TEACHING AND EXAMINATION REGULATIONS

2024-2025

Appendix - Programme Specifics

MASTER OF SCIENCE
APPLIED PHYSICS

DELFT UNIVERSITY OF TECHNOLOGY

Administrative data

Nomenclature in CROHO	**MSc Applied Physics**
CROHO registration number	**60436**
Orientation and level of the programme	**Higher education, Academic Master level**
Number of credits	**120 ec, 2 years**
Mode(s) of study	**Fulltime**
NVAO accreditation	**Positive (March 4, 2022)**

https://www.nvao.net/nl/besluiten/technische-universiteit-delft/m-applied-physics

THIS DOCUMENT

The implementation regulations in this document apply to the teaching and the examinations related to the Master's degree programme in Applied Physics. This document is part of the Teaching and Examination Regulations.

LIST OF CONTENTS

Article 1 – Admission to the programme **(TER art. 3)**

Individuals holding one of the following degrees have access to the education of the Master's degree programme on the condition that all of the stated requirements have been met. Students who want to start the programme as a second Master's degree programme must also submit a convincing motivation letter.

1. Students in possession of a Bachelor of Science degree in Applied Physics from Delft University of Technology will be admitted to the Master's programme.

2. Students who do not possess a degree mentioned in paragraph 1 are required to obtain proof of admission to the programme from the dean, who will seek the advice of the admissions officer on this matter.
   In order to obtain proof of admission, the student must meet or, as the case may be, possess:
   a. The general relevant criteria set by the executive board in chapter 2.2 "Admission requirements for Master's degree programmes" of the Student Charter. The Dutch language requirements for students admitted to a bridging programme stated in Article 3.1 of the TER do not apply if a customized bridging programme that is equivalent in content and level to the regular programme can be offered to non-Dutch speaking students living/studying in the Netherlands at the time of their application.
   b. A degree certificate, together with the accompanying list of marks, proving that he/she possesses knowledge of a sufficiently high level and broad scope to successfully complete the Master's programme within the allotted period of two years.

3. Students in possession of a Bachelor of Science degree in Applied Physics or in Physics (or equivalent in level and content) from a Dutch university other than TU Delft will be admitted to the Master's programme, provided that they fulfil the following requirements:
   - BSc has been completed within at most five years;
   - Cumulative Grade Point Average ≥ 7.0.

   If standard physics courses are missing from the student's Bachelor programme, homologation courses may be assigned as a condition for admission.

4. Students in possession of a Bachelor of Science degree in Aerospace Engineering, Applied Earth Sciences, Applied Mathematics, Electrical Engineering, Mechanical Engineering, Molecular Science and Technology, or Nanobiology from Delft University of Technology, admitted to and having passed the TU Delft Applied Physics bridging (minor) programme within the allotted period will be admitted to the Master's programme.
   Students will be admitted to the bridging programme, provided that they fulfil the following requirements:
   - Study delay at the time of admission to the bridging programme is limited to a maximum of 1 year;
   - Cumulative Grade Point Average ≥ 7.0.

5. Students in possession of a Bachelor degree in Applied Physics from a Dutch university of Applied Sciences (HBO), admitted to and having passed the TU Delft Applied Physics bridging (minor) programme within the allotted period will be admitted to the Master's programme.
   Students will be admitted to the bridging programme, provided that they fulfil the following requirements:
   - No delay of studies (without good reason);
   - Cumulative Grade Point Average ≥ 7.5;
   - The demands on the level of English language mentioned in the Student Charter.

   Notwithstanding the general relevant criteria set by the executive board in chapter 2.3 "Admission to a bridging programme" of the Student Charter, students holding a HBO Bachelor degree in Applied Physics are <u>not</u> obliged to do a preliminary exam 'VWO wiskunde B'.

6. Students in possession of a Bachelor of Science degree in (Applied) Physics or equivalent from a foreign university can be admitted to the Master's programme provided that they fulfil the following requirements:
   - No delay of studies (without good reason);
   - Cumulative Grade Point Average ≥ 7.5 (guideline, specific requirements concerning the CGPA apply to certain countries. These countries and their requirements are posted on the TU Delft website);
   - Average scores in the relevant core modules ≥ 7.5 (guideline, as above);
   - The demands on the level of English language stated in the appendix to Art. 3 of the TER.

Article 2 – Goal of the programme **(TER art. 5.1)**

The programme is intended to educate students to earn a Master of Science degree in Applied Physics, providing them with a level of knowledge, insight and skills that enable them to perform independent professional and scientific activities in the area of Applied Physics at the level of a Master of Science.

Article 3 – The programme's final attainment levels (TER art. 5.2)

In addition to the general attainment levels described in article 5.2, MSc Applied Physics graduates should possess the following competences:

1. **Applied Physics knowledge.** Mastery of Applied Physics at an advanced academic level. This means mastery of a choice of advanced general physics subjects (such as Quantum Mechanics, Statistical Physics, Electrodynamics, Continuum Physics) and the necessary mathematics, in addition to a choice of applied physics subjects (such as Quantum Electronics, Optics and Lasers, Fluid Dynamics, Reactor Physics) and optionally other advanced technical subjects (such as Computer Science, Materials Science, Chemistry, Life Sciences), as well as skills in the field of experimental techniques, data analysis, simulation and modelling. This knowledge and these skills should be mastered at a level comparable to that of Applied Physics programmes at international, top-quality, educational institutions.
2. **In-depth knowledge.** In-depth knowledge of at least one area within Applied Physics, so that international research literature can be understood.
3. **Research experience.** Capable of carrying out research in (Applied) Physics and aware of the applicability of research in technological developments.
4. **From abstraction to solution.** Capable of understanding a wide variety of different problems and being able to formulate these at an abstract level, whilst being able to see the relation between diverse problems at this abstract level and to contribute creatively to their solution, focusing on practical applications.
5. **Design.** Capable of creating innovative technical designs, taking feasibility issues into account.
6. **Collaboration/communication.** Capable of working in a possibly interdisciplinary team of experts, dealing comfortably with diversity, and communicating easily in both written and spoken English.
7. **Working independently.** Capable of carrying out a (research) project, including planning and time management. Working independently and taking initiatives where necessary.
8. **Presentation skills.** Capable of preparing and delivering physics research presentations in English, adapted to the background and interest of the audience.
9. **Societal awareness.** Knowledge of technology-related developments in society, such as sustainability issues. Capable of developing and defending opinions in this area.
10. **Responsibility.** Working safely and ethically responsibly, respecting scientific integrity.

