

**6.10.54 Implementation Regulations for the Master's Programme
in Petroleum Engineering
at the Clausthal University of Technology,
Faculty of Energy and Economics
from 21 July 2015**

In the version of the 3rd amendment from June 25, 2019

The Faculty for Energy and Economics agreed on the following implementation regulations on 21 July 2015, in accordance with § 7 para 3 in relation with § 44 para 1 of the Higher Education Act of Lower Saxony (NHG). These regulations were authorised by the chairmanship of the Clausthal University of Technology on 01 September 2015. Amended by the faculty board decree from 17 January 2017 and the authorisation from the chairmanship from 14 February 2017. Last amended by the faculty board decree from 13 June 2017 and the authorisation from the chairmanship from 27 June 2017. Last amended by the faculty board decree from June 25, 2019 and the authorisation from the chairmanship from July 11, 2019.

Preamble

These implementation regulations solely apply in relation with the general exam regulations (APO) of the TU Clausthal in the respectively valid version, and contain all programme-specific additions, amendments and regulations.

Objective of the Programme

The Master's programme Petroleum Engineering is intended to provide graduates with a wide range of skills, methods and knowledge for an international career and will put them in the position to apply these skills, methods and knowledge during problem-related analysis and solutions. The programme aims at acquiring transferable key qualifications as well as professional and interdisciplinary skills for a problem-solving-oriented understanding of technology and management skills staying abreast of the rapid changes at an international scale. In addition to an interdisciplinary understanding of science, this requires new, open and non-hierarchical forms of knowledge acquisition and knowledge transfer. Problem-oriented interdisciplinarity, internationality and competence are the pillars of this curriculum. The degree of scientifically sound professional skills is developed through successive steps starting at the foundation in natural sciences, engineering and economics with growing abilities for independent use and further education up to personal specialisation.

With the academic degree of Master of Science in Petroleum Engineering in the three disciplines - Reservoir Management, Drilling / Production and Deep Geothermal Systems
*) - graduates demonstrate that they have in-depth, scientifically based professional

*) 2nd Amendment of the implementation regulations of 13 June 2017

skills and knowledge beyond the Bachelor of Science for practical research, thus acquiring another professional qualification.

In accordance with the international orientation of the consecutive programme, lectures are given in English.

On § 5 Programme-specific implementation regulations

The Master's programme in Petroleum Engineering has a modular structure. Appendix 1 (Module Overview) lists the credit points (CP) assigned to individual modules in accordance with ECTS (European Credit Transfer System) as well as the type and scope of academic and/or examination requirements.

The following concentrations are available, students must select one:

- a. Reservoir Management
- b. Drilling/Production
- c. Deep Geothermal Systems ♦)

Annexes 2a, 2b and 2c ♦) contain a model study plan for each concentration, showing the recommended course of study.

A detailed description of the modules and their content is provided in the separate module manual.

On § 6 Duration and structure of the programme, examination

Students can only commence the programme the winter semester.

The time in which the Master's programme can be completed for full-time studies, including the Master's thesis is 4 semesters (standard period of study). The scope of the Master's programme equates to 120 Credit Points (CP), including 28 CP for the Master's thesis and the colloquium

Students who have earned their Bachelor of Science from a German university are advised to spend a semester abroad, preferably the third or fourth, preferably at a partner university or to do an internship abroad. Students must consult their Advisor regarding academic requirements in advance and have them approved by means of a Learning Agreement.

♦) 2nd Amendment of the implementation regulations of 13 June 2017

On § 10 Admission for exam

The concentration selection is binding with the first test attempt in one of the modules of the curriculum. Changing the concentration is only possible if no test attempts have been made in said module. Changing the concentration is possible only once and must be submitted in writing to the Examination Office in good time before placing the newly selected module of the other concentration.

The module selection is binding with the first test attempt in a compulsory elective module. Changing the compulsory elective module is only possible if no test attempts have been made in a compulsory elective module.

On § 13 Structure of the examinations, additional examinations and conditional examinations

According to Annex 1, the Master's programme consists of compulsory and elective modules with module and sub-module examinations and a Master's thesis according to § 16 APO.

