



Technische  
Universität  
Braunschweig



# Teaching in English

Guidance for the implementation  
of courses and modules taught in English  
at TU Braunschweig  
(2019)

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The purpose of this handbook is to provide guidance and show commitment to the implementation of foreign-language courses and examinations and to create transparency for students and teachers. The focus is explicitly on the implementation of courses in the English language and not on the establishment of fully English-language-based study programmes.

# I. Background and Objectives

## I.1: Target agreements and the university development contract

TU Braunschweig has set itself the goal of intensifying and advancing the internationalisation of the university at all levels. This goal is laid out in the target agreement 2014-2018 between the MWK and TU Braunschweig, as well as in the university development contract of 2013 between the state of Lower Saxony and the universities of Lower Saxony.

- In the target agreement 2014-2018 between the MWK and TU Braunschweig, the title is "Intensify internationalisation":  
"The university has set itself the goal of establishing an internationalisation strategy. TU Braunschweig won an audit in the HRK's competitive tender 'Internationalisation of Universities'".
- The 2013 Higher Education Development Agreement between the State of Lower Saxony and Lower Saxony's higher education institutions states, under the heading "Intensifying Internationalisation", "Lower Saxony's higher education institutions define internationalisation as a central building block of their institutional profile and as an essential instrument of quality development. On the basis of the strategy adopted by the Federal Government and the states at the Joint Science Conference (GWK) for the internationalisation of higher education institutions in Germany, Lower Saxony's higher education institutions will continue to push ahead with their strategic internationalisation at all levels.

## I.2: Recommendations from the HRK

The TU Braunschweig was accompanied by the HRK in this process of internationalisation from 2014 to 2018. In its recommendation report, the HRK defined language policy and English-language teaching as priority topics. It pointed to the lack of clarification of the role of the German and English languages in teaching, the overall low number of English-language courses offered and the unclear designation of the language of instruction in the course catalogue and information materials. This reduces Braunschweig's attractiveness as a place of study for international students and restricts international learning opportunities for German students.

In this context, the HRK therefore recommends that TU Braunschweig:

- clarify the role of the English language for all university fields of action,
- promote English as a teaching language.

A clarification of the role of the English language was elaborated in the "Recommendations on Language Policy" adopted in 2016 (HRK, 2016). The expansion of English-language teaching was also laid out here.

### 1.3: Why is English-language teaching important at TU Braunschweig?

International excellence in science is inextricably linked to the English language in many disciplines. A university that meets the demands of a globalised world must offer an appropriate range of qualifications. The courses offered in English are aimed at both foreign and German students, academics and researchers:

- For German students, it is an important element for qualification into the international research and labour market. By attending courses in English at TU Braunschweig, they can gain practical experience in the use of English in their field of study.
- Exchange students from partner universities need a sufficient number of courses in order to acquire the required 30 credits per semester in English.
- TU Braunschweig can only send students to attractive universities if it is an attractive exchange partner that meets the curricular requirements of its university partners.
- Foreign scholars should have the opportunity to integrate their research results directly into their teaching without language barriers.

### 1.4: Realisation

TU Braunschweig aims to offer at least 30 ECTS credits per semester in English-language courses in each of its study programmes („Recommendations on Language Policy at TU Braunschweig“, 2016: see page 7).

Courses are considered to be English-language courses if they are offered entirely in English. However, it must still be possible to study all degree programmes in the German language. Courses taught in English should therefore preferably be offered in the elective and compulsory elective areas. Compulsory courses can also be taught in English, but an additional course in German should be provided here if possible, or there should at least be the opportunity to take exams or do homework in German.

Essentially, students should never be disadvantaged by the use of English as the language of instruction. The language requirements of the respective courses must be clearly communicated to the

students in advance, in their personal consultation and in the Specific Examination Regulations (BPO), on the websites of the courses, the electronic course catalogue and in the module handbook (Modulhandbuch).

In addition, it is possible to offer German-language courses with English support for exchange students (e.g. a written exam or an oral examination in English, additional teaching material in English, and/or supporting tutorials in English) and to make reference to this in the course catalogue and in the module handbook (Modulhandbuch).

## II. Procedures and Regulations

### II.1: The decision of the Presidium

In order to achieve the greatest possible transparency and legal safety in the introduction and communication of courses and modules taught in the English language, the Presidium of TU Braunschweig passed the following resolution on 17 January 2018:

- The faculties determined independently which courses and examinations they want to offer in English in the future.
- The faculties will document the reasons for the use of the foreign language in teaching in a corresponding resolution by the Faculty Council.
- If necessary, the respective Specific Examination Regulations should be adapted as far as possible within the framework of other amendments to these Examination Regulations.
- The faculties shall ensure that prospective students are adequately informed about the language(s) of teaching and examination in their respective degree programmes prior to their choice.

### II.2: Procedure

The implementation of the courses taught in English follows two steps:

#### **Step 1:**

For the winter semester 2018/19, all existing English-language courses and modules should be visible in the course catalogue.