Article 4 – Structure of the programme (TER art. 6)

1. The Applied Physics programme is a two-year MSc programme and comprises 120 EC. The programme has a core-orientation structure. Within this structure, there is a choice of research tracks. The core programme comprises 90 EC and has the same structure for all students. Combining the core programme with a 30 EC orientation completes the programme.

2. **Tracks.** The tracks within the Applied Physics core programme are:
   - Physics for Energy,
   - Physics for Fluids Engineering,
   - Physics for Health and Life,
   - Physics for Instrumentation,
   - Physics for Quantum Devices and Quantum Computing.

3. **Orientations.** One of five orientations of 30 EC each must be chosen:
   - Research and Development (R&D),
   - Education (Ed1/Ed2),
   - Management of Technology (MoT),
   - Study Abroad (SA),
   - Pre-PhD.

4. **Special programmes.** Special programmes within the MSc Applied Physics with additional requirements for the electives that are part of the programme are:
   - Pre-PhD special programme. This programme focuses on preparing and educating students for a PhD position.
   - 4TU MP special programme on Optics & Photonics, fitting within the Physics for Instrumentation track.

5. **Programme additions.**
   - Honours programme. This is an additional individual challenging programme for students with a better than average performance in their MSc programme (>7.5 weighted average and no study delay).
   - Double degree programmes. These are three year programmes: Applied Physics – Management of Technology, Applied Physics – Applied Mathematics, or an individually approved combination of Applied Physics with another MSc programme.

Article 5 – Composition of the programme. (TER art. 7.5)

The courses of the degree programme are listed in this article, along with their study load. The number of contact hours and the form of examination of each course, as well as the programming of the examinations and the actual design of the education are elaborated in the study guide.

5.1 The core programme comprises 90 ec and has the same structure for all tracks and students:

5.1.1 Master Thesis Project, 45 EC
The Applied Physics core programme includes the Master Thesis Project

AP3903, Master Thesis, 45EC

The topic of the Thesis Project (5ec thesis preparation, 40ec thesis work) is related to the graduation track and is done in a research section of one of the departments of the faculty of Applied Sciences, in QuTech, or in an affiliated group.

Affiliated groups are:
For Physics for Energy: Energy Technology section (3mE), Photovoltaic Materials and Devices group (EEMCS);
For Physics for Fluids Engineering: Clouds & Climate group (CiTG), Fluid Mechanics section (3mE), Multiphase Systems section (3mE);
For Physics for Instrumentation: Centre for Systems and Control - Numerics for Control & Identification / Optics group (3mE), Dynamics of Micro and Nanosystems section (3mE), Experimental Astronomy Group (EEMCS), and Nikhef lecturers teaching in our programme.

The prior approval of the Board of Examiners should be obtained if the thesis work is performed outside the mentioned departments or affiliated groups.

Regulations governing the Master Thesis projects are stated in article 7.3.

5.1.2 Obligatory Modules, 12 EC
The Applied Physics core programme includes compulsory math and ethics modules.

AP3001, Mathematical Methods for Physics, 9EC
WM0320TU, Ethics and Engineering, 3EC

Students that have passed the Partial Differential Equation module AM2070, TW2070, WI2607 or WI3150TU+WI3151TU/ WI4150TU in their bachelor's programme, e.g. as part of their minor, have two options with respect to AP3001:
1: Complete the three parts of AP3001, including the PDE part.
2: Voluntary skip the PDE part of AP3001 and choose a different MSc-level course of at least 3EC (either an Applied Physics course, a math course, or another course).

Students that have passed the Complex Analysis module AM2070, TW2040, WI2602 or EE2M11 in their bachelor's programme, have two options with respect to AP3001:
1: Complete the three parts of AP3001, including the Complex Analysis part.
2: Voluntary skip the Complex Analysis part of AP3001 and choose a different MSc-level course of at least 3EC (either an Applied Physics course, a math course, or another course).

It isn't possible to get an exemption in the master programme based on courses passed in a bachelor programme without doing an alternative master course module (Teaching and Examination Regulations, article 7.3).

5.1.3 Advanced Fundamental Physics Modules: 12 EC
The advanced fundamental physics modules aim at breadth as well as depth in general physics knowledge, following on from the Bachelor's programme. At least two modules must be chosen from this list:

AP3021, Advanced Statistical Mechanics, 6EC
AP3032, Continuum Physics, 6EC
AP3051, Advanced Quantum Mechanics, 6EC
AP3071, Advanced Electrodynamics, 6EC

5.1.4 Track related Modules: 15 EC

Track-list modules are more specialised than fundamental physics modules. They are technical and science subjects relating to and recommended for at least one of the tracks. The student should take at least 15 EC from the track-list of his or her choice.

a. Physics for Energy:

AP3141, Environmental Physics, 6EC
AP3211, Advanced Solid State Physics, 6EC
AP3311, Neutrons, X-Rays and Positrons for Studying Microscopic Structures and Dynamics, 6EC
AP3333, Physics of Energy Materials, 6EC
AP3341, Nuclear Reactor Physics, 6EC
AP3352, Introduction to Nuclear Science and Engineering, 6EC
AE4W02TU, Introduction to Wind Turbines: Physics and Technology, 4EC
CH3783, Materials Chemistry for the Nuclear Fuel Cycle, 3EC
ET4377, Photovoltaic Technologies, 4EC
ET4378, Photovoltaic Systems, 4EC,
ET4379, Photovoltaic Lab Course, 4EC (2^{nd} year)
EE4670, PV Materials Processing and Characterization, 4EC (2^{nd} year)
EE4680, Photovoltaic Modelling, 4EC (2^{nd} year)
ME45203, Electrolyzers, Fuel Cells, and Batteries, 4EC
SET3110, Energy Storage in Batteries, 4EC

b. Physics for Fluids Engineering:

AP3141, Environmental Physics, 6EC
AP3171, Advanced Physical Transport Phenomena, 6EC
AP3181, Applied Multiphase Flow, 6EC
AP3551, Computational Multiphase Flow, 6EC
AP3563, Water in the Atmosphere, 5EC
AE4180, Flow Measurement Techniques, 3EC
AE4W02TU, Introduction to Wind Turbines: Physics and Technology, 4EC
CH3051, Applied Transport Phenomena, 4EC
CH3153, Molecular Transport Phenomena, 4EC
CH3412, Biological Transport Phenomena, 4EC
CH3421, Computational Transport Phenomena, 6EC
ME45000, Advanced Heat Transfer, 3EC
ME45030, Turbulence, 5EC
ME45042, Advanced Fluid Dynamics, 5EC
WI4011, Computational Fluid Dynamics, 6EC
WI4660, Dynamical Systems and Chaos, 6EC

c. Physics for Health and Life:

AP3061, Acoustic, Elastic and Electromagnetic Waves, 6EC
AP3122, Advanced Optical Imaging, 6EC
AP3132, Advanced Digital Image Processing, 6EC
AP3163, Physics of Biological Systems, 6EC
AP3232, Medical Imaging Signals and Systems, 6EC
AP3352, Introduction to Nuclear Science and Engineering, 6EC
AP3371, Radiological Health Physics, 6EC
AP3531, Acoustical Imaging, 6EC
AP3582, Medical Physics of Photon and Proton Therapy, 6EC
CH3412, Biological Transport Phenomena, 4EC
CH3764, Nuclear Medicine, 4EC
CH3771, Nuclear Chemistry, 6EC
NB4070, Soft Matter Physics, 6EC
NB4160, Engineering of Living Systems, 3EC

d. Physics for Instrumentation:

AP3061, Acoustic, Elastic and Electromagnetic Waves, 6EC
AP3091, Elementary Particles, 6EC
AP3113, Quantum Optics, 6EC
AP3122, Advanced Optical Imaging, 6EC
AP3132, Advanced Digital Image Processing, 6EC
AP3152, Optics for Lithography, 6EC
AP3222, Nanotechnology, 6EC
AP3243, Lasers and Photodetectors, 3EC
AP3252, Electron Microscopy Characterization of the Nanoscale, 3EC
AP3311, Neutrons, X-Rays and Positrons for Studying Microscopic Structures and Dynamics, 6EC
AP3352, Introduction to Nuclear Science and Engineering, 6EC
AP3382, Advanced Photonics, 6EC
AP3391, Geometrical Optics, 6EC
AP3401, Introduction to Charged Particle Optics, 6EC
AP3412, Experimental Techniques in Optics, 3EC
AP3531, Acoustical Imaging, 6EC
AP3701, Submm and Terahertz Physics and Applications, 3EC
AE4880, Optical Space Sensors, 4EC
EE4745, Terahertz Superconducting Astronomical Instrumentation, 5EC
ME46310, Opto-Mechatronics, 4EC
SC42030, Control for High Resolution Imaging, 3EC
SC42065, Adaptive Optics Design Project, 3EC

e. Physics for Quantum Devices and Quantum Computing:

AP3101, The Interpretation of Quantum Mechanics, 3EC
AP3113, Quantum Optics, 6EC
AP3211, Advanced Solid State Physics, 6EC
AP3222, Nanotechnology, 6EC
AP3252, Electron Microscopy Characterization of the Nanoscale, 3EC
AP3261, Mesoscopic Physics, 6EC
AP3281, Quantum Transport, 6EC
AP3303, Applications of Quantum Mechanics, 3EC
AP3421-PR, Quantum Information Project, 2EC
AP3432, Quantum Hardware 1 - Theoretical Concepts, 4EC
AP3442, Quantum Hardware 2 - Experimental State of the Art, 4EC
AP3452, Quantum Error Correction, 4EC
AP3472, Modelling of Superconducting Devices, 4EC (not scheduled in 2024-2025)
CS4090, Quantum Communication and Cryptography, 5EC (or CS4090AM, 6EC)
QIST4300, Qubit Dynamics and Quantum Control, 4EC
QIST4310, Fundamentals of Quantum Information, 4EC
QIST4400, Quantum Computing Architecture, 5EC

5.1.5 Advanced Fundamental, Track-list, or General elective: 6 EC

The remaining module(s) can be chosen from subjects from the Advanced Fundamental modules, the Track-lists, or a more general elective from this list can be taken:

4403TGR64, Theory of General Relativity, 6EC
AP3082, Computational Physics, 6EC
AP3652, Electronics for Physicists, 3EC
AP3681, Fairy Tales of Theoretical Physics, 6EC
AP3751, Artificial Intelligence for Physicists, 4EC
AP3832, Systems Engineering for Physicists, 5EC (or EE4C11, 5EC)
CS4195, Modelling and Data Analysis in Complex Networks, 5EC
CS4220, Machine Learning 1, 5EC
IN4049TU, Introduction to High Performance Computing, 6EC
WI4201, Scientific Computing, 6EC
WI4260TU, Scientific Programming for Engineers, 3EC
IFEEMCS4250, Statistical Learning for Engineers, 4EC

WI4430, Martingales, Brownian Motion, and Stochastic Processes, 6EC
WI4771TU, Object Oriented Scientific Programming with C++, 3EC

If a student wishes to take a module, within or outside of the faculty, that's not on the lists approval from the Board of Examiners must be obtained.

5.2 Orientations

Combining the core programme with a 30 EC orientation completes the master programme.

5.2.1 Research and Development (R&D)

The R&D orientation is the only orientation that allows for incorporating bridging/homologation courses in the programme (see article 6). It consists of the following three blocks of modules:

a. Compulsory course (5 EC):

AP3832, Systems Engineering for Physicists, 5EC (or EE4C11, 5EC)

b. Professional Practice Module (15 EC), selected from:

AP3841, Systems Engineering Company Project, 15EC
AP3912, Internship Applied Physics, 15EC
IFEEMCS520201, Advanced Interdisciplinary AI Project, 15EC
LM3692, iGEM, 15EC

There may be admission requirements for these different options. All details regarding prerequisites, application, deadlines, admission, etc are in the study guide.
Other 15EC interdisciplinary "Q5" projects, such as a Joint Interdisciplinary Project (TUD4040), may only be taken if they are sufficiently related to the programme and do not overlap in content with electives. Approval from the Director of Studies is required prior to participation.

c. Additional electives (10 EC):

4 EC Advanced Fundamental, Track-list, or General electives (listed in art. 5.1)
6 EC Advanced Fundamental, Track-list, General electives, or Societal-list modules; or assigned homologation modules.