The Faculty Council will update the elective module catalogue (Annex 1) once a year. Changes made to elective module catalogues, are published by the study centre by the end of August for the next academic year (winter/summer semester). Changes will be published in exceptional cases by the end of February for the following summer semester:

<https://www.tu-clausthal.de/studieninteressierte/studiengaenge/master-studiengaenge/petroleum-engineering>

All courses are taught in English. All written and oral examinations are held in English.

On § 14 Academic and examination requirements

Annex 1 (module overview) lists the types of academic and examination requirements (Module overview). In case the examiner requires a different type of examination, then the examiner will specify and make known all possible examinations and approved aids mentioned in Annex 1 during the first lecture. For written and oral exams (see § 15 para. 3 and 4 APO), the duration of the examination is defined in the module manual.

During the group project (module 13) students will train interdisciplinary cooperation skills while solving real life problems. The topic of the module will focus on the main concentration, e.g. a Field Development Plan and 4 students per group will normally work together. For a field development study, e.g. real data of a deposit is used to simulate the work stages of the geophysical exploration and evaluation of the deposit, the design of the drilling, the geological modelling, the production prediction, the

design of the day and night conveying facilities, the economic calculations, the evaluation of the project, the transport of the distribution of the products. The project time will be between 6 and up to 8 weeks. In preparation for the assignment, students learn about reporting and interpersonal skills by attending compact courses. Each group is assigned at least one university lecturer as a mentor. The results of the project are presented in written form, evaluated and presented by the group in a joint presentation within the course of a seminar. To examine the individual contribution of students, the specification of sections, page numbers or other objective criteria needs to be clearly distinguishable and assessable on its own as well as meet the requirements of § 14 APO. The assessment of the group's performance and the performance of individual students is carried out by lecturers in the field of the group project.

On § 16 Final thesis

The master thesis, including the colloquium, comprises 28 credit points and must be completed within a period of 5 months.

Upon request and with the approval of the primary examiner an extension may be granted in an exceptional situation for a total duration of up to 6 months by the Examination Board.

According to § 10 APO the Master Thesis requires a separate admission. When submitting the application, the primary examiner must be indicated.

The examiner must belong to the university lecturer group of the TU Clausthal and his or her department must be listed below:

- Department of Petroleum Engineering
- Department of Geology and Palaeontology
- Department of Geophysics
- Department of Mining
- Department of Processing, Landfill Technology and Geomechanics
- Department of Mechanical Engineering
- Department of Engineering Mechanics

Exceptions are granted by the Examination Board.

In addition to the admission requirements pursuant to § 10 APO, students need a total of at least 80 credit points. Justified exceptions are granted by the Examination Board.

Grading of the module Master's Thesis is based upon 90% of the written examination and 10% of the oral examination (Colloquium).

On § 18
Examination of exam performance, grading

The weighing of the individual modules for the final grade occurs in accordance with Annex 1 (Module Overview).

On § 20
Second attempt, repeating exams

Comparable courses of study within the meaning of § 20 (5) APO are all master's and diploma programmes in the fields of:

- Petroleum Engineering
- Erdöl- und Erdgastechnik.

In case of doubt, the responsible study advisor will carry out the assessment of the assignment of a course of study.

On § 22
Failure, cheating, exception regulations

The Master's programme Petroleum Engineering is not intended for part-time studies.

On § 28
Coming into effect

These implementation regulations come into effect on the day after their announcement in the official announcement paper of the Clausthal University of Technology at the beginning of the examination period of the winter semester 2015/2016.

Transitional provisions to these implementation regulations of 21 July 2015

Students who commence their studies at the TU Clausthal in the winter semester 2015/2016 will be examined in accordance with these implementation regulations.

Students who are already enrolled in the second or higher semester of this course of study when these implementation regulations take effect, may complete the Master's programme by the end of the winter semester 2017/18 in accordance with the implementation regulations of the Master's Programme for Petroleum Engineering as of 16 January 2007 in the version of the 2nd Amendment of 21 July 2015. Students may change to these implementation regulations. However, the application must be submitted to the Examination Office at the latest before the application for admission to the thesis.

Any hardships arising from a change may be compensated by the Head of the Examination Board on a case-by-case basis.

Transitional provisions to the 1st Amendment of 17.01.2017

(1) Students, who commence their studies at the TU Clausthal this summer semester 2017 will be examined in accordance with this version of the implementation regulations.

