Appendix 6 Degree-specific appendix - Engineering Physics

from 08 September 2023 -Consolidated version-

Supplement to Section 1 Scope of application

These master's examination regulations apply to the master's degree programme in "Engineering Physics" offered by the Faculty of Mathematics and Natural Sciences of the Carl von Ossietzky University of Oldenburg and the Faculty of Technology of the University of Applied Sciences Emden/Leer.

Supplement to Section 2 Learning outcomes

The Master's degree in Engineering Physics qualifies students for PhD programmes in the fields of physics and engineering sciences. More information can be found in the PhD regulations.

Supplement to Section 3 University degree

Once the student has passed the master's examination for the international Master's degree programme in Engineering Physics, the Faculty of Mathematics and Natural Sciences of the Carl von Ossietzky University of Oldenburg and the Faculty of Technology of the University of Applied Sciences Emden/Leer award the degree of "Master of Science (M.Sc.)".

Supplement to Section 5 Duration, scope and structure of the academic programme, part-time study

On 4: The master's degree programme comprises compulsory modules (with a student workload of 36 credit points), elective modules (with a student workload of 54 credit points) and the master's thesis module (with a student workload of 30 credit points). The modules are taught in either German or English.

On 5: The elective part comprises of 12 credit points of "Advanced Physics", 12 credit points of "Engineering", 18 credit points of "Specialisation" and additional freely chosen 12 credit points from the elective modules.

On 6: It is possible to specialise in the following areas: Biomedical Physics, Acoustics, Laser & Optics or Renewable Energies. A specialization is listed on the academic transcript if at least 12 credit points were obtained from modules from the Engineering Science programme in this specialisation and at least 18 credit points were obtained from modules in this specialisation area. The student must have passed all modules.

On 7: Students in the European Wind Energy Master programme must complete modules according to §10(b).

Supplement to Section 6 Examining Board, Examination Office

On 1: The Examining Board is appointed by the "Engineering Physics Joint Committee" of the Carl von Ossietzky University of Oldenburg and the University of Applied Sciences Emden/Leer, and is approved by the Faculty of Mathematics and Natural Sciences of the Carl von Ossietzky University of Oldenburg and the Faculty of Technology of the University of Applied Sciences Emden/Leer.

^{*)} There may be interim provisions for this version of the regulations, which may also affect you during the course of your degree programme. For more information, please read the official version of the regulations/amendments (Section II) in the official notices at: https://www.uni-oldenburg.de/amtliche-mitteilungen/

The Examining Board consists of six members with voting rights, namely two professors or university lecturers from the University of Oldenburg, two professors or university lecturers from the University of Applied Sciences Emden/Leer, a staff member active in teaching, and a student following the degree programme.

Supplement to Section 7 Examiners

Employees and members of the University of Oldenburg, the University of Applied Sciences Emden/Leer or another university, who are qualified to teach the relevant examination subject or subarea of the examination subject, are appointed to perform assessments and set examinations.

Supplement to Section 9 Admission to modules and module examinations

Modules can be taken by students enrolled in the Engineering Physics Master's programme at the Carl von Ossietzky University of Oldenburg or at the University of Applied Sciences Emden/Leer as long as the grounds for exclusion in Section 20.3.3 do not apply.

Module, requiring "active participation", can only be approved as passed if the requested amount of participation was documented. "Active participation" according to 9.6. is considered to be regular, active and well documented participation in practical meetings (practical courses, exercises, seminars, excursions) and in practical parts of lectures. This includes the solving of exercises, documentation of the done experiments, discussions during seminars, or the documentation and presentation of the lecture's contents. The efforts of the "active participation" are not graded. In the case of conflict an ombudsperson is to be asked.