For homologation modules see art. 6.
S-list (Societal) example modules are:

AS3111, ATHENS, 2EC
AS3132, Art, Empathy & Ethics, 5EC
AS3141, Multidisciplinary Project, 6EC
TPM001B, Sociotechnology of Future Energy Systems, 5EC
TPM007A, Talk Like TED, 3EC
TPM023A, Cost-Benefit Analysis: Theory and Application, 4EC
TPM301B, Spoken English for Academic Purposes – intermediate, 2EC
TPM302B, Spoken English for Academic Purposes - advanced, 2EC
TPM303A, Writing in English for the University, 2EC
TPM304A, Advanced Writing in English for the University, 2EC
TPM305A, Writing a Master's Thesis in English, 2EC
TPM401A, Technology Entrepreneurship and Innovation, 5EC
TPM402A, Technology Entrepreneurship and Health, 5EC
TPM403A, Technology Entrepreneurship and Sustainability, 4EC
TPM404B, Technology Entrepreneurship and Global Development, 5EC
TPM405A, Patent Law and Patent Policy, 5EC
TPM406A, Corporate Entrepreneurship and Startups, 5EC
TPM411A, Idea to Startup – IT & AI, 5EC
TPM412A, Idea to Startup – Health & Life Sciences, 5EC
TPM413A, Idea to Startup – Energy & Sustainability, 5EC
TPM414A, Idea to Startup – Deep Tech, 5EC
TPM415B, Idea to Startup – Climate Action, 5EC
TPM416A, Turning Technology into Business, 6EC
TPM420A, Ready to Startup, 6EC

TPM425B, Start-up Challenge, 3EC
WM0203TU-Eng, Oral Presentations, 2EC
WM1115TU, Dutch Elementary 1, 3EC
WM1116TU, Dutch Elementary 2, 3EC
WM1117TU, Dutch Intermediate 1, 3EC
WM1135TU, Advanced English for the University, 3EC

For the complete list see: http://studiegids.tudelft.nl/a101_displayProgram.do?program_tree_id=31540.
Only subjects marked as 'Category MSc level' are accepted.

5.2.2 Education (Ed1/Ed2)

The educational programmes are aimed at Dutch-speaking students only, because they are oriented towards the Dutch school system and because it includes internships (Schoolpracticum) at Dutch schools. Consequently the educational orientation 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 as part of the bachelor programme and leads to qualification as a tweedegraads secondary school teacher with limited qualification (beperkte bevoegdheid). If a student took the minor Education, only the Verdiepingsdeel/Ed2 of 30 EC remains for the master programme orientation. The combination of the minor Education and the Ed2 orientation leads to qualification as a fully-qualified eerstegraads (grade-one) secondary school teacher.
Students that did not take the minor Education can follow the Basisdeel/Ed1 orientation as part of their master programme and then optionally do the Verdiepingsdeel/Ed2 as a post-master course in order to become fully qualified.
Timely registration with the coordinator of the MSc Science Education and Communication is necessary for participation in the orientation and to be assured of an internship at a school. Application deadlines are stated in the study guide.

30 EC Education - Basisdeel (Ed1)
SL3462, Educational Sciences, 6EC
SL4201, Pedagogy of STEM education, 4EC
SL4202, Professional Learning Community, 1EC
SL4220, Physics Teaching Methodology, 4EC
SL4225, Physics Foundation Teaching Placement, 15EC
30 EC Education - Verdiepingsdeel (Ed2)
SL3012, Personal Professional Development, 3EC
SL4205, Advanced Professional Learning Community, 1EC
SL4301, Research of Science Education, 9EC
SL4320, Advanced Physics Teaching Methodology, 5EC
SL4325, Advanced Physics Teaching Placement, 12EC

5.2.3 Management of Technology (MoT)

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.
Because of the limited capacity at the TPM faculty to take these courses, it is necessary to timely register with the Applied Physics programme coordinator for taking this orientation. Details are stated in the study guide.

1st SEMESTER MoT Modules (30 EC)
MOT111a, Financial Management, 5EC
MOT112a, Economic Foundations, 5EC
MOT121a, Leadership and Technology Management, 5EC
MOT131a, Emerging Breakthrough Technologies, 5EC
MOT141a, Research Methods, 5EC
MOT142a, Social and Scientific Values, 5EC
2nd SEMESTER MoT Modules (30 EC)
MOT113a, Technology Dynamics, 5EC
MOT122a, Digital Business Process Management, 5EC
MOT123a, Inter- and Intra-organisational Decision Making, 5EC
MOT132a, Technology Strategy and Entrepreneurship, 5EC
MOT133a, High-tech Marketing, 5EC
MOT143a, Business Analytics, 5EC

5.2.4 Study abroad

This orientation consists of a semester at a foreign university. A package of 30 EC of courses - optionally including a research project of a maximum of 20 EC - must be done. A maximum of 7.5 EC of language/societal courses can be done within the orientation. A Study-Abroad programme must always be approved by the board of examiners in advance.
Because the number of available places (per destination) is limited, selection takes place at the international office. It is necessary to register with them in time. Deadlines are stated in the study guide.
Grades obtained abroad are not converted into Dutch grades. Results obtained abroad are not included in the calculation of the GPA (a.o. for graduating with honours).

5.2.5 Pre-PhD

This orientation is linked to the Pre-PhD special programme and focuses on the preparation and education of students for a PhD position. There are additional requirements for the advanced fundamental physics modules in the special programme. These and the admission requirements and procedure are described in Art. 5.3.
The orientation consists of:

AP3932, Academic Skills - Is a PhD something for you?, 3EC
AP3945, Academic Research Project, 12EC
Additional Track related module, 5EC (a total of 20ec from the graduation track)

and additional electives (10 EC):

4 EC Advanced Fundamental, Track-list, or General electives (listed in art. 5.1)
6 EC Advanced Fundamental, Track-list, General electives, or Societal-list modules; or assigned homologation modules.

5.3 Special programmes

For special programmes, additional conditions apply regarding electives in the core programme and/or orientation. There may also be admission requirements, based on results in the first semester of the first year of the programme.