(2) Students who have been enrolled in this programme at the TU Clausthal before the Summer Semester 2017 will be transferred into this version of the implementation regulations. The following provisional regulations apply to them:

- Students who have already successfully passed the previous valid modules will keep the credits for these modules.
- Students who have already passed the Module 3 „Advance Production and Well Planing“ and/or „Module 7 „Advanced Drilling and Completion“ within the scope of their free attempt will be given the opportunity to better their grades according to § 20 para. 1 APO after consulting the Faculty of Energy and Economics. Students can only register for the module examination within the scope of their free attempt to improve grades by submitting the Application For Admission to Examinations at the Examination Office.
- Failed examination attempts for the replaced module examinations in Module 3 and/or Module 7 will not be included in the new sub-module examination according to this version of the implementation regulations.

(3) Any hardships arising from a change to the present implementation regulations may be compensated by the Head of the Examination Board on a case-by-case basis.

Transitional provisions for the 2nd amendment from 13 June 2017

(1) Students who commence their studies at the TU Clausthal in the winter semester 2017/2018 will be examined in accordance with this version of the implementation regulations.

(2) Students already enrolled at TU Clausthal before the winter semester 2017/2018 will be transferred into this version of the implementation regulations.

(3) Any hardships resulting from a change may be compensated on application for a case-by-case based decision by the Examination Committee.

Transitional regulations of the 3rd amendment issued on June 25, 2019

(1) Students who are enrolled in this study programme when these amendments come into force will be transferred to this version of the Implementation Regulations. The following transitional regulations apply to them:

- Students who have already successfully completed the modules or module examinations previously in force will continue to receive credits for these modules or module examinations.

- Students who have already passed the previous module examinations as part of the free trial will be given a one-off opportunity to improve their grades in the winter semester 2019/2020 in accordance with § 20 Para. 1 APO. Applications for the module examination as part of the free attempt to improve grades can only be submitted to the Examination Office using the form (Application for Admission to Exams).

- Any failed attempts of the replaced module examination "Production" will not be credited to the new module partial examinations "Advanced Hydrocarbon Conditioning and Processing I" and "Enhanced Production" according to this version of the Implementation Regulations.

(2) Any hardships resulting from these changes may be compensated by the examination board on application by way of individual case decisions.

Annex 1: Modules of the Master's programme in Petroleum Engineering

The weighting factors of each module for the calculation of the final grade is given in the tables below. In each case, the module's credit points are divided by the amount (Σ) of all the modules selected within the concentration of the Master's Programme, depending on the concentration and elective courses.

Common compulsory modules of all concentrations							
All modules listed below must be passed with a total of 71 credit points.							
Course	Course No	Course type, SWS	CP	Type	Weight	Graded	Exam typ
Module 1 Communication Skills		4	5		5/ ΣCP		
Interpersonal Skills	S 6111	2V	3	K od. M	0,600	ben.	MTP
Technical Writing	W 9009	2Ü	2	ThA	0,400	ben.	MTP
Module 2 Advanced Reservoir Mechanics		6	10		10/ ΣCP		
Thermodynamics and Phase Behavior of Hydrocarbons	W 6104	2V+1Ü	5	K od. M	0,500	ben.	MTP
Rock Mechanics II	W 6234	2V+1Ü	5	K od. M	0,500	ben.	MTP
Module 3 Advanced Production and Well Planning		6	10		10/ ΣCP		
Advanced Production	W 6131	2V+1Ü	5	K od. M	0,500	ben.	MTP ¹⁾
Well Planning	W 6105	2V+1Ü	5	K od. M	0,500	ben.	MTP
Module 11 Project Management		4	6		6/ ΣCP		
Integrated Project Management and Development	W 6117	4V	6	K od. M	1	ben.	MP
Module 13 Group Project		6	12		12/ ΣCP		
Group Project	W 6171	6P	12	PA	1	ben.	MP
Module 14 M.Sc. Thesis + Presentation			28		28/ ΣCP		
M.Sc. Thesis + Presentation		5 Month	28	Ab	1,000	ben.	MP

¹⁾ 1st Amendment of the implementation regulations of 17 January 2017

Field of study:

Concentration "Reservoir Management"

- Students need to choose one concentration.
- The concentration selection is binding with the first test attempt in one of the modules of the curriculum. Changing the concentration is only possible if no test attempts have been made in said module. Changing the concentration is possible only once and must be submitted in writing to the Examination Office in good time before placing the newly selected module of the other concentration.