#### **Step 2:**

In the medium term, the range of courses and modules in the English language is to be extended until a minimum of 30 ECTS credits per semester can be acquired in each degree programme. Faculty members are advised to consider and, if necessary, change the language of their courses. The Study Commissions will discuss the courses that are proposed for language conversion, check whether the entire degree programme can still be studied in the German language and approve the course for language conversion.

The following points must be considered when introducing courses taught in English:

- 1) Each faculty is responsible for determining its own English-language courses and should submit a corresponding recommendation to the Faculty Council for the following semester.
- 2) The faculties should justify the use of the English language by a general addition in the Specific Examination Regulations, as in the following example:

„The language of the courses and examinations is generally German, unless the course, together with the examination language and examination modalities, is marked as an English-language course and described in English in the course catalogue and module handbook (Modulhandbuch).

Courses and examinations can be held in English, in particular, if considerable parts of the key literature are in English or if the qualification objectives of this course of study (e.g. the qualification of the students for the international labour market and for international scientific activities) require them to acquire in-depth knowledge of English as a specialist language.

For students in English-language courses, it is possible to submit an informal application for a German language examination to the examination board by the date specified by the examination board.“

- 3) The language of instruction of a course is specified by the entry in the electronic course catalogue (MHB). The MHB is used to manage courses, modules and degree programmes, to define the courses for the next semester and to create and update module descriptions. This data is transferred to the lecture and examination portal (QIS/LSF). All courses must be declared as English-speaking or German-speaking. Courses taught in English are described in English. The entry "English" must be made in the language field provided.
- 4) For modules consisting of multiple courses there are three possibilities:
  - a) They consist exclusively of English-language courses:**  
In this case, the module description is in English, a German language description may remain listed if necessary, the entry in the language field is "English“.
  - b) They consist exclusively of German-language courses:**  
In this case the description is in German, the entry in the language field is "German". An added English translation of the entries in all fields is not obligatory, but recommended.
  - c) The module contains German-language and English-language courses:**  
In this case the title of the module should be listed in German, all further fields of the module description should be in both languages, the entry in the language field should read “Deutsch und Englisch” or “German and English”.
- 5) From the entries in the MHB, the module handbooks (Modulhandbücher) are generated. These are usually PDF documents which contain the module descriptions, but not the detailed descriptions of individual courses. The module descriptions are also the basis of the appendices to the Specific Examination Regulations (BPO), where extracts from the module handbooks list the qualification goals, examination modalities, credit points and planned semesters for all modules.

- 6) The faculties must ensure that the BPOs and module handbooks are easy to find on their webpages. A uniform approach for all faculties is desirable here. An example of webpage design in this area is given in chapter "III. Communication" (see page 11).
- 7) As a rule, the language of the course and the language of the examination should be identical. However, students in English-language courses must be given a choice of examination language. For this purpose, an informal written application for a German-language examination must be submitted to the Examination Board.

As part of the certification process, the extent to which participation in English-language courses has been taking place can be explicitly stated. This offers a good opportunity for German students to prove their knowledge of foreign languages.

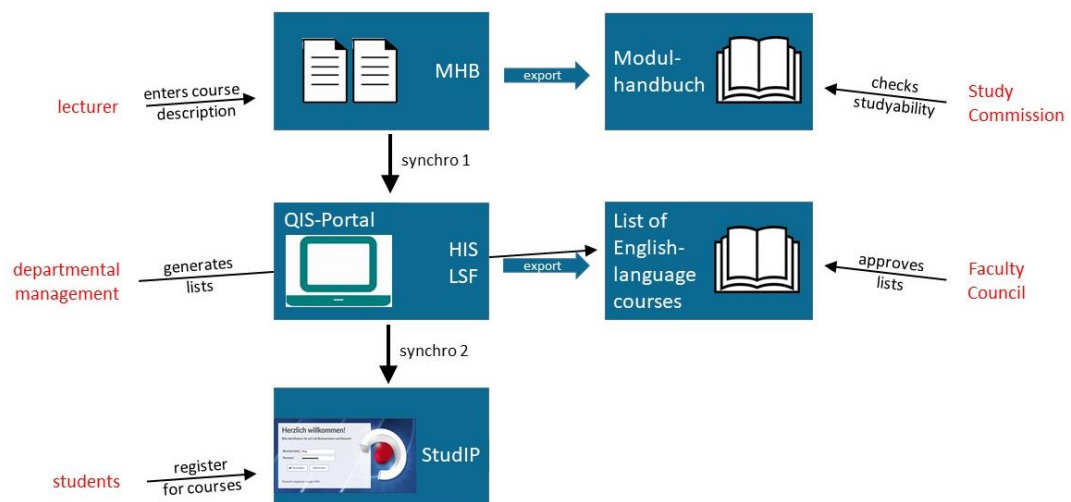


Fig. 1: Cascade from MHB via QIS-Portal to StudIP, the exports to the module handbook and HIS LSF and the participation of the different stakeholders.