Supplement to Section 10 Structure and content of the modules

a) Students must complete the following compulsory modules (with a student workload of 36 credit points):

Module name	Module type	Ср	Teaching-format	Examination components
phy631 Advanced Metrology	Compulsory	6	L or S	1 Examination according to Supplement of 11, Abs. (2
phy640 Seminar Advanced Topics in EP	Compulsory	3	S	1 Examination according to Supplement of 11, Abs. (2) and active participation of the seminar
phy611 Theoretical Methods	Compulsory	6	L and E	1 Examination according to Supplement of 11, Abs. (2)
phy681 Tools and Skills in Engineering Sciences	Compulsory	6	L, E, S, I	1 Examination according to Supplement of 11, Abs. (2)
phy691 Advanced Research Project (Preparation Master's Thesis)	Compulsory	15	Practical work	1 Examination according to Supplement of 11, Abs. (2)
Total		36		

L = Lecture(s), E = Exercise(s), I = Internship, S = Seminar(s)

The following elective modules are offered in the master's degree programme:

Students must obtain 12 credit points for elective modules listed under "Advanced Physics".

1. Advanced Physics

Module name	Module type	Ср	Teaching-format	Examination components
phy602 Advanced Nuclear & Particle Physics	Elective	6	2 L	1 Examination according to Supplement of 11, Abs. (2)
phy603 Fluid Dynamics	Elective	6	2 L	1 Examination according to Supplement of 11, Abs. (2)
phy633 Optics	Elective	6	L	1 Examination according to Supplement of 11, Abs. (2)
phy617 Fourier Methods	Elective	6	2 L	1 Examination according to Supplement of 11, Abs. (2)
phy950 Audiologie und Akustik ¹	Elective	6	L	1 Examination according to Supplement of 11, Abs. (2)
phy607 Selected Topics in Advanced Physics	Elective	6	L, E, S, I	1 Examination according to Supplement of 11, Abs. (2) or 2 partial examinations according to Abs. (3)

2. Specialisation: Biomedical Physics

2.1. Engineering Science

Students must obtain at least 12 credit points from the following modules.

Module name	Module type	Ср	Teaching-format	Examination components
bio279 Grundlagen der Physiologie ¹	Elective	6	Course/s according to the respective examination regulations for the degree program Master of Education (Special Needs Education) Appendix 5 Biology	1 Examination according to the respective specifications in the examination regulation for the Master of Education (Special Education), Annex 5 Biology
phy614 Personalized Medicine	Elective	6	L	1 Examination according to Supplement of 11, Abs. (2)
phy678 Processing and Analysis of Biomedical Data	Elective	6	L	1 Examination according to Supplement of 11, Abs. (2)
phy685 Advanced Engineering Topics in Biomedical Physics & Acoustics	Elective	6	L, E, S, I	1 Examination according to Supplement of 11, Abs. (2) or 2 partial examinations according to Abs. (3)

2.2. Specialisation

Students must obtain at least 18 credit points from the following modules.

Module name	Module type	Ср	Teaching-format	Examination components
phy698 Selected Topics on Medical Radiation Physics Physics	Elective	6	L, S	1 Examination according to Supplement of 11, Abs. (2)

phy954 Imaging and Data Analysis	Elective	6	L	1 Examination according to Supplement of 11, Abs. (2)
phy955 Medizinische Strahlenphysik I ¹	Elective	6	2 L	1 Examination according to Supplement of 11, Abs. (2
phy959 Medizinische Strahlenphysik II1	Elective	6	L	1 Examination according to Supplement of 11, Abs. (2)
phy964 Advanced Computing	Elective	6	2 L, 2 E	1 Examination according to Supplement of 11, Abs. (2)
phy686 Advanced Topics in Biomedical Physics & Acoustics	Elective	6	L, E, S, I	1 Examination according to Supplement of 11, Abs. (2) or 2 partial examinations according to Abs. (3)

¹ These modules can only be taken by students with sufficient German skills on B2-level according to the Common European Framework of Reference for Languages (CEFR). These modules can also be taken as part of advanced training for medical physics experts/ professional recognition by "Deutsche Gesellschaft für medizinische Physik" (DGMP).

3. Specialisation: Acoustics 3.1. Engineering Science

Students must obtain at least 12 credit points from the following modules.