Compulsory modules "Reservoir Management"

All modules listed below must be passed with a total of 34 credit points.

Bezeichnung des Moduls bzw. der Lehrveranstaltung	Course No	Course type, SWS	CP	Exam type	Weight	Graded ?	Exam typ
Module 4 Data Acquisition and Evaluation		6	10		10/ Σ CP		
Applied Well Test Analysis	S 6109	2V+1Ü	5	K od. M	0,500	ben.	MTP
Well Logging II	S 4023	2V+1Ü	5	K od. M	0,500	ben.	MTP
Module 5 Reservoir Modeling and Simulation		6	10		10/ Σ CP		
Geological Modeling	W 4820	2V+1Ü	5	K od. M	0,500	ben.	MTP
Numerical Reservoir Simulation	S 6102	2V+1Ü	5	K od. M	0,500	ben.	MTP
Module 6 Enhanced Hydrocarbon Recovery		3	5		5/ Σ CP		
Enhanced Oil Recovery	W 6103	2V+1Ü	5	K od. M	1	ben.	MP
Module 10a Economics and Law		3	5		5/ Σ CP		
Planning and Budgeting	W 6114	2V	3	K od. M	0,600	ben.	MTP
Energy Law I	S 6168	1Ü	2	K od. M	0,400	ben.	MTP
Module 12 Seminar		2	4		4/ Σ CP		
Advanced Reservoir Topics	S 6101	2S	4	SL	1	ben.	MP

Elective module selection "Advanced Rock Characterization"

- Students must select modules worth 5 credit points from the compulsory elective module catalogue 15 "Advanced Rock Characterization" and pass them all. Further examinations can only be carried out as additional examinations.
- The module selection is binding with the first test attempt in a compulsory elective module. Changing the compulsory elective module is only possible if no test attempts have been made in a compulsory elective module.

Elective module selection "Advanced Reservoir Engineering"

- Students must select modules worth 4 credit points from the compulsory elective module catalogue 16 "Advanced Reservoir Engineering" and pass them all. Further examinations can only be carried out as additional examinations.
- The module selection is binding with the first test attempt in a compulsory elective module. Changing the compulsory elective module is only possible if no test attempts have been made in a compulsory elective module.

Elective module selection "Enhanced Production Engineering"

- Students must select modules worth 4 credit points from the compulsory elective module catalogue 17 "Enhanced Production Engineering" and pass them all. Further examinations can only be carried out as additional examinations.
- The module selection is binding with the first test attempt in a compulsory elective module. Changing the compulsory elective module is only possible if no test attempts have been made in a compulsory elective module.

Elective module selection "Management and Law"

- Students must select modules worth 2 CP plus max. 1 CP CP from the compulsory elective module catalogue 18 "Management and Law" and pass them all. Further examinations can only be carried out as additional examinations.
- The module selection is binding with the first test attempt in a compulsory elective module. Changing the compulsory elective module is only possible if no test attempts have been made in a compulsory elective module.

Concentration "Drilling/Production"

- Students need to choose one concentration.
- The concentration selection is binding with the first test attempt in one of the modules of the curriculum. Changing the concentration is only possible if no test attempts have been made in said module. Changing the concentration is possible only once and must be submitted in writing to the Examination Office in good time before placing the newly selected module of the other concentration.

Compulsory modules "Drilling/Production"

