

# **IMPLEMENTATION REGULATIONS**

**2015-2016**

**BACHELOR'S DEGREE PROGRAMME  
APPLIED EARTH SCIENCES**

**DELFT UNIVERSITY OF TECHNOLOGY**

## Section 1 Study programme

### Article 1 - Composition of study programme

The study load for the Bachelor's degree programme is 180 credits and comprises the following:

- 60 credits in the first year, the propedeutic phase, as described in Article 2,
- 90 credits in the second and third years, which together with the first year combine to make the major, as described in Article 3,
- 30 credits in the third year, the minor, as described in Article 4.

### Article 2 – Composition of the propedeutic (first-year) phase

#### First year

<u>Code</u>	<u>Subject</u>	<u>EC</u>
AESB1110-15	Mathematics 1	5
AESB1120-15	Introduction to Chemistry & Thermodynamics	5
AESB1130	Geology 1: Basics	5
AESB1210-15	Mathematics 2	5
AESB1230	Geology 2: North West Europe	5
AESB1240-14	Introduction to Minerals, Mining & Geo-engineering	5
AESB1310-15	Mathematics 3	5
AESB1320-15	Mechanics 1	5
AESB1340	Introduction to Petroleum Engineering & Reservoir Geology	5
AESB1420-15	Mechanics 2, Electricity & Magnetism	5
AESB1430-14	Geology 3: Geological Systems and Excursion	5
AESB1440	Introduction to Geophysics & Remote Sensing	5

### Article 3 - Composition of major, second and third years

#### Second year

<u>Code</u>	<u>Subject</u>	<u>EC</u>
AESB2110	Mathematics 4	5
AESB2120	Instrumentation and Signals with Matlab	5
AESB2140	Geophysical Methods for Subsurface Characterization	5
AESB2210	Mathematics 5	5
AESB2220	Chemical Thermodynamics	5
AESB2230	Sedimentology and Reservoir Geology	5
AESB2320	Physical Transport Phenomena	5
AESB2330	Soil Mechanics	5
AESB2340	Extraction of Resources	5
AESB2430	Geological Fieldwork Data Acquisition	5
AESB2431	Geological Fieldwork Data Integration	5
AESB2440	Geostatistics and Remote Sensing	5

#### Third year

<u>Code</u>	<u>Subject</u>	<u>EC</u>
n/a	Minor	30
AESB3340	Mechanics and Transport by flow in Porous Media	5
AESB3341	Petrophysics and Image Analysis	5
AESB3342	Extractive Metallurgy and Physical Processing	5
AESB3400	Bachelor Thesis	10
AESB3440	Field Exploration Project	5

### Article 4 - Minor

1. For the minor, students can choose as indicated below:

#### TU Delft, Leiden University, Erasmus University Rotterdam

One of the minors offered at TU Delft, University of Leiden or Erasmus University Rotterdam that does not include any overlap with the content of the subjects included in the major of the degree programme. Only the minors offered by the said universities that are intended for students taking the Bachelor's degree programme in Applied Earth Sciences, are allowed.

In case the chosen minor does not comprise 30 credits, the student should take additional related subjects to complete the minor, or – if the chosen minor comprised 15 credits – should take a second minor of 15 credits. In case the entire minor of 30 credits is not made up of authorised minors from the said universities, the student has to follow the procedure for free minors, mentioned below.

Students are required to register for the minor according to the procedure described in the concerned study guide for minors.

#### Free minor

A cohesive group of subjects of sufficient academic quality comprising 30 credits in total that do not include any overlap with the content of the subjects included in the major of the degree programme. A free minor may not include subjects from a Master's degree programme at TU Delft.

In order to qualify for a free minor, the student must apply in advance for approval from the Board of Examiners by submitting a motivated request.

2. The minor is timetabled in the first semester of the third year.

### **Article 5 – Bachelor's Final Project**

1. The Bachelor's phase is completed with an individual Bachelor's Final Project demonstrating that the student is proficient in and can apply the knowledge and skills acquired in the degree programme. The Bachelor's Final Project is made up of an integrated project comprising 10 credits.
2. Articles 26, 27 and 28 of the Rules and Guidelines for the Board of Examiners BSc include further stipulations concerning the Bachelor's Final Project.

