Article 11 – The free study programme

Students may compile a free curriculum concluded by a final exam. Such a curriculum must consist entirely or mainly of modules given in conjunction with the programme. It has to comply with the final attainment levels of the programme. The curriculum must be accompanied by a justified request and submitted to the Board of Examiners for approval.

Article 12 – Transition ruling Chemical Engineering

1. Equivalences:

CH3041 = SC4190CH = CH3042

CH3051TU = CH3052

CH3071 = ME1590CH = CH3072

CH3091 = ME1591CH

CH3621 = ME1592CH

CH3803 = CH3804

CH3842 = CH3843

WM0329TU = WM0320TU

WM0922TU = WM0939TU

Differences in credits may be compensated in the electives.

2. Students who have started their master programme Chemical Engineering before 1 September 2008 and have not finished their first year of their master programme, are advised to contact the academic counsellor to establish on an individual basis a "transition" programme.

Article 13 – Date of commencement

These regulations will come into effect on 3 September 2012.

Delft August 22, 2012



Prof.dr.ir. T.H.J.J. van der Hagen
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