All modules listed below must be passed with a total of 37 credit points

Course	Course No	Course type, SWS	CP	Exam type	Weight	Graded?	Exam typ
Module 7 Advanced Drilling and Completion		6	10		10/ ΣCP		
Advanced Drilling Technology	W 6122	2V+Ü	5	K od. M	0,500	ben.	MTP ²⁾
Completion and Workover	S 6121	2V+Ü	5	K od. M	0,500	ben.	MTP
Module 8 Directional Drilling and Logging		5	9		9/ ΣCP		
Directional Drilling	S 6125	2V	4	K od. M	0,444	ben.	MTP
Well Logging II	S 4023	2V+1Ü	5	K od. M	0,556	ben.	MTP
Module 9 Production		4	7		7/ ΣCP		3)
Advanced Hydrocarbon Conditioning and Processing I	S 6110	2V	3	K od. M	0,4286	ben.	MTP
Enhanced Production	S 6169	2V	4	K od. M	0,5714	ben.	MTP
Module 10b Management, Economics and Law		3	7		7/ ΣCP		
Energy Law I	S 6168	1V	2	K od. M	0,286	ben.	MTP
Planning and Budgeting	W 6114	2V	3	K od. M	0,428	ben.	MTP
Health, Safety and Environmental Management	W 6135	1V	2	K od. M	0,286	ben.	MTP
Module 12 Seminar		2	4		4/ ΣCP		
Advanced Drilling and Production Topics	S 6120	2S	4	SL	1	ben.	MP

Elective module selection "Drilling/Production"

- Students must select modules worth 12 CP plus max. 3 CP from the compulsory elective module catalogue "Drilling / Production" and pass all of them. Further examinations can only be carried out as additional examinations.
- The module selection is binding with the first test attempt in a compulsory elective module. Changing the compulsory elective module is only possible if no test attempts have been made in a compulsory elective module.

²⁾ 1st Amendment of the implementation regulations of 17 January 2017

³⁾ 3rd Amendment of the implementation regulations of June 25, 2019

Concentration "Deep Geothermal Systems" ♦)

- Students need to choose one concentration.
- The concentration selection is binding with the first test attempt in one of the modules of the curriculum. Changing the concentration is only possible if no test attempts have been made in said module. Changing the concentration is possible only once and must be submitted in writing to the Examination Office in good time before placing the newly selected module of the other concentration.

Compulsory modules "Deep Geothermal Systems"

All modules listed below must be passed with a total of 37 credit points

Course	Course No	Course type, SWS	CP	Exam type	Weight	Graded?	Exam typ
Modul 4 Data Acquisition and Evaluation		6	10		10/ΣCP		
Applied Well Test Analysis	S 6109	2V+1Ü	5	K od. M	0,500	ben.	MTP
Well Logging II	S 4023	2V+1Ü	5	K od. M	0,500	ben.	MTP
Modul 7 Advanced Drilling and Completion		6	10		10/ΣCP		
Advanced Drilling Technology	W 6122	2V+1Ü	5	K od. M	0,500	ben.	MTP
Completion and Workover	S 6121	2V+1Ü	5	K od. M	0,500	ben.	MTP
Modul 10a Economics and Law		3	5		5/ΣCP		
Planning and Budgeting	W 6114	2V	3	K od. M	0,600	ben.	MTP
Energy Law I	S 6168	1V	2	K od. M	0,400	ben.	MTP
Modul 12 Seminar		2	4		4/ΣCP		
Advanced Geothermal Engineering Topics	S 6119	2S	4	SL	1	ben.	MP
Modul 14 Geothermal Systems		4	8		8/ΣCP		
Enhanced Geothermal Systems	S 6149	2V	4	K od. M	0,500	ben.	MTP
Geothermal Energy Production Systems	W 6150	2V	4	K od. M	0,500	ben.	MTP

Elective modul selections "Deep Geothermal Systems"

- Students must select modules worth 12 CP plus max. 3 CP from the compulsory elective module catalogue "Deep Geothermal Systems" and pass all of them. Further examinations can only be carried out as additional examinations.
The module selection is binding with the first test attempt in a compulsory elective module. Changing the compulsory elective module is only possible if no test attempts have been made in a compulsory elective module.

♦)) 2nd Amendment of the implementation regulations of 13 June 2017

Compulsory elective module catalogue:

Elective module selection 15 "Advanced Rock Characterization"

• The compulsory elective module catalogue corresponds to the status of 09 July 2015. The Faculty Council updates the list of offered modules (from WS 16/17) for the following academic year once a year. The Study Centre will publicly announce the updated lists:

<http://www.studium.tu-clausthal.de/studienangebot/energie-und-rohstoffe/petroleum-engineering-master/>