Module name	Module type	Ср	Teaching- format	Examination components
phy605 Digital Signal Processing	Elective	6	L	1 Examination according to Supplement of 11, Abs. (2)
phy694 Machine Learning II	Elective	6	L, E	1 Examination according to Supplement of 11, Abs. (2)
phy964 Advanced Computing	Elective	6	2 L, 2 E	1 Examination according to Supplement of 11, Abs. (2)
phy685 Advanced Engineering Topics in Biomedical Physics & Acoustics	Elective	6	L, E, I, S	1 Examination according to Supplement of 11, Abs. (2) or 2 partial examinations according to Abs. (3)

3.2. Specialisation

Students must obtain at least 18 credit points from the following modules.

Module name	Module type	Ср	Teaching-format	Examination components
phy677 Speech Processing	Elective	6	L	1 Examination according to Supplement of 11, Abs. (2)
phy696 Advanced Topics Speech and Audio Processing	Elective	6	L	1 Examination according to Supplement of 11, Abs. (2)
phy679 Acoustics	Elective	6	L	1 Examination according to Supplement of 11, Abs. (2)
phy960 Psychoacoustics	Elective	6	L, E, S	1 Examination according to Supplement of 11, Abs. (2)

phy686	Elective	6	L, E, I, S	1 Examination according to
Advanced Topics in Biomedical				Supplement of 11, Abs.
Physics & Acoustics				(2)or 2 partial examinations
				according to Abs. (3)

4. Specialisation: Laser and Optics

4.1. Engineering Sciences

Students must obtain at least 12 credit points from the following modules.

Module name	Module	Ср	Teaching-	Examination
	type		format	components
phy632	Compulsory	6	L	1 Examination according
Spectrophysics				to Supplement of 11, Abs.
				(2)
phy600 Photonics	Compulsory	6	L	1 Examination according
				to Supplement of 11, Abs.
				(2)
phy608	Elective	6	L, S	1 Examination according
Medical Optics				to Supplement of 11, Abs.
				(2)
phy624	Elective	6	L, E	1 Examination according
Optoelectronics				to Supplement of 11, Abs.
				(2)
phy638	Elective	6	L, E, I, S	1 Examination according
Laser Material Processing				to Supplement of 11, Abs.
				(2)
phy682	Elective	6	L, E, I, S	1 Examination according
Advanced Engineering Topics				to Supplement of 11, Abs.
in Laser and Optics				(2) or 2 partial
				examinations according to
				Abs. (3)

4.2. Specialisation

Students must obtain at least 18 credit points from the following modules.

Module name	Module type	Ср	Teaching-format	Examination components
phy637 Laser Design and Beam Guiding	Elective	6	L	1 Examination according to Supplement of 11, Abs. (2)
phy634 Biophotonics and Spectroscopy	Elective	6	L, S	1 Examination according to Supplement of 11, Abs. (2)
phy965 Engineering Scientific Instrumentation	Elective	6	L, S	1 Examination according to Supplement of 11, Abs. (2)
phy966 Intense Light Physics	Elective	6	L	1 Examination according to Supplement of 11, Abs. (2)
phy683 Advanced Topics in Laser and Optics	Elective	6	L, E, I, S	1 Examination according to Supplement of 11, Abs. (2) or 2 partial examinations according to Abs. (3)

5. Specialisation: Renewable Energies

5.1. Engineering Sciences

Students must obtain at least 12 credit points from the following modules.