## **Section 2 - Admission requirements**

### **Article 6 - Admission requirements**

1. It is not permitted to take AESB1430-14, Geology 3: Geological Systems and Excursion, until the student has earned 30 points from the 6 tests of AESB1130 and AESB1230, Geology 1 and 2.
2. It is not permitted to take AESB2230, Sedimentology and Reservoir Geology, until the student has completed AESB1130 and AESB1230, Geology 1 and 2.
3. It is not permitted to take AESB2430, Geological Fieldwork Data Acquisition, until the student has completed AESB2230, Sedimentology and Reservoir Geology.
4. It is not permitted to take AESB2431, Geological Fieldwork Data Integration, until the student has completed AESB2430, Geological Fieldwork Data Acquisition, and is following or has completed AESB2440, Geostatistics and Remote Sensing.
5. It is not permitted to take AESB3440, Field Exploration Project, until the student has completed:  
AESB1130, Geology 1  
AESB1240, Introduction to Minerals, Mining & Geo-Engineering  
AESB1440, Introduction to Geophysics and Remote Sensing  
AESB2140, Geophysical methods for subsurface characterization  
AESB2220, Chemical thermodynamics  
AESB2440, Geostatics and Remote Sensing  
AESB2340, Extraction of Resources  
and has followed:  
AESB3340, Mechanics and Transport by Flows in Porous Media  
AESB3341, Petrophysics and Image Analysis  
AESB3342, Extractive Metallurgy and physical Processing.
6. It is not permitted to start the Bachelor's Final Project until the student has obtained the first-year degree audit or completed the propedeutic (first-year) phase and has successfully taken subjects with a total study load of 80 credits from the second and third years.
7. Students are permitted to start the Bachelor's Final Project pending the results of examinations in the previous quartile. If it emerges after the marking period of 20 working days that the student does not meet the admission requirement, he or she will be removed from the Bachelor's Final Project with immediate effect.

## **Section 3 – Education, practicals and examinations**

### **Article 7 – Type of education**

The education is provided in the form of lectures and/or practicals as described in the study guide.

### **Article 8 – Practical and examinations**

1. Practical must have been completed before the student is permitted to sit the examination unless otherwise stated in the study guide for the subject concerned.
2. Examinations are sat in the way described in the study guide for the subject concerned.

### **Article 9 - Frequency, times and sequence of examinations**

1. An opportunity to sit examinations in the degree programme will be offered twice a year:
  - the first time during or as soon as possible after the quartile in which the subject is offered,
  - the second time in the subsequent period as laid down in the examination timetable.
2. An opportunity to take skill tests in practicals and projects will be offered once a year, with the exception of the Bachelor's Final Project.
3. The examinations will be sat as indicated in the examination timetable in the study guide.

## **Section 4 - Honours Programme**

### **Article 10 – AES Bachelor Honours Programme**

1. Well-motivated students who have completed the first year in a single year and achieved an average mark of at least 7.5 will be invited to apply to participate in the AES (Applied Earth Sciences) Bachelor Honours Programme for outstanding Bachelor students, described in Article 11 of the BSc Teaching and Examination Regulations (TER).
2. The AES Bachelor Honours Programme comprises 60 credits:
  - a. of these, 40 credits are part of the study programme in the form of a minor and a Bachelor's Final Project that meet the special requirements for outstanding students.
  - b. 20 credits will be completed as additional subjects alongside the study programme in the manner described in paragraph 3.
3. The 20 credits in the AES Bachelor Honours Programme to be taken as additional subjects alongside the study programme will be as follows:
  - a. CEG research subject, CT3431-12: 4 credits
  - b. Student's own project subject, CT3432: 6 credits
  - c. Third-year subject, CT3430: 5 credits
  - d. Subjects from the institution-wide part of the Bachelor Honours Programme: at least 5 credits.
4. Students who are invited to participate in the AES Bachelor Honours Programme write a letter to the honours coordinator in which they clearly state the reasons why they wish to participate in the programme.
5. If the student is admitted to the AES Bachelor Honours Programme by the honours committee, the student will put together a cohesive programme of an outstanding academic level that must be approved by a member of academic staff involved and the honours coordinator.
6. The honours committee for the AES Bachelor Honours Programme is made up of an honours coordinator and three professors. The members of the honours committee are appointed by the Director of Studies.
7. The various parts of the programme will be assessed by the relevant examiner. In addition, the honours coordinator will always be involved in the assessment of the minor and the Bachelor's Final Project.