Course	Course No	Course type, SWS	CP	Exam type	Weight	Graded ?	Exam typ
Module 15.1 Petrophysics		3	5		5/ Σ CP		
Petrophysics I	W 4021	2V+1Ü	5	K od. M	1	ben.	MP
Module 15.2 Geostatistics		3	5		5/ Σ CP		
Advanced Geostatistics	W 4635	2V+1Ü	5	K od. M	1	ben.	MP
Module 15.3 Rock Physics		3	5		5/ Σ CP		
Advanced Rock Physics	W 6118	2V+1Ü	5	K od. M	1	ben.	MP

Elective module selection 16 "Advanced Reservoir Engineering"

• The compulsory elective module catalogue corresponds to the status of 09 July 2015. The Faculty Council updates the list of offered modules (from WS 16/17) for the following academic year once a year. The Study Centre will publicly announce the updated lists:

<http://www.studium.tu-clausthal.de/studienangebot/energie-und-rohstoffe/petroleum-engineering-master/>

Course	Course No	Course type, SWS	CP	Exam type	Weight	Graded ?	Exam typ
Module 16.1 Data Interpretation		3	4		4/ Σ CP		
Applied Seismic Data Interpretation	S 4008	2V+1Ü	4	K od. M	1	ben.	MP
Module 16.2 Model Validation		2	4		4/ Σ CP		
Reservoir Model Validation	S 6103	2V	4	K od. M	1	ben.	MP
Module 16.3 Reservoir Modelling		2	4		4/ Σ CP		
Fractured Reservoir Modelling	S 4620	2V	4	K od. M	1	ben.	MP

Elective module selection 17 "Enhanced Production Engineering"

• The compulsory elective module catalogue corresponds to the status of 09 July 2015. The Faculty Council updates the list of offered modules (from WS 16/17) for the following academic year once a year. The Study Centre will publicly announce the updated lists:

<http://www.studium.tu-clausthal.de/studienangebot/energie-und-rohstoffe/petroleum-engineering-master/>

Course	Course No	Course type, SWS	CP	Exam type	Weight	Graded ?	Exam typ
Module 17.1 Natural Gas Recovery		2	4		4/ Σ CP		
Enhanced Natural Gas Recovery	S 6104	2V	4	K od. M	1	ben.	MP

Module 17.2 Natural Gas Storage		2	4		4/ ΣCP		
Natural Gas Storage	S 6113	2V	4	K od. M	1	ben.	MP
Module 17.3 Enhanced Production		3	4		4/ ΣCP		
Enhanced Production	S 6169	3V	4	K od. M	1	ben.	MP

Elective module selection 18 "Management and Law"

• The compulsory elective module catalogue corresponds to the status of 09 July 2015. The Faculty Council updates the list of offered modules (from WS 16/17) for the following academic year once a year. The Study Centre will publicly announce the updated lists:

<http://www.studium.tu-clausthal.de/studienangebot/energie-und-rohstoffe/petroleum-engineering-master/>

Course	Course No	Course type, SWS	CP	Exam type	Weight	Graded ?	Exam typ
Module 18.1 Energy Law		2	3		3/ ΣCP		
Energy Law II	W 6115	2V	3	K od. M	1	ben.	MP
Module 18.2 Health, Safety and Environmental Management		1	2		2/ ΣCP		
Health, Safety and Environmental Management	W 6135	1V	2	K od. M	1	ben.	MP

Elective module selection "Drilling/Production"

• The compulsory elective module catalogue corresponds to the status of 09 July 2015. The Faculty Council updates the list of offered modules (from WS 16/17) for the following academic year once a year. The Study Centre will publicly announce the updated lists:

<http://www.studium.tu-clausthal.de/studienangebot/energie-und-rohstoffe/petroleum-engineering-master/>

Course	Course No	Course type, SWS	CP	Exam type	Weight	Graded ?	Exam typ
Modul 19.1 Energy Law		2	3		3/ Σ CP		
Energy Law II	W6115	2V	3	K od. M	1	ben.	MP
Modul 19.2 Materials Engineering		2	3		3/ ΣCP		
Materials Engineering and Corrosion	S 6117	2V	3	K od. M	1	ben.	MP
Modul 19.3 Fluid Mechanics		2	3		3/ ΣCP		
Fluid Mechanics	W 8040	2V	3	K od. M	1	ben.	MP
Modul 19.4 Offshore Production and Structures		2	3		3/ ΣCP		
Offshore Production and Structures	W 6124	2V	3	K od. M	1	ben.	MP
Modul 19.5 Numerical Reservoir Simulation		3	5		5/ ΣCP		
Numerical Reservoir Simulation	S 6102	2V+1Ü	5	K od. M	1	ben.	MP