# III. Communication

## III.1 Goals and target groups

The primary aim of communication is to convince international university partners of TU Braunschweig's performance as an attractive exchange partner and to offer international exchange students an easily accessible, comprehensive range of information on English-language courses. The main target groups in communication are thus:

- Professors and coordinators of international partner universities who wish to assess whether TU Braunschweig meets the requirements of their own curricula and whether the exchange students can acquire sufficient credits during the exchange period,
- exchange students from international partner universities who choose TU Braunschweig as their host university on the basis of the study opportunities and who have to compile their specific Learning Agreements in the application process.

Another important target group are German-speaking students at TU Braunschweig, for whom attending English-language courses is a central element of international qualification. Information about the availability of English-language courses should also be advertised and made accessible for this target group.

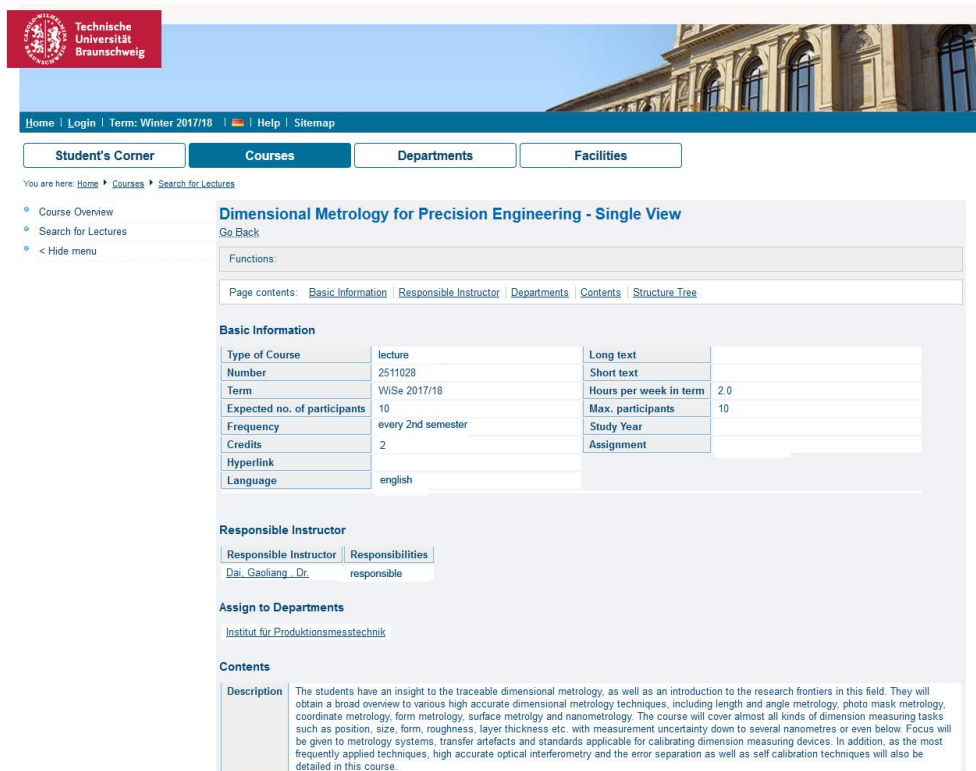
## III.2 Where and how is the information provided?

### The online course catalogue

The online course catalogue (MHB) is the central platform for entering courses. The descriptions from the MHB are exported to the QIS-Portal once a semester (Fig. 2). The courses are then transferred to StudIP, where the students can register.

The QIS-Portal offers an English-language option, a search function and an English-language website. (Fig. 3)

The presentation and naming of the various courses should be consistent, and abbreviations that are difficult to understand internationally (e.g. SWS) should be avoided. A general goal that can be easily achieved in the medium run should be to include the texts of the course descriptions in both German and English (see sample in appendix). Since there are no separate input options for German and English in the current course catalogue, this can currently only be done "consecutively" on the same page, so that the German and English descriptions are visible simultaneously. This problem should be solved in the near future with the conversion to HISinOne.



The screenshot shows the course description page for 'Dimensional Metrology for Precision Engineering - Single View' on the QIS-Portal. The page is part of the Technische Universität Braunschweig website. The navigation bar includes 'Home', 'Login', 'Term: Winter 2017/18', 'Help', and 'Sitemap'. The main navigation menu has 'Student's Corner', 'Courses', 'Departments', and 'Facilities'. The breadcrumb trail is 'You are here: Home > Courses > Search for Lectures'. The course title is 'Dimensional Metrology for Precision Engineering - Single View' with a 'Go Back' link. The 'Functions' section includes 'Page contents' with links to 'Basic Information', 'Responsible Instructor', 'Departments', 'Contents', and 'Structure Tree'. The 'Basic Information' section is a table with the following data:

Basic Information		Long text	Short text
Type of Course	lecture		
Number	2511028		
Term	WiSe 2017/18	Hours per week in term	2.0
Expected no. of participants	10	Max. participants	10
Frequency	every 2nd semester	Study Year	
Credits	2	Assignment	
Hyperlink			
Language	english		