8. The Board of Examiners will be responsible for assessing whether all the requirements of the AES Bachelor Honours Programme have been met.
9. A pass must have been obtained for all parts of the AES Bachelor Honours Programme. Students who have successfully completed the AES Bachelor Honours Programme will receive proof of this from the University in the form of a certificate issued together with the Bachelor certificate.

## **Section 5 – Deviations from the study programme**

### **Article 11 – Free study programme**

1. Students may compile their own study programme for which there is a degree audit. This study programme must be approved by the Board of Examiners in advance. The programme must only or mainly comprise subjects provided for the degree programme, but can be supplemented by subjects provided by or for another degree programme.
2. The student must apply for the prior approval referred to in paragraph 1 by submitting a motivated request to the Board of Examiners.

### **Article 12 - Deviations from the study programme**

The Board of Examiners can permit deviations from the study programme.



## Section 6 – Transitional measure(s)

### Article 13 – Transitional measure 2014-2015

#### *Introduction*

The Executive Board has made a decision intended to improve study success for TU Delft. To this end, the TU Delft Bachelor degree programmes must renew their curricula, and this includes the BSc programme in Applied Earth Sciences.

Pursuant to the decision by the Dean, the new programme is being introduced over the course of several years: the first year in 2013-2014 and the second and third year in 2014-2015. The transitional measure for the new curriculum will also be introduced over the course of several years.

#### *The new curriculum*

The new curriculum for the BSc degree programme in Applied Earth Sciences features some key differences compared to the old curriculum:

- There are no longer any small subjects since all subjects have been merged to form subjects of 5 or 10 credits;
- The content of the subjects has been changed. In other words: the content of old subjects has been integrated within a single subject or spread across several; new subjects and new content have been added; soft skills have been integrated explicitly within subjects;
- Some learning paths have been reduced in size whilst others have been extended.

#### *Transitional measure: basic principles*

1. The new curriculum is being introduced over the course of several years: the first year will be introduced from the academic year 2013-2014 and the second and third years from the academic year 2014-2015.
2. There will be two further opportunities to resit parts of the old curriculum: for the old first year in the academic year 2013-2014 and for the old second and third years in the academic year 2014-2015.
3. After this 'last chance', parts of the old programme will be substituted by the new one.
4. One or more of the following basic principles will apply in determining which subject from the new curriculum should be obtained instead of a subject from the old curriculum:
  - In each learning path, a check will be made for each subject to determine which subjects from the old curriculum have been incorporated in it. For this group of subjects, it will be determined which subjects must have been obtained as a minimum. The student must have obtained a minimum number of ECTS from this group of subjects.
  - In each learning path, a check will be made for each subject to determine which equivalent in the new curriculum is the best match.
  - In each learning path, a check will be made for each subject to determine which equivalent outside the new curriculum is the best match.
5. The transitional measure has been designed in such a way as to ensure that students in the current curriculum experience the minimum possible disruption as a result of the changes in the curriculum.

### **AES BSc transitional measure**

#### *General recommendation*

It is recommended that students taking the existing curriculum obtain as many subjects from the old curriculum as possible and take advantage of the two opportunities for resits for each subject in the academic year 2013-2014 before the first BSc year is offered. Initially, students are advised to prioritise the subjects from the first BSc year since these will be the first to be replaced by the new curriculum.

**First year***Geology learning path*

## Subject Group 1

Subject code and name	Number of ECTS	Year and period of academic year 2012-2013	Subject in new BSc curriculum	Number of ECTS	Year and period of academic year 2013-2014
TA1910-09 part 1 Algemene Geologie [General Geology] part 1	2	Y1 – Q1			
TA1910-09 part 2 Algemene Geologie [General Geology] part 2	2	Y1 – Q3			
TA1900 * Mineralen & Gesteenten [Minerals & Rocks] part 1 and part 3 (pr), part 4 (pr)	2+1	Y1 – Q1 & 2			
TA1911 * Geologisch Kaartlezen [Geological Map-reading]	1	Y1 – Q1			
			AESB1130 Geology 1: Basics	5	Y1 – Q1

\* = **not compulsory**

## Guideline for subject group 1

1. From this subject group (total 8 ECTS), at least 5 ECTS must be obtained, of which TA1910-09 part 1 and TA1910-09 part 2 are compulsory.
2. If fewer than 5 ECTS have been obtained: the student takes the new subject *Geology 1: basics*
3. If more than 5 ECTS have been obtained, but TA1910-09 part 1 and/or TA1910-09 part 2 have not: the student takes the new subject *Geology 1: basics*