Module name	Module type	Ср	Teaching-format	Examination components
phy641 Energy Resources & Systems	Elective	6	2 L	2 Examinations according to Supplement of 11, Abs. (2)
pre022 Solar Energy	Elective	6	Course/s according to Supplement 12 Sustainable Renewable Energy technologies	Examination according to Supplement 12 Sustainable Renewable Energy technologies
pre200 Selected Renewable Energy Technologies	Elective	6	Course/s according to Supplement 12 Sustainable Renewable Energy technologies	Examination according to Supplement 12 Sustainable Renewable Energy technologies
phy644 Wind Energy Physics, Data & Analysis	Elective	6	2 L, E	1 Examination according to Supplement of 11, Abs. (2)
phy616 Computational Fluid Dynamics	Elective	6	2 L, 2 E	1 Examination according to Supplement of 11, Abs. (2)
phy964 Advanced Computing	Elective	6	2 L, 2 E	1 Examination according to Supplement of 11, Abs. (2)
phy687 Advanced Engineering Topics in Renewable Energies	Elective	6	L, E, I, S	1 Examination according to Supplement of 11, Abs. (2) or 2 partial examinations according to Abs. (3)

5.2. Specialisation

Students must obtain at least 18 credit points from the following modules.

Module name	Module type	Ср	Teaching-format	Examination components
phy609 Photovoltaic Physics	Elective	6	L, E	1 Examination according to Supplement of 11, Abs. (2)
phy646 Wind Physics Student's Lab	Elective	6	S	1 Examination according to Supplement of 11, Abs. (2)
phy647 Future Power Supply Systems	Elective	6	L, S	1 Examination according to Supplement of 11, Abs. (2)
phy648 Wind Resources and their Applications	Elective	6	2 L	1 Examination according to Supplement of 11, Abs. (2)
phy649 Design of Wind Energy Systems	Elective	6	L, S	1 Examination according to Supplement of 11, Abs. (2)
inf511 Smart Grid Management	Elective	6	Course/s according to Examination regulations for the Master's degree programmes Supplement 2 for Department of Informatics	Examination according to Examination regulations for the Master's degree programmes Supplement 2 for Department of Informatics
phy984 Advanced Energy Materials	Elective	6	S	Examination according to Supplement of 11, Abs. (2)

pre114 Solar Energy Meteorology	Elective	6	Course/s according to Supplement 12 Sustainable Renewable Energy technologies	Examination according to Supplement 12 Sustainable Renewable Energy technologies
pre113 Photovoltaic Systems	Elective	6	Course/s according to Supplement 12 Sustainable Renewable Energy technologies	Examination according to Supplement 12 Sustainable Renewable Energy technologies
phy987 Control of Wind Turbines and Wind Farms	Elective	6	2 L	1 Examination according to Supplement of 11, Abs. (2)
phy967 Advanced Laboratories in Renewable Energies	Elective	6	I, S	1 Examination according to Supplement of 11, Abs. (2)
phy689 Advanced Topics in Renewable Energies	Elective	6	L, E, I, S	1 Examination according to Supplement of 11, Abs. (2) or 2 partial examinations according to Abs. (3)

b) For students studying Wind Physics as part of the Erasmus Mundus Master's degree programme in European Wind Energy, the following modules are available:

I) Subtrack 1: "Atmospheric Physics"

Module name	Module type	Ср	Teaching-format	Examination components
phy616 Computational Fluid Dynamics	Compulsory	3	2 L 2 E	1 Examination according to Supplement of 11, Abs. (2)
phy627 Hydrodynamcis II²	Compulsory	5	L, E	1 Examination according to Supplement of 11, Abs. (2)
phy670 Fluid Dynamics II / Wind Energy Meteorology	Compulsory	3	2 L, E	1 Examination according to Supplement of 11, Abs. (2)
phy674 Turbulent Flows²	Compulsory	5	L, E	1 Examination according to Supplement of 11, Abs. (2)
phy659 Introduction to Micro Meteorology for Wind Energy ²	Compulsory	5	L, E, S	1 Examination according to Supplement of 11, Abs. (2)
phy684 Wind Turbine Technology and Aerodynamics²	Compulsory	10	L, E, S	1 Examination according to Supplement of 11, Abs. (2)
phy688 Planning and Development of Wind Farms ¹	Compulsory	5	L, E, S	1 Examination according to Supplement of 11, Abs. (2)
phy692 Research Project European Wind Energy Master	Compulsory	9	I, S	2 Partial Examinations according to Supplement of 11, Abs. (3).