5.3.1 Pre-PhD special programme

This programme focuses on the preparation and education of students for a PhD position. The programme consists of the core programme (Art. 5.1) and the Pre-PhD orientation (Art. 5.2.5) with additional requirements for the choice of the Advanced Fundamental Physics Modules:

- Compulsory for all students in the Pre-PhD special programme:

AP3021, Advanced Statistical Mechanics

- The second course is compulsory for all students in a particular track of the Pre-PhD special programme:

Physics for Energy	AP3032, Continuum Physics
Physics for Fluids Engineering	AP3032, Continuum Physics
Physics for Health and Life	AP3071, Advanced Electrodynamics
Physics for Instrumentation	AP3071, Advanced Electrodynamics
Physics for Quantum Devices and Quantum Computing	AP3051, Advanced Quantum Mechanics

Admission requirements: students without study delay in the first semester scoring a Grade Point Average (GPA) of at least 7.50 or better for the courses of the first semester, having passed the required advanced fundamental physics modules, and submitting a convincing motivation followed by an interview if needed.
Admission into this programme proceeds as follows. Students inform the programme coordinator that they are interested in following the Pre-PhD special programme in the course of the first semester. After the examination period in January, the director of studies decides on the admission into the special programme. Students who are declined can continue with the regular programme without incurring delays. Students admitted in the Pre-PhD special programme are encouraged to take part in the Honours Programme as well, for example, to carry out a third research project.
Students should in principle complete this programme within two years. In cases where students incur substantial delays without good reason, the admission into the special programme can be withdrawn.

5.3.2 MP Optics & Photonics special programme

This 4TU initiative fits within the Physics for Instrumentation track with a focus on optics and photonics. The programme consists of the core programme (Art. 5.1), Physics for Instrumentation track (Art. 5.1.4d) and the orientation Research & Development (Art. 5.2.1) with additional requirements for:

- Advanced Fundamental Physics Modules:

AP3071, Advanced Electrodynamics
second course : free choice from AP3021, AP3032, AP3051

- 20EC Physics for Instrumentation Track-related Modules on Optics & Photonics:

AP3061, Acoustic, Elastic and Electromagnetic Waves, 6EC
AP3113, Quantum Optics, 6EC
AP3122, Advanced Optical Imaging, 6EC
AP3132, Advanced Digital Image Processing, 6EC
AP3152, Optics for Lithography, 6EC
AP3222, Nanotechnology, 6EC
AP3243, Lasers and Photodetectors, 3EC
AP3252, Electron Microscopy Characterization of the Nanoscale, 3EC
AP3382, Advanced Photonics, 6EC
AP3391, Geometrical Optics, 6EC
AP3401, Introduction to Charged Particle Optics, 6EC
AP3412, Experimental Techniques in Optics, 3EC
AP3531, Acoustical Imaging, 6EC
AP3701, Submm and Terahertz Physics and Applications, 3EC
AE4880, Optical Space Sensors, 4EC
EE4745, Terahertz Superconducting Astronomical Instrumentation, 5EC
ME46310, Opto-Mechatronics, 4EC
SC42030, Control for High Resolution Imaging, 3EC
SC42065, Adaptive Optics Design Project, 3EC

- Orientation Research and Development, Professional Practice Module (15 EC) must be related to optics and photonics.
- Master Thesis Project (AP3903, 45 EC) must be related to optics and photonics.

It is possible to take optics & photonics courses or projects at TU Eindhoven or University of Twente. These courses must be approved by the board of examiners.
Admission requirements: none. All students enrolled in the MSc Applied Physics programme have the opportunity to take this special programme.

5.3.3 Honours Programme (TER art. 10)

The Honours Programme consists of at least 20 EC on top of the regular master programme of 120 EC. The full Applied Physics 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 coherent package of at least 15 ec of challenging course modules or projects composed by the student.

Obligatory Collective Part (5EC) – choice of:		
IFHPM0000, Entrepreneurship and innovation		
IFHPM0010, Materials in a sustainable society		
IFHPM0020, Leadership skills for engineers		
UD2010, Technological expertise in public debate		
UD2012, Business Leadership for Engineers		
Individual Part (15EC) – examples:		
Company Oriented HPM		
AS1011HPM	Applied Sciences Company Project	12
AS1021HPM	Applied Sciences Honours Classes	3
Research Oriented HPM		
AS1031HPM	Applied Sciences Research Project	9-15
x	Project related course	0-6
IF3ME40000	4TU Responsible Sustainability Challenge	15
Coherent package of courses, different from the MSc AP programme		15

5.3.4 Double degree programme[1] Applied Physics – Management of Technology

This is a three year programme Applied Physics – Management of Technology of the Faculties of Applied Sciences (AS) and Technology, Policy and Management (TPM).
Students finishing a Master AP degree with orientation MoT may decide to do an additional year of Master MoT courses and thesis in order to obtain a double degree in both AP and MoT. Admission to this double degree programme is decided upon by the programme directors of the MSc Applied Physics and the MSc Management of Technology. The programme consists of:

Programme	**EC**
The AP core programme	90
The AP orientation MoT / 1st semester MoT modules (list of modules in art. 4.2.3)	30
2nd semester MoT modules (list of modules in art. 4.2.3)	30
MOT201a, Preparation for the Master Thesis	5
MOT2910, MoT MSc Thesis Project	30

The 120EC Applied Physics part of the programme consists of the 90EC AP Core Programme and the 30EC second semester MoT modules.

5.3.5 Double degree programme Applied Physics – Applied Mathematics

This is a three year programme Applied Physics – Applied Mathematics.
Admission to this double degree programme is decided upon by the programme directors of the MSc Applied Physics and the MSc Applied Mathematics. A double bachelor programme or a bridging programme is required to enter this programme.

The programme consists of:

Option 1 - two different thesis projects:

Programme	**EC**
AP courses: AP3001-FE (Finite Elements)* – 3 EC WM0320TU (Ethics and Engineering) – 3 EC Advanced Fundamental Physics Modules – 12 EC Track-list modules – 15 EC Applied Physics electives or math courses instead of AP3001 parts already covered* – 6 EC Applied Physics (advanced fundamental, track-list or general) electives – 6 EC	45
AP Thesis Project	45
AM courses: - Common courses (6 EC); WM1028AM (Ethics for Applied Mathematics) is not needed if WM0320TU is done - Orientation course (6 EC); - Specialisation courses 36 EC, should be mathematics courses.	48
AM Thesis Project	42

*If applicable Applied Physics bridging/homologation courses can also be done in the programme here.
AP3001 parts are covered by (list is not complete):
Complex Analysis : AM2040, TW2040, WI2602, EE2M11;
Finite Elements : WI4014TU, WI4205;
Partial Differential Equations : AM2070, TW2070, WI2607 or WI3150TU+WI3151TU/WI4150TU.

The 120EC Applied Physics programme consists of the 90EC AP courses and thesis project and 30EC of AM orientation and specialisation courses.