## Subject Group 2

Subject code and name	Number of ECTS	Year and period of academic year 2012-2013	Subject in new BSc curriculum	Number of ECTS	Year and period of academic year 2013-2014
TA1900 * Mineralen & Gesteenten [Minerals & Rocks] part 2 and part 5 (pr)	1+1	Y1 – Q2 & 3			
TA2930 Geologie van Nederland [Geology of the Netherlands]	2	Y2 – Q1			
TA2920 Structurele Geologie [Structural Geology]	2	Y2 – Q1			
TA2921 * Geologisch Constructies [Geological Constructions]	2	Y2 – Q3			
			AESB1230 Geology 2: North West Europe	5	Y1 – Q2



\* = not compulsory

Guideline for Subject Group 2

1. From this subject group (total 8 ECTS), at least 5 ECTS must be obtained, of which TA2930 and TA2920 are compulsory.
2. If fewer than 5 ECTS have been obtained: the student takes the new subject *Geology 2: North West Europe*
3. If more than 5 ECTS have been obtained, but TA2930 and TA2920 have not: the student takes the new subject *Geology 2: North West Europe*
4. The subjects TA2930, TA2920 and TA2921 are second-year subjects and will still be offered in the old-style in the academic year 2013-2014. These subjects will be discontinued in the academic year 2014-2015, and there will then be two further opportunities for resits in the old style.

Subject Group 3

Subject code and name	Number of ECTS	Year and period of academic year 2012-2013	Subject in new BSc curriculum	Number of ECTS	Year and period of academic year 2013-2014
TA1913 Geologisch Werkbezoek [Geology Working Visit]	2	Y1 – Q4			
			AESB1430 Geology 3: geological systems & excursion	5	Y1 – Q4

Guideline for Subject Group 3

1. If the student has not yet obtained the subject TA1913, the 'Excursion' component can be done in the new subject as an equivalent for 2 ECTS.

*Mathematics, Linear Algebra and Statistics Learning Path*

Subject code and name	Number of ECTS	Year and period of academic year 2012-2013	Subject in new BSc curriculum	Number of ECTS	Year and period of academic year 2013-2014
WI1300TA Analyse [Analysis] Part 1	3	Y1 – Q1	AESB1110 MATH 1	5	Y1 – Q1
WI1300TA Analyse [Analysis] Part 2	3	Y1 – Q2	AESB1110 MATH 1	5	Y1 – Q1
WI1300TA Analyse [Analysis] Part 3	3	Y1 – Q3	AESB1310 MATH 3	5	Y1 – Q3
WI1300TA Analyse [Analysis] Part 4	3	Y1 – Q4	AESB1310 MATH 3	5	Y1 – Q3
WI1273TA Lineaire Algebra [Linear Algebra] part 1	3	Y1 – Q2	AESB1210 MATH 2	5	Y1 – Q2
WI1273TA Lineaire Algebra [Linear Algebra] part 2	3	Y1 – Q3	AESB2110 MATH 4	5	Y2 – Q1 <b>Available from academic year 2014-2015</b>

Guideline for Analysis and Linear Algebra subjects

1. If the student has not yet obtained the component WI1300TA part 1 and/or 2, the component *MATH 1* can be taken as an equivalent
2. If the student has not yet obtained the component WI1300TA part 3 and/or 4, the component *MATH 3* can be taken as an equivalent
3. If the student has not yet obtained the component WI1273TA part 2, the component *MATH 4* can be taken as an equivalent

*Chemistry and Physics (Mechanics and Chemistry) learning path*

Subject code and name	Number of ECTS	Year and period of academic year 2012-2013	Subject in new BSc curriculum	Number of ECTS	Year and period of academic year 2013-2014
ST7042TA Inleiding chemie voor TA [Introduction to Chemistry for Applied Earth Sciences]	3	Y1 – Q1	AESB1120 Introduction to Chemistry	5	Y1 – Q1
TN4110TA Mechanica [Mechanics] part 1	4	Y1 – Q2	AESB1320 Mechanics 1	5	Y1 – Q3
TN4120TA Mechanica [Mechanics] part 2	4	Y1 – Q3	AESB1320 Mechanics 1	5	Y1 – Q4
MST1211TA1 Chemische Thermodynamica [Chemical Thermodynamics]	5	Y1 – Q4	AESB2220 Chemical Thermodynamics	5	Y2 – Q2 <b>Available from academic year 2014-2015</b>