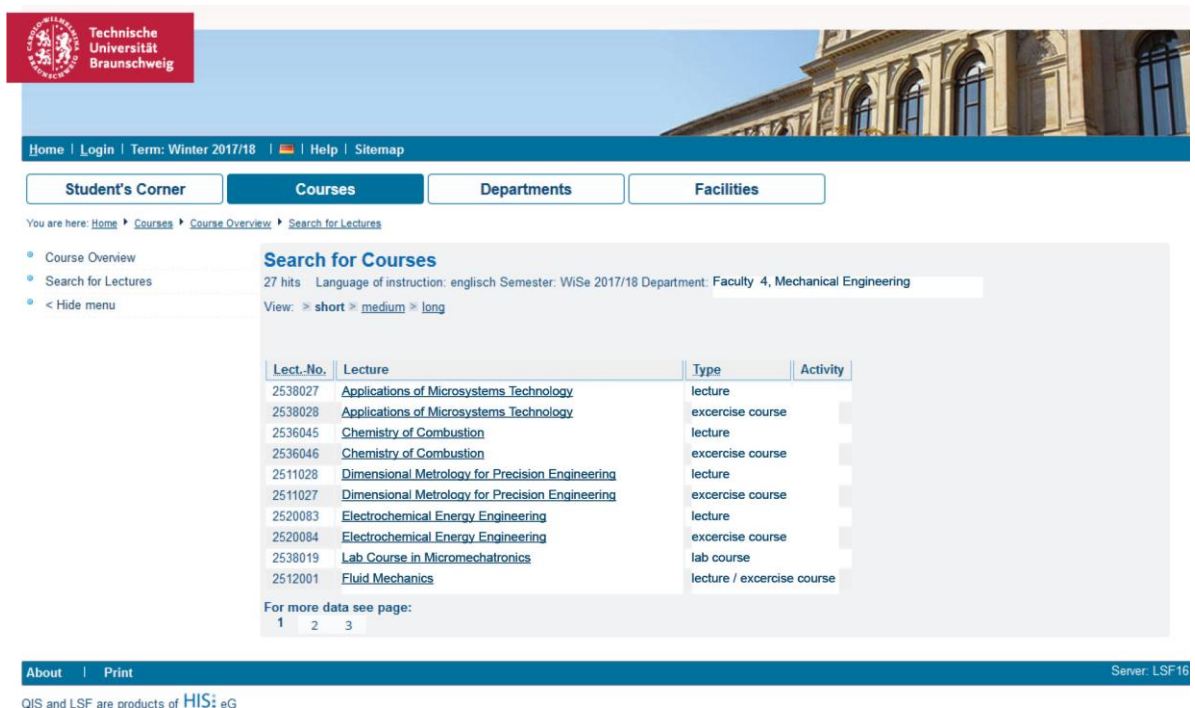
The 'Responsible Instructor' section shows 'Dai, Gaoliang, Dr.' as 'responsible'. The 'Assign to Departments' section lists 'Institut für Produktionsmesstechnik'. The 'Contents' section includes a 'Description' box with the following text:

The students have an insight to the traceable dimensional metrology, as well as an introduction to the research frontiers in this field. They will obtain a broad overview to various high accurate dimensional metrology techniques, including length and angle metrology, photo mask metrology, coordinate metrology, form metrology, surface metrology and nanometrology. The course will cover almost all kinds of dimension measuring tasks such as position, size, form, roughness, layer thickness etc. with measurement uncertainty down to several nanometres or even below. Focus will be given to metrology systems, transfer artefacts and standards applicable for calibrating dimension measuring devices. In addition, as the most frequently applied techniques, high accurate optical interferometry and the error separation as well as self calibration techniques will also be detailed in this course.

Fig. 2: Course description in the QIS-Portal.

In the case of courses offered in English, the title must be listed in English so that the title can be found in the (unfiltered) list of events in the lecture portal.

The entry in the language field must be "English". In the QIS-Portal you can generate course lists, filtered by language of instruction and course of study. Since the search and filter functions are currently relatively difficult to use for an international target group, the faculties are to create preconfigured lists for each study programme, which can then be integrated into the central website of TU Braunschweig at the appropriate locations.



Technische Universität Braunschweig

Home | Login | Term: Winter 2017/18 | Help | Sitemap

Student's Corner | **Courses** | Departments | Facilities

You are here: Home > Courses > Course Overview > Search for Lectures

- Course Overview
- Search for Lectures
- < Hide menu

**Search for Courses**  
27 hits Language of instruction: englisch Semester: WiSe 2017/18 Department: Faculty 4, Mechanical Engineering

View: > short > **medium** > long

Lect.No.	Lecture	Type	Activity
2538027	<a href="#">Applications of Microsystems Technology</a>	lecture	
2538028	<a href="#">Applications of Microsystems Technology</a>	exercise course	
2536045	<a href="#">Chemistry of Combustion</a>	lecture	
2536046	<a href="#">Chemistry of Combustion</a>	exercise course	
2511028	<a href="#">Dimensional Metrology for Precision Engineering</a>	lecture	
2511027	<a href="#">Dimensional Metrology for Precision Engineering</a>	exercise course	
2520083	<a href="#">Electrochemical Energy Engineering</a>	lecture	
2520084	<a href="#">Electrochemical Energy Engineering</a>	exercise course	
2538019	<a href="#">Lab Course in Micromechatronics</a>	lab course	
2512001	<a href="#">Fluid Mechanics</a>	lecture / exercise course	

For more data see page:  
1 2 3

About | Print Server: LSF16  
QIS and LSF are products of HIS: eG

Fig. 3: Example of a preconfigured list filtered by language of instruction (English) and faculty (Faculty 4).