Option 2 - combined thesis project and industrial internship:

Programme	**EC**
AP courses - as above	45
AM courses - as above	48
Double Degree Combined Thesis Project	60
Orientation R&D (AP3832, Professional Practice Module) or Orientation Pre-PhD	20/15
Additional Applied Physics (advanced fundamental, track-list or general) electives	4/9
Additional AM elective course	6

The 120EC Applied Physics programme consists of 45 + 4 / 9 EC AP courses, 20 EC or 15 EC Orientation, 45 EC for the Thesis Project and the 6 EC AM orientation course.

[1] More generally, double degree programmes combining Applied Physics with other master courses taught at TU Delft or elsewhere are possible, but 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 admission by the programme directors is required in advance. Applied Physics double degree admission requirements: the first year of the programme must have been completed (almost) nominally – at least 54 EC obtained - and there must be a realistic planning to complete the entire double degree programme in three years.

5.3.6 Free study programme (WHW art. 7.3j)

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 6 Bridging and homologation programmes

Article 1 states that students can be admitted to the programme with a compulsory homologation programme. If homologation modules are assigned, a maximum of 6 EC can be incorporated in the Master programme in the R&D orientation (see article 5.2.1.c).

Students holding a Bachelor of Science degree in Aerospace Engineering, Applied Earth Sciences, Applied Mathematics, Electrical Engineering, Mechanical Engineering, Molecular Science and Engineering, or Nanobiology from Delft University of Technology may apply, but, if admitted, will be required to follow a bridging and/or homologation programme to provide them with the required background to allow them to complete the Master programme.
Bridging modules must be completed before a student can be admitted in the Master programme; homologation modules can be done as part of the Master. The bridging and/or homologation programmes are listed below. The final decision about a bridging or homologation programme, also in other cases, is made on an individual basis.

Students can be admitted to the Master programme if the extent of their deficiencies is limited to a maximum of 15 EC. If deficiencies extend this size, students can only be admitted to the bridging programme. Completion of the bridging programme by students formally admitted to it guarantees admission to the Master programme.
A maximum of 15 EC of homologation modules can be incorporated in the Master programme, if an exemption is obtained for the Industrial Internship (AP3912); otherwise 6 EC of homologation modules can be done in the R&D orientation and if exemptions have been obtained for compulsory courses (Mathematical Methods for Physics and/or Ethics and Engineering) homologation courses can be done as alternatives.

Required bridging/homologation courses for TU Delft BSc Aerospace Engineering:

TN2054, Electromagnetisme, 6EC
TN2304, Kwantummechanica 1, 3EC (or TN2305, 4EC)
TN2314, Kwantummechanica 2, 3EC
TN2321, Klassieke Mechanica, 3EC
TN2421, Optica, 3EC
TN2612, Relativiteitstheorie, 3EC
TN2626, Statistische Fysica, 6EC (or TN2625, 4EC)
TN2844, Vaste Stof Fysica, 6EC
TN2953SO, Research Practicum, 3EC (or TN2994, 9EC)

Required bridging/homologation courses for TU Delft BSc Applied Earth Sciences:

TN2054, Electromagnetisme, 6EC
TN2211, Electronische Instrumentatie, 6EC
TN2304, Kwantummechanica 1, 3EC (or TN2305, 4EC)
TN2314, Kwantummechanica 2, 3EC
TN2321, Klassieke Mechanica, 3EC
TN2421, Optica, 3EC
TN2612, Relativiteitstheorie, 3EC
TN2626, Statistische Fysica, 6EC (or TN2625, 4EC)
TN2844, Vaste Stof Fysica, 6EC
TN2953SO, Research Practicum, 3EC (or TN2994, 9EC)

Required bridging/homologation courses for TU Delft BSc Applied Mathematics:

TN2054, Electromagnetisme, 6EC
TN2211, Electronische Instrumentatie, 6EC
TN2304, Kwantummechanica 1, 3EC (or TN2305, 4EC)
TN2314, Kwantummechanica 2, 3EC
TN2321, Klassieke Mechanica, 3EC
TN2421, Optica, 3EC
TN2612, Relativiteitstheorie, 3EC (not required if TN1531TW is done)
TN2626, Statistische Fysica, 6EC (or TN2625, 4EC)
TN2786, Fysische Transportverschijnselen, 6EC (or 4052FYSTRY, 6EC)
TN2844, Vaste Stof Fysica, 6EC
TN2953SO, Research Practicum, 3EC (or TN2994, 9EC)

Required bridging/homologation courses for TU Delft BSc Electrical Engineering:

TN2304, Kwantummechanica 1, 3EC (or TN2305, 4EC)
TN2314, Kwantummechanica 2, 3EC
TN2321, Klassieke Mechanica, 3EC
TN2421, Optica, 3EC
TN2612, Relativiteitstheorie, 3EC
TN2626, Statistische Fysica, 6EC (or TN2625, 4EC)
TN2786, Fysische Transportverschijnselen, 6EC (or 4052FYSTRY, 6EC)
TN2844, Vaste Stof Fysica, 6EC
TN2953SO, Research Practicum, 3EC (or TN2994, 9EC)

Required bridging/homologation courses for TU Delft BSc Mechanical Engineering:

TN2054, Electromagnetisme, 6EC
TN2304, Kwantummechanica 1, 3EC (or TN2305, 4EC)
TN2314, Kwantummechanica 2, 3EC
TN2321, Klassieke Mechanica, 3EC
TN2345, Inleiding Golven, 3EC
TN2421, Optica, 3EC
TN2612, Relativiteitstheorie, 3EC
TN2626, Statistische Fysica, 6EC (or TN2625, 4EC)
TN2844, Vaste Stof Fysica, 6EC
TN2953SO, Research Practicum, 3EC (or TN2994, 9EC)

Required bridging/homologation courses for TU Delft BSc Molecular Science and Technology:

TN2054, Electromagnetisme, 6EC
TN2211, Electronische Instrumentatie, 6EC
TN2304, Kwantummechanica 1, 3EC (not if 4052THECHY, Theoretische Chemie, is taken)
TN2314, Kwantummechanica 2, 3EC (not if 4052THECHY, Theoretische Chemie, is taken)
TN2321, Klassieke Mechanica, 3EC
TN2345, Inleiding Golven, 3EC
TN2421, Optica, 3EC
TN2545, Systemen en Signalen, 6EC
TN2612, Relativiteitstheorie, 3EC
TN2626, Statistische Fysica, 6EC (or TN2625, 4EC)
TN2786, Fysische Transportverschijnselen, 6EC (not if 4052FYSTRY is taken)
TN2844, Vaste Stof Fysica, 6EC
TN2953SO, Research Practicum, 3EC (or TN2994, 9EC)