Guideline for Chemistry, Chemical Thermodynamics and Mechanics subjects

1. If the student has not yet obtained the component ST7042TA, the component *Introduction to Chemistry* can be taken as an equivalent
2. If the student has not yet obtained the component TN4110TA, the component *Mechanics 1* can be taken as an equivalent
3. If the student has not yet obtained the component TN4120TA, the component *Mechanics 1* can be taken as an equivalent. If the student has also not yet obtained the component TN4010TA (second year), the component *Mechanics 2 & E&M* can be taken as an equivalent
4. If the student has not yet obtained the component MST1211TA1, the component *Chemical Thermodynamics* can be taken as an equivalent in the second year

*Introduction/Applications in Applied Earth Sciences learning path*

Subject code and name	Number of ECTS	Year and period of academic year 2012-2013	Subject in new BSc curriculum	Number of ECTS	Year and period of academic year 2013-2014
TA1009-1 Inleiding Technische Aardwetenschappen [Introduction to Applied Earth Sciences], Petroleum Engineering section	3	Y1 – Q1	AESB1340 Introduction to Petroleum Engineering & Reservoir Geology	5	Y1 – Q3

TA1009-2 Inleiding Technische Aardwetenschappen [Introduction to Applied Earth Sciences], Resource Engineering section	3	Y1 – Q2	AESB1240 Introduction to Minerals, Mining & Geo-engineering	5	Y1 – Q2
TA1009-3 Inleiding Technische Aardwetenschappen [Introduction to Applied Earth Sciences], Applied Geophysics section	3	Y1 – Q3	AESB1440 Introduction to Geophysics & Remote Sensing	5	Y1 – Q4
TA1009-4 Inleiding Technische Aardwetenschappen [Introduction to Applied Earth Sciences], Geo-Engineering section	3	Y1 – Q4	AESB1240 Introduction to Minerals, Mining & Geo-engineering	5	Y1 – Q2

Guideline for Introduction to Applied Earth Sciences subjects

1. If the student has not yet obtained the component TA1009-1 (Petroleum Engineering section), the component *Introduction to Petroleum Engineering & Reservoir Geology* can be taken as an equivalent
2. If the student has not yet obtained the component TA1009-2 (Resource Engineering section), the component *Introduction to Minerals, Mining & Geo-engineering 1* can be taken as an equivalent
3. If the student has not yet obtained the component TA1009-3 (Applied Geophysics section), the component *Introduction to Geophysics & Remote Sensing* can be taken as an equivalent
4. If the student has not yet obtained the component TA1009-4 (Geo-Engineering section), the component *Introduction to Minerals, Mining & Geo-engineering* can be taken as an equivalent

#### Skills learning path

Subject code and name	Number of ECTS	Year and period of academic year 2012-2013	Subject in new BSc curriculum	Number of ECTS	Year and period of academic year 2013-2014
WM0201TA Schriftelijk Rapporteren [Written Reporting]	1	Y1 – Q3	Integrated within Introduction to Minerals, Mining & Geo-engineering (AESB1240)	5	Y1 – Q2
WM0203TA Mondeling Presenteren [Oral Presentation]	1	Y1 – Q1	Integrated within Introduction to Minerals, Mining & Geo-engineering (AESB1240)	5	Y1 – Q2
WM0325TA Techniek & Verantwoordelijkheid [Technology & Responsibility]	3	Y2 – Q4	Integrated within Introduction to Geophysics & Remote Sensing (AESB1440)	5	Y1 – Q2

Guideline for Written Reporting, Oral Presentation, Technology & Responsibility subjects

1. If the student has not yet obtained the component WM0201TA, the student can take an equivalent subject at the ITAV (Institute for Languages and Academic Skills) in the TPM faculty.