## Central website of TU Braunschweig

The English-language courses offered by TU Braunschweig are of interest to different target groups, and the search behaviour of these target groups varies greatly from person to person. Therefore, it should be integrated into the website of TU Braunschweig in several places:

- on the pages for exchange students : [www.tu-braunschweig.de/international/incomings/exchange](http://www.tu-braunschweig.de/international/incomings/exchange)
- in the portraits of the study programmes: [www.tu-braunschweig.de/studieninteressierte/studienangebot/...](http://www.tu-braunschweig.de/studieninteressierte/studienangebot/...)
- in the web area "Studies": [www.tu-braunschweig.de/studium/imstudium](http://www.tu-braunschweig.de/studium/imstudium)
- on the pages of the faculties under the heading "Students". Reference to the Specific Examination Regulations (BPO) should also be established here.

## Visibility of the Specific Examination Regulations, the course catalogues and the course lists on the faculty pages

The Specific Examination Regulations (BPO) and module handbooks should be made available on the faculty pages under the heading ► "Students" ► "Documents and Downloads". To reduce page length the PDF documents can be grouped into an accordion. The headers should contain the terms "Examination Regulations" and "Course Catalogue".

The section "International" on the faculty pages is a good starting point to locate the list of English-language courses in the study programme.

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**- Prüfungsordnung und Modulhandbuch Bachelorstudiengang**

- [Konsolidierte Fassung des Besonderen Teils der Prüfungsordnung Bachelor Umweltingenieurwesen.pdf](#)  
(Studienbeginn ab WiSe 2016/17)
- [Modulhandbuch Umweltingenieurwesen.pdf](#)  
(Studienbeginn ab WiSe 2016/17)
- [Erläuterungen zum Bachelor Umweltingenieurwesen.pdf](#)  
(Studienbeginn ab WiSe 2016/17)

**+ Prüfungsordnung und Modulhandbuch Masterstudiengang**

Abb. 4: An example of the provision of Specific Examination Regulations and the module handbook in the field of environmental engineering.

## IV. Literature quoted

Recommendations on Language Policy at TU Braunschweig (2016), available at:  
<https://www.international.tu-braunschweig.de/internationalisierung/en/downloads/>

# Appendix

## Materials for the implementation of courses and modules in English

- Appendix 1: Work steps and scheduling
- Appendix 2: Entry into the MHB: Input pattern
- Appendix 3: Input into the QIS Portal: Sample for a lecture with exercises
- Appendix 4: Input into the QIS Portal: Sample for a seminar

# Materials for the implementation of courses and modules in English

## Appendix 1: Work steps and scheduling

What?	Who?	When? (winter)	When? (summer)
▶ <b>Identification of the planned English-language courses for the next winter / summer semester</b>	all faculty, Deans of Studies	til April	til October
▶ <b>Preparation of the descriptions for the course catalogue</b>	person responsible for the course catalogue	til April	til October
▶ <b>Translation or English proofreading of the description texts, if necessary</b>	International House, external translators	continuously	continuously
▶ <b>Entry into the course catalogue</b>	person responsible for the course catalogue, institutes	April-May	November
▶ <b>Adaptation of the Specific Examination Regulations (BPO) if necessary</b>	Faculty Council	continuously	continuously
▶ <b>Releasing the course catalogue for students</b>	GITZ	begin of August	begin of February

## Appendix 2: Entry in the MHB: Input pattern

Technische Universität Braunschweig | Modulhandbuch: Bachelor Umweltnaturwissenschaften