phy985 Stochastic Processes in Experiments	Compulsory	3	S	1 Examination according to Supplement of 11, Abs. (2)
phy987 Control of Wind Turbines and Wind Farms	Compulsory	6	L, E	1 Examination according to Supplement of 11, Abs. (2)
phy997 Wind Turbine Measurement Techniques²	Elective	10	L	1 Examination according to Supplement of 11, Abs. (2)
phy621 Advanced Engineering Topics in Wind Energy	Elective	5	L, E, S, I	1 Examination according to Supplement of 11, Abs. (2)
phy622 Advanced Topics in Wind Energy	Elective	5	L, E, S, I	1 Examination according to Supplement of 11, Abs. (2)
phy628 Computational Tool for Data Science2	Elective	5	L, E	1 Examination according to Supplement of 11, Abs. (2)
phy988 Introduction to Machine Learning and Data Mining²	Elective	5	L	1 Examination according to Supplement of 11, Abs. (2)
phy993 Advanced Time Series Analysis²	Elective	10	L, E	1 Examination according to Supplement of 11, Abs. (2)
phy994 Optimisation and Data Fitting ²	Elective	5	L, I	1 Examination according to Supplement of 11, Abs. (2)
phy995 Physics of Sustainable Energy²	Elective	5	L	1 Examination according to Supplement of 11, Abs. (2)
phy998 Probabilistic Methods in Wind Energy²	Elective	5	L, E	1 Examination according to Supplement of 11, Abs. (2)

²The modules are offered by the partner universities.

Students must obtain at least 30 credit points from the elective modules.

II) Subtrack 2: "Wind Farms"

Module name	Module type	Ср	Teaching-format	Examination components
phy692 Research Project European Wind Energy Master	Compulsory	9	I, S	2 Partial Examinations according to Supplement of 11, Abs. (3)
phy645 Wind Physics Measurement Project	Compulsory	3	L	1 Examination according to Supplement of 11, Abs. (2)
phy987 Control of Wind Turbines and Wind Farms	Compulsory	6	L, E	1 Examination according to Supplement of 11, Abs. (2)
phy659 Introduction to Micro Meteorology for Wind Energy ²	Compulsory	5	L, E, S	1 Examination according to Supplement of 11, Abs. (2)

phy684 Wind Turbine Technology and Aerodynamics²	Compulsory	10	L, E, S	1 Examination according to Supplement of 11, Abs. (2)
phy626 Introduction to Dynamical Systems ²	Compulsory	5	L	1 Examination according to Supplement of 11, Abs. (2)
phy674 Turbulent Flows ²	Compulsory	5	L, E	1 Examination according to Supplement of 11, Abs. (2)
phy688 Planning and Development of Wind Farms²	Compulsory	5	L, E, S	1 Examination according to Supplement of 11, Abs. (2)
phy670 Fluiddynamics II / Wind Energy Meteorology	Compulsory	6	2 L, E	1 Examination according to Supplement of 11, Abs. (2)
phy616 Computational Fluid Dynamics	Compulsory	6	2 L, 2 E	1 Examination according to Supplement of 11, Abs. (2)
phy997 Wind Turbine Measurement Techniques²	Compulsory	10	L	1 Examination according to Supplement of 11, Abs. (2)
phy627 Hydrodynamcis II2	Compulsory	5	L, E	1 Examination according to Supplement of 11, Abs. (2)
phy988 Introduction to Machine Learning and Data Mining²	Elective	5	L	1 Examination according to Supplement of 11, Abs. (2)
phy625 Deep Learning²	Elective	5	L	1 Examination according to Supplement of 11, Abs. (2)
phy994 Optimization and Data Fitting ²	Elective	5	L, I	1 Examination according to Supplement of 11, Abs. (2)
phy998 Probabilistic Methods in Wind Energy²	Elective	5	L, E	1 Examination according to Supplement of 11, Abs. (2)
phy675 Integration of Wind Power in the Power System ²	Elective	5	L, E	1 Examination according to Supplement of 11, Abs. (2)
phy981 HardTech Entrepreneurship²	Elective	10	L, E	1 Examination according to Supplement of 11, Abs. (2)
phy622 Advanced Topics in Wind Energy	Elective	5	L, E, S, I	1 Examination according to Supplement of 11, Abs. (2)
phy621 Advanced Engineering Topics in Wind Energy	Elective	5	L, E, S, I	1 Examination according to Supplement of 11, Abs. (2
phy629 Advanced CFD ²	Elective	5	L, E	1 Examination according to Supplement of 11, Abs. (2)
phy657 Energy Economics ²	Elective	5	L, E	1 Examination according to Supplement of 11, Abs. (2)