2. If the student has not yet obtained the component WM0203TA, the student can take an equivalent subject at the ITAV (Institute for Languages and Academic Skills) in the TPM faculty.
3. If the student has not yet obtained the component WM0325TA, the student can take an equivalent subject at the ITAV (Institute for Languages and Academic Skills) in the TPM faculty. However please note: the subject WM0325TA (Techniek en Verantwoordelijkheid) is offered for the last time in the academic year 2013-2014. In the academic year 2014-2015, students have two further opportunities to retake the old-style subject WM0325TA (Techniek en Verantwoordelijkheid)

***Second and third year***  
*Geology learning path*

Subject Group 1

Subject code and name	Number of ECTS	Year and period of academic year 2013-2014	Subject in new BSc curriculum	Number of ECTS	Year and period of academic year 2014-2015
TA2610 Sedimentologie [Sedimentology]	2	Y2 – Q2			
TA2611 Sedimentology laboratory course	1	Y2 – Q2			
			AESB2230 Sedimentology & Reservoir Geology	5	Y2 – Q2

Guideline for Subject Group 1

1. If the student has not yet obtained TA2610 and TA2611, the student should take the subject *Sedimentology & Reservoir Geology*.
2. If the student has only not yet obtained TA2611, the *Sedimentology & Reservoir Geology* laboratory course only can be taken in 2014/2015.

Subject code and name	Number of ECTS	Year and period of academic year 2013-2014	Subject in new BSc curriculum	Number of ECTS	Year and period of academic year 2014-2015
TA3942 Geologisch Veldwerk Frankrijk [Geology Fieldwork in France]	6	Y2 – Q4	AESB2430 Geological Fieldwork; Data Acquisition + AESB2431 Geological Fieldwork; Spatial Data Integration	5+5	Y2 – Q4

Guideline for Geology Fieldwork

1. If a student has not yet obtained TA3942, the student must take both subjects *Geological Fieldwork; Data Acquisition* and *Geological Fieldwork; Spatial Data Integration* as an equivalent for 10 ECTS
2. If a student has completed the fieldwork for TA3942, but has not yet obtained a pass, the student must take *Geological Fieldwork; Spatial Data Integration* for 5 ECTS in addition.

*Mathematics, Linear Algebra and Statistics Learning Path*

Subject Group 1

Subject code and name	Number of ECTS	Year and period of academic year 2013-2014	Subject in new BSc curriculum	Number of ECTS	Year and period of academic year 2014-2015
WI1275TA Toegepaste Statistiek [Applied Statistics]	4	Y2- Q3			
TA2060 Data analyse en geostatistiek [Data Analysis and Geostatistics]	3	Y2 – Q4			
			AESB2440 Geostatistics & Remote Sensing	5	Y2 – Q4

Guideline for Subject Group 1

1. If the student has not yet obtained WI1275TA and/or TA2060, the student must take the subject *Geostatistics & Remote Sensing* as an equivalent.

Subject code and name	Number of ECTS	Year and period of academic year 2013-2014	Subject in new BSc curriculum	Number of ECTS	Year and period of academic year 2014-2015
WI2034TA Differentiaalvergelijkingen [Differential Equations]	3	Y2 – Q1	AESB2110 MATH 4	5	Y2 – Q1
WI3097TU Numerieke Wiskunde [Numerical Analysis]	4	Y3 – Q3	AESB2210 MATH 5	5	Y2 – Q2 or Q3 (Q3 in academic year 2014-2015 only)

*Chemistry and Physics (Mechanics and Chemistry) learning path*

Subject Group 1

Subject code and name	Number of ECTS	Year and period of academic year 2013-2014	Subject in new BSc curriculum	Number of ECTS	Year and period of academic year 2014-2015
TA2560 Systemen en Signalen [Systems and Signals]	3	Y2 – Q1			

TA2601 * Matlab laboratory course	2	Y2 – Q1			
			AESB2120 Instrumentation & Signals with Matlab	5	Y2 – Q1

\* = **not compulsory**

Guideline for Subject Group 1

1. If the student has not yet obtained TA2560, the subject *Instrumentation & Signals with Matlab* should be taken as an equivalent.
2. If the student has not yet obtained the component TA2601, the laboratory course component of *Instrumentation & Signals with Matlab* can be taken in 2014/2015.

Subject group 2

Subject code and name	Number of ECTS	Year and period of academic year 2013-2014	Subject in new BSc curriculum	Number of ECTS	Year and period of academic year 2014-2015
TN4780TA (*) Fysische Transportverschijnselen [Physical Transport Phenomena]	4	Y2 – Q2 & 3			
TA3220 (*) Fluid Flow, Heat and Mass Transfer	4	Y3 – Q3			
			AESB2320 Physical Transport Phenomena	5	Y2 – Q3

(\*) = **at least one is compulsory**

Guideline for Subject Group 2

1. (\*) A student must obtain TN4780TA or TA3220.