Modulbezeichnung: <b>Modeling water, energy and matter transport in soil</b>		Modulkürzel: <b>PHY-IGÖ-06</b>	
Workload:	180 h	Kontakt-/Präsenzzeit:	56 h
Leistungspunkte:	6	Selbststudium:	124 h
Pflichtform:	Wahlpflicht		
Lehrveranstaltungen:			
<ul style="list-style-type: none"> <li>• WEST: Modeling water, energy, and matter transport in soil [lecture and exercise course, 5 CP]</li> <li>• Field Experiments in soil hydrology [practical field work, 1 CP]</li> </ul>			
Lehrende:			
Prof. Dr. Wolfgang Durner			
Dr. Sascha Iden			
Dr. Andre Peters			
Qualifikationsziele:			
(en)			
The students ...			
<ul style="list-style-type: none"> <li>▪ understand the mathematical and physical description of transport processes in soil and are able to derive the basic model equations for the transport of energy, gases, water and solutes with the continuum approach.</li> <li>▪ know how to apply the most important transport models to problems of flow and transport in the unsaturated zone.</li> <li>▪ are able to specify appropriate initial and boundary conditions for the governing ordinary and partial differential equations.</li> <li>▪ know the most important approaches for the mathematical description of constitutive relationships in soil physics, namely the parametrization of soil hydraulic properties and the water content dependence of transport coefficients (energy, gases, solutes).</li> <li>▪ can estimate the typical behavior and intensity of transport processes in the field</li> <li>▪ know how to simulate scenarios of water, energy and matter transport in porous media with the aid of suitable software products.</li> </ul>			
(de)			
Die Studierenden ...			
<ul style="list-style-type: none"> <li>▪ verstehen die mathematische-physikalische Beschreibung von Transportprozessen im Boden und können die Modellgleichungen für den Transport von Energie, Gasen, Wasser und gelösten Stoffen mit dem Kontinuumsansatz formulieren.</li> <li>▪ können häufig angewendete Modelle aus der Bodenphysik und -hydrologie auf energetische und stoffliche Transportprozesse im Boden anwenden.</li> <li>▪ sind in der Lage für gegebene Transportprozesse geeignete Anfangs- und Randbedingung für die entsprechenden gewöhnlichen und partiellen Differenzialgleichungen zu formulieren.</li> <li>▪ kennen die wichtigsten Ansätze zur mathematischen Beschreibung konstitutiver Relationen in der Bodenphysik, insbesondere Parametrisierungen bodenhydraulischer Funktionen und Parametrisierungen der Wassergehaltsabhängigkeit von Transportkoeffizienten (Energie, Gase, gelöste Stoffen).</li> <li>▪ können für typische Feldszenarien die Transportprozesse für Energie, Wasser und Stoffe sowohl phänomenologisch als auch in ihrer Intensität abschätzen.</li> <li>▪ sind in der Lage Szenarien des Wasser-, Wärme- und Stofftransports in porösen Medien mit Hilfe geeigneter Softwarewerkzeuge selbständig und quantitativ zu simulieren</li> </ul>			
Inhalte:			
(en)			
Modeling water, energy, and matter transport in soil (lecture / exercise course)			
<ul style="list-style-type: none"> <li>▪ Conceptual and mathematical description of the transport processes of water, energy, gases and solutes by a combination of the respective flux laws and the principle of local mass conservation, expressed by the continuity equations for energy and mass.</li> <li>▪ Derivation and application of Richards' equations, convection-dispersion-equations, gas transport equations, and heat flow equations.</li> <li>▪ Parametrization of subscale processes and the concept of the REV.</li> <li>▪ Parametrization of transport-controlling material functions, e.g. the soil water retention curve, the unsaturated hydraulic conductivity curve, dependence on thermal conductivity, heat capacity thermal diffusivity, gas diffusion coefficients and reaction parameters on soil water content.</li> </ul>			



## Appendix 2 (continuation)

Technische Universität Braunschweig | Modulhandbuch: Bachelor Umweltnaturwissenschaften

- Analytical and numerical solutions of steady-state transport processes in Microsoft Excel and Matlab.
- Introduction to the software packages HYDRUS-1D und HYDRUS-2D/3D and the application of these packages to numerically simulate transient transport processes in soil.
- Simulation projects conducted by students to deepen their understanding.

### Field Experiments in soil hydrology (practical field work)

- Field experiments for characterizing soil hydraulic properties: tension disc infiltration, well infiltration, double ring infiltration, time domain reflectometry, tensiometer measurements.
- Evaluation of the experiments by applying the analytical solutions of the Richards equation, the quantification of the results' error by error analysis.

(de)

### Modellierung des Wasser-, Energie- und Stofftransports in Böden (Vorlesung/Übung)

- Konzeptionelle und mathematische Beschreibung von Wasser-, Energie- und Stofftransportvorgängen im Boden durch Kombination von Fließgesetzen und Kontinuitätsgleichung (lokale Massenbilanz)
- Herleitung und Anwendung von Richardsgleichung, Konvektions-Dispersionsgleichung, Gashaushaltsgleichung und Wärmeleitungsgleichung.
- Parametrisierung subskaliger Prozesse und REV-Konzept
- Parametrisierung wichtiger transportrelevanter Materialfunktionen, z.B. Retentionskurve, hydraulische Leitfähigkeit, Abhängigkeit von Wärmeleitfähigkeit, Wärmekapazität, Temperaturleitfähigkeit, Gasdiffusionskoeffizienten und Reaktionsparametern vom Bodenwassergehalt.
- Analytische und numerische Lösung stationärer Transportprobleme in MS Excel und Matlab.
- Einführung in die Programmpakete HYDRUS-1D und HYDRUS-2D/3D und Einsatz der Programmpakete zur Lösung transients Transportprobleme
- studentische Projekte zur Lösung verschiedener Modellierungsaufgaben

### Bodenhydrologie (Praktische Feldarbeit)

- Durchführung von Feldversuchen zur Charakterisierung hydraulischer Eigenschaften von Böden: Tensionsinfiltration, Bohrlochinfiltation, Ringinfiltation, TDR-Messungen, Tensiometermessungen.
- Auswertung der Experimente durch Anwendung von analytischen Lösungen der Richardsgleichung und Quantifizierung des Fehlers der Ergebnisse durch Methoden der Fehlerrechnung.