² The modules are offered by the partner universities.

Students must obtain at least 25 credit points from the elective modules.

Supplement to Section 11 Types of module examinations

- (1) The nature and scope of the examination components must correspond to the number of credit points for that particular module.
- (2) The scope of the various types of module examinations (with a student workload of 6 credit points, as partial examinations if applicable) is as follows:
 - Written examination: Between 90 and 180 minutes
 - Oral examination: Between 20 and 45 minutes
 - Short presentation: Between 10 and 20 pages of written analysis plus a presentation lasting between 15 and 30 minutes
 - Term paper: Between 15 and 30 pages
 - Presentation: Between 20 and 45 minutes
 - Internship report: Between 15 and 30 pages
- (3) If allowed by the Module Table, the examination can also consist of two partial examinations. Partial examinations may be of nature and scope as determined below:
 - Written examination: Between 45 and 90 minutes
 - Oral examination: Between 10 and 20 minutes
 - Short presentation: Between 5 and 10 pages of written analysis plus a presentation lasting between 10 and 15 minutes
 - Term paper: Between 10 and 15 pages
 - Presentation: Between 10 and 20 minutes
 - Internship report: Between 10 and 15 pages
- (4) For the following Modules an internship report of 15 to 30 pages may be considered as the examination:
 - phy607 Selected Topics in Advanced Physics
 - phy638 Laser Material Processing
 - phy646 Wind Physics Student's Lab
 - phy681 Tools and Skills in Engineering Sciences
 - phy682 Advanced Engineering Topics in Laser and Optics
 - phy683 Advanced Topics in Laser and Optics
 - phy685 Advanced Engineering Topics in Biomedical Physics& Acoustics
 - phy686 Advanced Topics in Biomedical Physics & Acoustics
 - phy687 Advanced Engineering Topics in Renewable Energies
 - phy689 Advanced Topics in Renewable Energies
 - phy967 Advanced Laboratories in Renewable Energies

Supplement to Section 15 Resits of module examinations

Upon request, students may withdraw from an elective module for which they fail the module examination without stating reasons. In this case, unsuccessful attempts for the alternative elective module will be counted.

Supplement to Section 20 Admission to the master's thesis phase

For admission to the master's thesis phase, students must be enrolled in the corresponding master's programme at the Carl von Ossietzky University of Oldenburg or the University of Applied Sciences Emden/Leer and meet the additional requirements stipulated in Section 20 of the examination regulations.

Supplement to Section 21 Final Master's module

On 2: The topic of the master's thesis may be set by any professor or lecturer at the Faculty of Mathematics and Natural Sciences of the Carl von Ossietzky University of Oldenburg or at the Faculty of Technology of the University of Applied Sciences Emden/Leer who is involved in teaching the master's programme in Engineering Physics. Subject to the approval of the Examining Board, the topic may also be set by other authorised examiners in accordance with Section 7.1, in which case the second examiner must be a professor or university lecturer at the Faculty of Mathematics and Natural Sciences of the Carl von Ossietzky University of Oldenburg or at the Faculty of Technology of the University of Applied Sciences Emden/Leer who is involved in teaching the corresponding master's degree programme.

Supplement to Section 23 Overall result

On 3: All module results are taken into account when determining the overall mark.