Subject code and name	Number of ECTS	Year and period of academic year 2013-2014	Subject in new BSc curriculum	Number of ECTS	Year and period of academic year 2014-2015
TN4010TA Electriciteit & Magnetisme [Electricity & Magnetism]	4	Y2 – Q2	AESB1420 Mechanics 2 & E&M	5	Y1 – Q4
TA2201-07 Analytische Chemie [Analytical Chemistry] including laboratory course	3	Y2 – Q2	AESB2340 Extraction of Resources	5	Y2 – Q3
			or AESB3342 Extractive Metallurgy and Physical Processing	5	Y3 - Q3

*Introduction/Applications in Applied Earth Sciences learning path*

Subject group 1

Subject code and name	Number of ECTS	Year and period of academic year 2013-2014	Subject in new BSc curriculum	Number of ECTS	Year and period of academic year 2014-2015
TA3530 Subsurface Characterization	3	Y2 – Q1			
TA3520 Introduction to Reflection Seismics	3	Y2 – Q3			
			AESB2140 Geophysical Methods for Subsurface Characterization	5	Y2 – Q1

Guideline for Subject Group 1

1. If the student has not yet obtained the component TA2560 or TA3520, the subject Geophysical Methods for Subsurface Characterization should be taken as an equivalent.
2. If the student has not yet obtained the laboratory course component of TA3520, the relevant component of Geophysical Methods for Subsurface Characterization can be taken in 2014/2015.

Subject code and name	Number of ECTS	Year and period of academic year 2013-2014	Subject in new BSc curriculum	Number of ECTS	Year and period of academic year 2014-2015
CTB3390 Mechanics and Transport by Flow in Porous Media	4	Y2 – Q3	AESB3340 Mechanics and Transport by Flow in Porous Media	5	Y3 – Q3
TA3700 Introduction to Rock Mechanics	3	Y2 – Q2	CTB2310 Soil Mechanics	5	Y2 – Q3
TA2230 Introduction to Resource and Geo-Engineering	3	Y2 – Q4	AESB2340 Extraction of Resources	5	Y2 – Q3
TA3500-12 Petrophysics including Image Analysis	4	Y3 – Q3	AESB3341 Petrophysics & Image Analysis	5	Y3 – Q3
TA3009 Field Exploration	5	Y3 – Q4	AESB3440 Field Exploration Project	5	Y3 – Q4
TA3006-10 Bachelor Thesis/Individual Project	10	Y3 – Q4	AESB3400 Bachelor Thesis	10	Y3 – Q4

***Credit deficiency***

The following general rule applies for obtaining the Bachelor degree:

1. every student must have obtained all compulsory components (or an equivalent) and
2. every student must have obtained a total of 180 ECTS in the three-year Bachelor's degree programme, of which 30 ECTS are from a minor

#### *List of choices*

If, after the propedeuse ("first year") and the Bachelor's degree programme (excluding the minor), a student has obtained fewer than 150 ECTS, the student must take one or more of the subjects listed below from the new BSc curriculum. In the case of a deficiency of 1, 2 or 3 ECTS, an addition to the Bachelor Thesis will suffice.

This also applies in the case of the replacement of the electives from the third year, quartile 3, which are being discontinued: TA3440, TA3540, TA3690.

This is conditional on the subjects selected not being part of the Bachelor's degree programme for the minor taken.

1. Extraction of Resources (AESB2340) 5 ECTS
2. Geophysical Methods for Subsurface Characterization (AESB2340) 5 ECTS
3. Soil Mechanics (CTB2310) 5 ECTS
4. Extractive Metallurgy & Physical Processing (AESB3342) 5 ECTS
  - If Extractive Metallurgy & Physical Processing has been taken in the minor, the student must take Soil Mechanics.

Students wishing to deviate from this measure must apply individually to the Board of Examiners of the study programme.

#### ***New rule for propedeuse ("first year")***

Starting on 1 September 2014, students who started the programme before 1 September 2013 can take the first-year degree audit after obtaining 60 ECTS from the Bachelor's degree programme (not limited to the first year). This rule will apply until 31 August 2016.