Lernformen:

(en)

Lecture, exercise course, project work, field work, protocol and reports, presentation of results

(de)

Vorlesung, Übung, Projektarbeit, Feldarbeit, Protokoll, Präsentation

Prüfungsmodalitäten:

(en)

Examination type: Portfolio

(de)

Prüfungsleistung: Portfolio

Turnus (Beginn):

(en) Every winter semester (5<sup>th</sup> semester in this course programme)

(de) Jährlich Wintersemester (5. Fachsemester)

Modulverantwortliche/r:

Prof. Dr. Wolfgang Durner

Sprache:

English

Medienform:

(en) Lecture slides, lecture notes, exercises

(de) Vorlesungsfolien, Skript, Übungsaufgaben

## Appendix 3: Input in the QIS Portal: Sample for a lecture with exercises

	Fundamentals of Nanotechnology
Course Type	<ul style="list-style-type: none"> <li>lecture and tutorial</li> </ul>
Semester	<ul style="list-style-type: none"> <li>summer semester 2018</li> </ul>
Frequency	<ul style="list-style-type: none"> <li>every 2<sup>nd</sup> semester</li> </ul>
Credits	<ul style="list-style-type: none"> <li>5</li> </ul> <p><i>Please enter your details! This refers to the ECTS credits that are required for the compilation of the Learning Agreements.</i></p>
Language	<ul style="list-style-type: none"> <li>English</li> </ul>
Hours per week in term	<ul style="list-style-type: none"> <li>2</li> </ul>
Max. participants	<ul style="list-style-type: none"> <li>25</li> </ul>
Dates / Times / Location	<ul style="list-style-type: none"> <li>to be announced, please contact the instructors for further information</li> </ul>
Instructors	<ul style="list-style-type: none"> <li>Prof. Dr. Georg Garnweitner (instructor responsible)</li> <li>Dr. Reza Ebrahimifard (assistant instructor)</li> </ul>
Content: Description	<p>(en)</p> <p>After completing the lecture, the students will have a basic knowledge of nanotechnology. The participants will learn and understand the characteristics of nanomaterials, the types of nanomaterials that are available and their most important applications. In addition, they will explore current developments in nanotechnology and trends for future progress. The students will also investigate the characteristics of nanotechnology, the potential risks involved and its manifold possibilities.</p> <p><i>Please formulate the English qualification goal In the last paragraph of the description:</i></p> <p>In addition to gaining knowledge in the field of nanotechnology, the students will also study related research publications in English, discuss them in teams of 2-5 people and present them to all participants in order to develop key competencies such as reading comprehension of scientific texts in English, working in teams, giving presentations and participating in discussions in technical English.</p> <p>(de)</p> <p>Die Studierenden haben Grundkenntnisse der Nanotechnologie erworben. Sie wissen, was die Besonderheiten von Nanomaterialien sind, welche Arten von Nanomaterialien es gibt und kennen die wichtigsten Anwendungen. Zudem kennen sie die bisherige Entwicklung der Nanotechnologie ebenso wie aktuelle Trends für die zukünftige Entwicklung. Die Studierenden können grundlegend einschätzen, welche Charakteristiken die Nanotechnologie aufweist, welche Chancen und Risiken sie bietet.</p>

## Appendix 3 (continuation)

	<p>Zusätzlich zum Erwerb von Grundkenntnissen auf dem Gebiet der Nanotechnologie arbeiten die Studierenden in kleinen Teams von 2-5 Personen Kurzvorträge basierend auf geeigneten wissenschaftlichen englischen Texten aus, die im Anschluss im Plenum präsentiert werden. Hierdurch werden zusätzliche Kompetenzen wie das Erfassen wissenschaftlicher englischer Texte, die Ausarbeitung von Kurzpräsentationen im Team sowie die Vorstellung und Diskussion in englischer Fachsprache erlernt.</p>
<b>Content: Literature</b>	<p>K. Jopp.: Nanotechnologie - Aufbruch ins Reich der Zwerge, Gabler Verlag, Wiesbaden 2006</p> <p>M. Köhler, W. Fritzsche: Nanotechnology - An Introduction to Nanostructuring Techniques, Wiley-VCH, Weinheim 2007.</p> <p>S. A. Edwards: The Nanotech Pioneers - Where Are They Taking Us?, Wiley-VCH, Weinheim 2006.</p> <p>(en) Further literature will be announced in the lecture. (de) Weitere Literatur wird in der Vorlesung bekannt gegeben.</p>
<b>Content: General Remarks</b>	<p><i>Please specify precisely the language requirements:</i></p> <p>(en) Lectures and examinations will be held in English. A minimum language level of B2 is required.</p> <p>(de) Vorlesung und Prüfung erfolgen in englischer Sprache. Ein Sprachniveau mindestens auf der Stufe B2 ist erforderlich.</p>