Modul 19.6 Natural Gas Storage		2	4		4/ΣCP		
Natural Gas Storage	S 6113	2V	4	K od. M	1	ben.	MP
Modul 19.7 Geological Modeling		3	5		5/ΣCP		
Geological Modeling	W 4820	2V+1Ü	5	K od. M	1	ben.	MP
Modul 19.8 Applied Well Test Analysis		3	5		5/ΣCP		
Applied Well Test Analysis	W 6101	2V+1Ü	5	K od. M	1	ben.	MP
Modul 19.9 Enhanced Oil Recovery		3	5		5/ΣCP		
Enhanced Oil Recovery	W 6103	2V+1Ü	5	K od. M	1	ben.	MP

Elective modul selection 20 "Deep Geothermal Systems" ♦)

• The compulsory elective module catalogue corresponds to the status of 13 June 2017. The Faculty Council updates the list of offered modules (from WS 18/19) for the following academic year once a year. The Study Centre will publicly announce the updated lists:

<http://www.studium.tu-clausthal.de/studienangebot/energie-und-rohstoffe/petroleum-engineering-master/>

Course	Course No	Course type, SWS	CP	Exam type	Weight	Graded ?	Exam typ
Modul 20.1 Energy Law		2	3		3/ΣCP		
Energy Law II	W 6115	2V	3	K od. M	1	ben.	MP
Modul 20.2 Fluid Mechanics		2	3		3/ΣCP		
Fluid Mechanics	W 8040	2V	3	K od. M	1	ben.	MP
Modul 20.3 Numerical Reservoir Simulation		3	5		5/ΣCP		
Numerical Reservoir Simulation	S 6102	2V+1Ü	5	K od. M	1	ben.	MP
Modul 20.4 Geological Modeling		3	5		5/ΣCP		
Geological Modeling	W 4820	2V+1Ü	5	K od. M	1	ben.	MP
Modul 20.5 Hydrogeology for Geothermal Energy Production		2	3		3/ΣCP		
Hydrogeology for Geothermal Energy Production	S 6145	1V+1Ü	3	K od. M	1	ben.	MP
Modul 20.6 Geothermal Geology		2	4		4/ΣCP		
Geothermal Geology	W 4660	1V+1Ü	4	K od. M	1	ben.	MP
Modul 20.7 Fossil & Renewable Energy		3	5		5/ΣCP		
Fossil & Renewable Energy	W 8831	2V+1Ü	5	K od. M	1	ben.	MP
Modul 20.8		1	2		2/ΣCP		

♦) 2nd Amendment of the implementation regulations of 13 June 2017

Health, Safety and Environmental Management							
Health, Safety and Environmental Management	W 6135	1V	2	K od. M	1	ben.	MP
Modul 20.9 Geoinformation Systems		3	5		5/ΣCP		
Geoinformation Systems	W 6340	2V+1Ü	5	K od. M	1	ben.	MP

Explanation:

(1) Type of course:	E	Excursion [Exkursion]
	P	Practical training [Praktikum]
	S	Seminar [Seminar]
	T	Tutorium [Tutorium]
	V	Lecture [Vorlesung]
	Ü	Excercise [Übung]
(2) Form of examination:	K	Written examination [Klausur]
	M	Oral examination [Mündliche Prüfung]
	SL	Seminar performance [Seminarleistung]
	PrA	Practical work [Praktische Arbeit]
	ThA	Theoretical work [Theoretische Arbeit]
	SA	Student research project [Studienarbeit]
	PA	Project work [Projekt Arbeit]
	IP	Internship [Industriepraktikum]
	HA	Homework [Hausarbeit]
	Ex	Excursions [Exkursion]
	Ab	Final Thesis [Abschlussarbeit]
(3) Type of examination:	LN	Certificate of performance [Leistungsnachweis]
	MP	Module-related examination [ModuCPrüfung]
	MTP	Partial module-related examination
[ModulteiCPrüfung]	PV	Preparatory assessment [Prüfungsvorleistung]
(4) Other abbreviations	ben.	Evaluated performance [benotete Leistung]
	unben.	Performance without evaluation [unbenotete Leistung]
	od.	or [oder]
	LV	Course [Lehrveranstaltung]
	Prüf.	Examination [Prüfung]
	CP	Credits [Leistungspunkte]
	SWS	Number of hours per week [Semesterwochenstunden]