Required bridging/homologation courses for TU Delft BSc Nanobiology:

TN2054, Electromagnetisme, 6EC
TN2304, Kwantummechanica 1, 3EC (or NB3017, 2.5EC)
TN2314, Kwantummechanica 2, 3EC (or NB3018, 2.5EC)
TN2321, Klassieke Mechanica, 3EC
TN2345, Inleiding Golven, 3EC
TN2421, Optica, 3EC
TN2612, Relativiteitstheorie, 3EC
TN2626-D2, Statistische Fysica, 3EC
TN2786, Fysische Transportverschijnselen, 6EC (or 4052FYSTRY, 6EC)
TN2844, Vaste Stof Fysica, 6EC
TN2953SO, Research Practicum, 3EC

For students holding a Bachelor of Engineering (HBO) degree in applied physics, the bridging/homologation programme is:

TN1142WI, Lineaire algebra deel 1, 3EC (or IFEEMCS010400, 5EC)
TN2054, Electromagnetisme 1, 6EC
TN2244WI, Lineaire Algebra en Differentiaalvergelijkingen, 6EC
TN2304, Kwantummechanica 1, 3EC
TN2314, Kwantummechanica 2, 3EC
TN2321, Klassieke Mechanica, 3EC
TN2345, Inleiding Golven, 3EC
TN2421, Optica, 3EC
TN2545, Systemen en Signalen, 6EC
TN2626-D1, Statistische Fysica, 3EC
TN2953SO, Research Practicum, 3EC

The quantum mechanics subjects TN2304 and TN2314 form a module. The minimum pass grade for these subjects is 5.0, provided that the weighted average of the two subjects is at least 5.8.

Article 7 Examinations

7.1 The form of the examinations and the methods of assessment

The form of the examinations and the methods of assessment are described in the study guide, http://ap.msc.studyguide.tudelft.nl.

7.2 Order of the examinations

1. In general, there are no requirements with regard to the order in which courses and examinations are taken.
2. If there are conditions for participating in a particular course or an examination with regard to previously completed courses, this is stated in the study guide.
3. Notwithstanding the provisions of sections 1 and 2, there are conditions for starting the Master Thesis Project work (AP3903-MTP). You may start your Master Thesis Project work if you:
- have been admitted to the master programme Applied Physics,
- have passed bridging/homologation courses or other obligations from the bachelor programme,
- have passed at least 33EC from the obligatory (12EC), advanced fundamental physics (12EC) and track-list (15EC) core programme courses,
- have made a project plan with your thesis supervisor (Preparation for the Master Thesis, AP3903-PMT), and
- have handed in the signed thesis registration form together with the project plan at the thesis office.

There are no requirements with regard to completed courses for starting the Preparation for the Master Thesis.

7.3 Graduation Project, Master's thesis

The following regulations have been drawn up to make the time spend on the thesis project in line with the credits obtained for it and to avoid unnecessary delays.

1. The master thesis project consists of two separate stages: a 5 EC preparation, followed by 40 EC thesis work that includes writing the report and giving the final presentation.

2. The Preparation for the Master Thesis consists of
   - Reading background literature necessary for the project;
   - Acquiring necessary skills, such as learning to work with experimental set-ups, clean room and/or computer skills, and transferable/soft skills;
   - Identifying areas, in collaboration with the supervisor, where extra training is necessary, for example English writing skills, presenting, a particular course, etc and establishing personal learning objectives.
   - Formulating the research goal of the project: which question will be addressed and what method(s) will be applied to arrive at the answer;
   - Making a planning, including anticipating pitfalls and how these will be dealt with in order to prevent delays (e.g. equipment failure, delayed delivery of materials, sharing/availability of facilities);
   - Writing a project plan.

3. The expected time spent on the Preparation for the Master Thesis corresponds to 5 EC (3.5 weeks FTE); usually it is spread over a longer period of time, parallel to other courses. During the preparation stage meetings with the responsible supervisor are required for discussing the different issues.

4. The result of the Preparation for the Master Thesis is a project plan which addresses the project goal, the name of your supervisor(s) and others involved in the project, the track of the Master's programme, knowledge (e.g. courses done) and skills that you will use in the project, required training for skills that need improvement, personal learning goals, anticipated pitfalls and how these will be dealt with, agreements about supervision (such as the meeting frequency between the student and the responsible supervisor), and a time planning. The report typically contains between 4 and 7 pages.

5. The time planning is based on 28 weeks FTE, the equivalent of 40 EC. The time taken to complete courses the student still has to do, exams, regular holidays, and work have to be taken into account to arrive at the intended end date on which the final version of the thesis should be handed in.
   The time planning also takes into account known periods of absence of the supervisor and contains agreements on ways of communication and/or substitution during these periods. Absence of the supervisor cannot be used to justify delay. Neither does an impending publication, or more/better results.
   The time schedule is binding and contains a green light meeting two weeks prior to the end date for handing in the final version of the thesis.
   The schedule also contains the dates for two intermediate evaluations that are meant to give feedback to the student on her/his performance. Proposed timeslots are after a period equal to three months FTE (ca 40%) and five months FTE (ca 70%). The learning outcomes - as stated in the master's thesis grading scheme - should be used for these intermediate evaluations of the student.

6. After approval of the project plan by the responsible supervisor – and before the start of the second stage of the thesis project – the signed thesis project registration form must be handed in, together with the project plan, at the thesis office via the programme coordinator.

7. The assessment of the student is based on the learning goals of the master's thesis project rather than on whether the planned research outcome has been realized.
   On behalf of the Board of Examiners, the responsible supervisor composes a suitable assessment committee. The committee consists of at least three examiners(*), all members of the scientific staff of research groups that contribute to the master's degree programme. The members of the assessment committee come from at least two different sections of the degree programme, at least one of the members belongs to the teaching staff of the degree programme (of a course other than the thesis project), and at least one of them is a full professor or an associate professor with 'ius promovendi'.
   Thesis projects carried out in affiliated groups outside the Faculty of Applied Sciences shall be assessed by a committee including at least one examiner from the Faculty of Applied Sciences.

   (*) Alternatively, a committee consisting of two examiners plus a third member suffices provided that the above requirements are met through the two examiners. The third member can then be a member of academic staff or a researcher with a PhD employed at TU Delft.