## Appendix 4: Input in the QIS Portal: Sample for a seminar

	Future Production Systems
<b>Course Type</b>	<ul style="list-style-type: none"> <li>seminar</li> </ul>
<b>Serm</b>	<ul style="list-style-type: none"> <li>summer semester 2018</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>every 2<sup>nd</sup> semester</li> </ul>
<b>Credits</b>	<ul style="list-style-type: none"> <li>4</li> </ul> <p><i>Please enter your details! This refers to the ECTS credits that are required for the compilation of the Learning Agreements.</i></p>
<b>Language</b>	<ul style="list-style-type: none"> <li>English</li> </ul>
<b>Hours per week in term</b>	<ul style="list-style-type: none"> <li>3</li> </ul>
<b>Max. participants</b>	<ul style="list-style-type: none"> <li>10</li> </ul>
<b>Dates / Times / Location</b>	<ul style="list-style-type: none"> <li>Tue 11.30-13.00, CIM-Seminar Room, 003, IWF, Langer Kamp 19 B</li> </ul>
<b>Instructors</b>	<ul style="list-style-type: none"> <li>Prof. Dr.-Ing. Christoph Hermann (responsible lecturer)</li> <li>Max Juraschek (assistant lecturer)</li> </ul>
<b>Content: Description</b>	<p>(en)</p> <p>Production is undergoing enormous change due to a number of different trends. These include: new production technologies for customer-specific products; the increasing relevance of digitalisation (Industry 4.0) and trends towards sustainability and social change (e.g. demographic change, urbanisation etc). Based on these trends and changes, new challenges for the production industry have arisen. Production systems of the future need flexible structures and should incorporate the potentials of urban embedment and cyber-physical approaches as well as innovative ways for employee qualification. Thus, an interdisciplinary understanding is crucial in order to balance conflicting goals. Against this background, the seminar “Future Production Systems” aims to present and discuss diverse approaches in the context of future production. After an introductory lecture, the students (in teams of 2-3 people) will develop written or applied solutions which will be presented and discussed in the form of a presentation towards the end of the semester.</p> <p><i>Please formulate the English qualification goal In the last paragraph of the description:</i></p> <p>Besides imparting future-relevant content in the field of production engineering, the seminar fosters key competencies such as working in teams, scientific writing skills and proficiency in giving presentations and participating in discussions in technical English.</p>

## Appendix 4 (continuation)

(de)

Die Produktion wandelt sich aktuell stark unter dem Einfluss von verschiedenen Trends. Dazu gehören neue Produktionstechnologien zur Herstellung kundenindividueller Produkte, die immer stärkere Bedeutung von Digitalisierung (Industrie 4.0) und Nachhaltigkeit sowie gesellschaftliche Veränderungen (z.B. demographischer Wandel, Urbanisierung). Aus diesen Trends und Veränderungen resultieren neue Herausforderungen für die produzierende Industrie: Produktionssysteme der Zukunft brauchen flexibleren Strukturen, sie müssen urbane Rahmenbedingungen und cyber-physische Ansätze, aber auch innovative Ansätze zur Qualifikation von Mitarbeitern berücksichtigen. Die resultierenden Handlungsfelder erfordern ein interdisziplinäres Verständnis von Fabriken und Produktionssystemen und den Umgang mit Zielkonflikten. Vor diesem Hintergrund zielt das englischsprachige Seminar „Future Production Systems“ auf die inhaltliche Vermittlung und Diskussion verschiedener Aspekte einer zukünftigen Produktion. Nach einer einleitenden Veranstaltung verfassen die Studierenden in Teams von 2-3 Personen selbstständig eine schriftliche oder praktische Ausarbeitung in ausgewählten Handlungsfeldern, die dann abschließend im Rahmen des Seminars vorgestellt und diskutiert wird.

Neben der Vermittlung von zukunftsrelevanten Inhalten im Bereich Produktion werden im Seminar wichtige Handlungskompetenzen wie Gruppenarbeit, Präsentationstechniken und wissenschaftliches Schreiben, Präsentieren und Diskutieren in Fachenglisch erlernt.

### Content: Literature

C. Herrmann, C. Schmidt, D. Kurle, S. Blume & S. Thiede (2014). Sustainability in Manufacturing and Factories of the Future. International Journal of precision engineering and manufacturing - Green Technology, 1(4), 283-292.

C. Herrmann, C. Schmidt, D. Kurle, S. Blume & S. Thiede (2015). The Positive Impact Factory-Transition from Eco-efficiency to Eco-effectiveness Strategies in Manufacturing. Procedia CIRP, 29, 19-27.

(en) Further literature will be announced in the lecture.

(de) Weitere Literatur wird in der Vorlesung bekannt gegeben.

### Content: General Remarks

*Please specify precisely the language requirements:*

(en) Lectures and examinations will be held in English. A minimum language level of B2 is required.

(de) Vorlesung und Prüfung erfolgen in englischer Sprache. Ein Sprachniveau mindestens auf der Stufe B2 ist erforderlich.