Annex 2a: Model Study Programme Study Field: Petroleum Engineering
Concentration: Reservoir Management

SWS	1. Semester (WS)	2. Semester (SS)	3. Semester (WS)	4. Semester (SS)
1	Technical Writing 2 CP	Interpersonal Skills 3 CP	Enhanced Oil Recovery 5 CP	Master Thesis + Presentation 28 CP
2				
3	Geological Modeling 5 CP	Energy Law I 2 CP		
4		Applied Well Test Analysis 5 CP	Planning & Budgeting 3 CP	
5			Elective modul 18 2 CP	
6	Thermodynamics & Phase Behavior of Hy- drocarbons 5 CP	Well Logging II 5 CP	Integrated Project Management 6 CP	
7				
8				
9	Rock Mechanics II 5 CP	Numerical Reservoir Si- mulation 5 CP	Group Project 12 CP	
10				
11				
12	Advanced Production 5 CP	Advanced Reservoir To- pics 4 CP		
13				
14				
15	Well Planning 5 CP	Elective modul 16 4 CP		
16		Elective modul 17 4 CP		
17				
18	Elective modul 15 5 CP			
19				
20				
21				
∑ SWS	20	18	16	
∑ CP	32	32	28	28 CP

Annex 2b: Model Study Programme Study Field: Petroleum Engineering
Concentration: Drilling/Production

SWS	1. Semester (WS)	2. Semester (SS)	3. Semester (WS)	4. Semester (SS)
1	Technical Writing 2 CP	Interpersonal Skills 3 CP	Planning & Budgeting 3 CP	Master Thesis + Presentation 28 CP
2				
3	Thermodynamics & Phase Behaviour of Hy- drocarbons 5 CP	Energy Law I 2 CP	Health, Safety, Envir. Mgt 2 CP	
4		Well Logging II 5 CP	Integrated Project Ma- nagement 6 CP	
5				
6	Rock Mechanics II 5 CP	Adv. Drilling & Prod. Topics 4 CP	Group Project 12 CP	
7				
8				
9	Advanced Production 5 CP	Directional Drilling 4 CP		
10				
11				
12	Advanced Drilling Technology 5 CP	Enhanced Production 4 CP		
13				
14				
15	Well Planning 5 CP	Completion & Workover 5 CP	Elective modul 3 CP	
16				
17				
18	Elective modul 5 CP	Advanced HC Condition- ing & Processing I 3 CP		
19		Elective modul 4 CP		
20				
21				
S SWS	20	21	15	
S CP	32	34	26	28

Annex 2c: Model Study Programme Study Field: Petroleum Engineering
Concentration: Deep Geothermal Systems

SWS	1. Semester (WS)	2. Semester (SS)	3. Semester (WS)	4. Semester (SS)
1	Technical Writing 2 CP	Interpersonal Skills 3 CP	Planning & Budgeting 3 CP	Master Thesis + Presentation 28 CP
2				
3	Thermodynamics & Phase Behavior of Hy- drocarbons 5 CP	Energy Law I 2 CP	Geothermal Energy Pro- duction Systems 4 CP	
4		Well Logging II 5 CP	Integrated Project Ma- nagement 6 CP	
5				
6	Rock Mechanics II 5 CP	Adv. Geothermal Engineering Topics 4 CP	Group Project 12 CP	
7				
8				
9	Advanced Production 5 CP	Applied Well Test Anal- ysis 5 CP		
10				
11				
12	Advanced Drilling Tech- nology 5 CP	Completion & Worko- ver 5 CP		
13				
14				
15	Well Planning 5 CP	Enhanced Geothermal Systems 4 CP	Elective modul 3 CP	
16		Elective modul 4 CP		
17				
18	Elective modul 5 CP			
19				
20				
21				
∑ SWS	20	19	16	
∑ CP	32	32	28	28