8. The thesis office reminds the responsible supervisor and student in time to have the green light meeting. If the responsible supervisor is confident that the student will pass the defence, the exact time and date of the final presentation and thesis defence are fixed and the members of the assessment committee confirmed at this meeting. Both the date/time and the committee are determined by the thesis supervisor after hearing the student. In principle the defence takes place within two weeks after the end date for handing in the final version of the thesis. The supervisor reports the date of the defence and the composition of the assessment committee to the thesis office. In exceptional cases, the board of examiners may be involved in setting the date and time.
   If the responsible supervisor is in doubt whether the student will pass the defence, he/she should discuss with the other members of the assessment committee whether to give green light or not.

9. In the case that, in spite of the effort, the student is failing to complete the project on time, the responsible supervisor can decide at the green light meeting to cancel the planned defence if he/she is confident that the student won't pass the defence. The supervisor needs to deliver a written argumentation for this decision to the thesis office and the programme coordinator. Prior to this decision the student must be warned repeatedly, at least at the intermediate evaluation, to give him/her a chance to improve.
   After a negative decision, a choice must be made in consultation with the student between a delay (with a new binding time schedule with a maximum of three months) or a definitive cancellation of the thesis project. The thesis project can be delayed only once. Cancellation implies starting a new project.
   Note that an impending publication or more/better results are not valid reasons for an extension.

10. In case of unforeseen personal circumstances (illness; pregnancy and childbirth; exceptional family circumstances; physical, sensory or other functional disabilities) the student can apply for an extension of the end date (on which the final version of the thesis report needs to be handed in) to the Board of Examiners, with a statement of the academic counsellor. Students are required to contact the academic counsellor as soon as possible after the particular circumstance has occurred. The information is treated confidentially by the academic counsellor.
    In case of exceptional events, an extension of the end date (on which the final version of the thesis report needs to be handed in) can be granted by the Board of Examiners. Reasons for this should be non-project related and non-private; e.g. unexpected absence of the responsible supervisor without a suitable alternative responsible supervisor available.

Further rules governing MSc graduation projects can be found in article 21 of the Rules and Regulations of the Board of Examiners.

Article 8 Transition ruling

The core programme described in article 5 is compulsory for students who enrolled after 30-06-2024 for the first time in the master Applied Physics.
Students who started before 1 July 2024 do the AP2011-23 programme (with a 48EC thesis project and 18EC internship). They can voluntarily opt for the new programme. If necessary, a deadline may be introduced in the future for still being able to start an 18EC internship (AP3911) and/or 48EC thesis project (AP3902). This will then be announced at least 1 academic year in advance; among others in this document,.

Students enrolled before 01-09-2016 starting the thesis work after 01-07-2017 will do AP3902 instead of AP3901. The regulations in article 7.3 are mandatory for all students who hand in the approved (by the responsible supervisor) report of the 'preparation for the master thesis' or start the thesis project work after 31-12-2020. From 01-04-2024, 7 months after the implementation of this change, article 7.3 also applies for students who started their project before January 1, 2021.

Please refer to the 2023-2024 Programme Specifics Appendix for the transitional regulations for students who started the programme before 1-7-2011.

Equivalences:
AP3001 = WI4243AP-11
AP3001-CA = WI4243AP-CA = WI4244AP = WI4143TN = WI2602 = TW2040 = AM2040= EE2M11
AP3001-FE = WI4243AP-FE = WI4014TU = WI4205
AP3001-PDE = WI4243AP-PDE = WI3150TU + WI3151TU / WI4150TU = WI2607 = TW2070 = AM2070
AP3021 = AP3021G
AP3032 = AP3032G
AP3051 = AP3051G
AP3061 = AP3061D
AP3071 = AP3071G
AP3082 = AP3082D = AP3081D
AP3091 = AP3091D
AP3113 = AP3112 = AP3112D = AP3111D
AP3122 = AP3221 = AP3121D
AP3132 = AP3132D = ET4283
AP3141 = AP3141D
AP3163 = AP3162 = AP3162D = AP3161D
AP3171 = AP3171D
AP3181 = AP3181D
AP3211 = AP3211D
AP3222 = AP3232D = AP3221D = NS3501
AP3232 = AP3232D = AP3231D
AP3242 = AP3241

AP3261 = AP3261D = NS3521
AP3271 = NS3531 = 4403MOLE6
AP3281 = AP3281D = NS3571
AP3292 = AP3292D = AP3432 + AP3442
AP3311 = AP3311D
AP3341 = AP3341D
AP3352 = CH3792
AP3371 = AP3371TUD
AP3382 = AP3381
AP3392 = AP3391
AP3421 = AP3421D = QIST4310
AP3461 = NB4150
AP3511 = AP3511D = NB4070 = NS3511
AP3582 = AP3581 + AP3242
AP3652 = AP3651
AP3663 = QIST4300
AP3691 = AP3691D = NB4160
AP3832 = AP3831 = EE4C02 = EE4C11
AP3843 = AP3841
AP3903 = AP3902 = AP3901
AP3912 = AP3911
AP3972 = AP3971
CESE4080 = EE4575 = QIST4400
CH3222 = SET3111
ME45030 = ME45031 = WB1424ATU
ME45040 = ME45041 = ME45042 = ME45043 = WB1427-13
MOT111a = MOT1461
MOT112a = MOT1421
MOT113a = MOT1412
MOT121a = MOT1524
MOT122a = MOT1531
MOT123a = MOT1452
MOT131a = MOT2421
MOT132a = MOT1435
MOT133a = MOT1534
MOT141a = MOT2313 = MOT2312
MOT142a = MOT1442

Equivalences for Bridging programmes:
TN1142WI = WI1142TN
TN1612SK, 2 EC = TN2612, 3 EC
TN2053 = TN2054
WI2140TN, 4 EC = WI2240TN, 3EC + TN2953DV, 1 EC
TN2244WI, 6 EC = WI2240TN, 3EC + WI2242TN, 3 EC
TN2301 = TN2302 = TN2303 = TN2304 = TN2305
TN2311 = TN2312 = TN2314
TN2624 = TN2626
TN2624NB = TN2626-D1
TN2785 = TN2786
TN2843, 5 EC = TN2844, 6 EC
TN4780TA, 4 EC = TN2785, 6 EC = SET3021, 4 EC = 4052FYSTRY, 6EC

TN2953SK, 2 EC + TN2953DV, 1 EC = TN2953SO, 3 EC (voor HBO schakelaars)
TN2953SK, 2 EC = TN2953SO, 3 EC (voor overige schakelaars)