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# Student Handbook Annex – TRACEE Master ST4

Study Track 4: Environmental Chemistry and Toxicology

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# 1 The Study Track 4: Environmental Chemistry and Toxicology

**The study track Environmental Chemistry and Toxicology (ST4)** is an international research-oriented study track focusing on the evaluation and solution of environmental problems. The study track aims for a comprehensive understanding of the physical, chemical, and biological process mechanisms. The focus is on environmental chemistry and toxicology. Students from various science backgrounds learn to qualitatively and quantitatively address complex processes in soils, water and air and to evaluate environmental risks based **on multi-disciplinary approaches.**

The **first semester** will be offered at **Stockholm University. The second semester** will take place at the **Stockholm University** with the focus on »Environmental toxicology«. **The third semester** is offered by the **University of Tübingen** with the focus on »Environmental chemistry«. The Master thesis can be completed at the University of Stockholm or University of Tübingen or University of Bucharest. Students can only choose SU or UT for the 4th semester, if they are not resident in Germany or Sweden at the time of enrollment.

<table>
<tr><th>Study track</th><th>Semester 1</th><th>Semester 2</th><th>Semester 3</th><th>Semester 4</th></tr>
<tr><td rowspan="2">ST4: Environmental Chemistry and Toxicology</td><td>SU</td><td>SU</td><td>UT</td><td>SU or UT or UB*</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td></td><td>Common Core</td><td colspan="2">Study Track</td><td>Master Thesis</td></tr>
<tr><td></td><td colspan="4">Transdisciplinary stream</td></tr>
</table>

** Students can only choose SU or UT for the 4th semester, if they are not resident in Germany or Sweden at the time of enrollment.*

The **study and examination language** of Study Track 4 is **English.**

**SU** is a renowned educational institution in Sweden, known for its excellent research and teaching. The Department of Earth Sciences plays a central role in the study of earth processes and environmental issues. Here, various disciplines such as geology, geophysics, meteorology and oceanography are combined to promote a comprehensive understanding of the earth and its systems. Students and researchers have access to modern laboratories and innovative technologies that enable them to address current challenges in the field of geosciences. The university places great emphasis on interdisciplinary collaboration and sustainable development, which makes it an attractive place for students from all over the world.

**UT** is a full university covering virtually all areas in natural and social sciences giving the individual students much space for inter/transdisciplinary projects. The University is one out of eleven excellence Universities and has the largest Department for terrestrial geosciences in Germany providing state-of-the art laboratory and field facilities in a new building from 2020. Tübingen is located in hilly south-western Germany, the bike gets you everywhere you need to go and it is one of the most sought after student locations in Germany.

**UB,** founded in 1864, is one of Romania's leading higher education institutions. Located in the capital city, it offers a diverse range of programs across various fields, including humanities, sciences, social sciences, and law. The university is known for its strong emphasis on research and academic excellence, attracting both local and international students. With a vibrant campus life, numerous student organizations, and cultural events, the University of Bucharest provides a dynamic environment for learning and personal growth. Its commitment to fostering critical thinking and innovation makes it a significant contributor to Romania's educational and cultural landscape.

## 1.1 The Vision of the Study Track

Students will gain a comprehensive understanding of the linkages between physical, chemical, and biological process mechanisms. Students from various science backgrounds will learn to qualitatively and quantitatively address complex processes in soils, water and air as well as in organisms. In addition, students will address the ethical, legal, and regulatory frameworks governing environmental protection, chemical safety, and toxicology and to evaluate environmental risks based on multi-disciplinary approaches.

## 1.2 Target Group of Students: Entry Requirements

Prerequisite for the Study Track 4 is a Bachelor's degree in natural sciences or engineering. In addition, performance must also have been achieved in the following subjects of the Bachelor's program in particular:

- 15 CP in mathematics or statistics or equivalent,
- 15 CP chemistry,
- 6 CP in geology*.

To take part in the Study Track, applicants must also document knowledge of English at least at the level of B2 of the Common European Framework of Reference for Languages (CEFR). Requirements can be met with an English test, for example an overall IELTS score of 6.5 with no subtests under 6.0 or a TOEFL score of 90 overall with Reading 20; Listening 19; Speaking 19; Writing 21.

* *These competences may also be acquired in the second semester.*

## 1.3 Intended Learning Outcomes of the Study Track

The intended learning outcomes of this Study Track, in addition to the overarching learning outcomes of the programme, are listed below.

***Knowledge and understanding***

- demonstrate advanced understanding of the fundamental principles of environmental chemistry and toxicology, including the fate and effects of pollutants.
- demonstrate an understanding of the ethical, legal, and regulatory frameworks governing environmental protection, chemical safety, and toxicology.

***Competence and skills***

- define and analyse environmental problems related to chemical pollution
- plan and undertake appropriate field and advanced laboratory techniques to identify and quantify environmental contaminants, quantify their fate processes and their toxicity, including methods for environmental sampling, chemical analysis, and bioassays.
- develop and implement models to assess the fate and toxicity of chemicals in different environmental media and various organisms.
- present and interpret chemical and toxicological data and analysis results

***Judgement and approach***

- develop strategies to mitigate the environmental and toxicological impacts of chemical pollutants, integrating both scientific and regulatory perspectives.
- promote sustainability and the responsible use of chemicals, considering environmental health and societal implications.

# 2 Structure Overview of the Study Track 4

## 2.1 Semester Periods of the Study Track

The study track takes place at Stockholm University (SU), the University of Tübingen (UT) and the University of Bucharest (UB). Below you will find an overview of the semester times of the participating universities:

| Semester | University | Period |
|---|---|---|
| 1st Semester | SU | Winter semester runs from **Beginning of September to Mid-January (including exams)** of the following year. |
| 2nd Semester | SU | Summer semester runs from **Mid-January to Beginning of June (including exams)** of the following year. |
| 3rd Semester | UT | Winter semester runs from **1 October to 31 March (including exams)** of the following year. |
| 4th Semester | SU | **Summer semester** runs from **Mid-January to Beginning of June (including exams)** of the following year. |
| | UT | **Summer semester** runs **from 1 April to 30 September (including exams)** of the following year. |
| | UB | **Summer semester** runs from **End of February to End of May (including exams)** of the following year. |

## 2.2 Academic Degree and Grades of the Study Track

The study track is divided in 4 semesters of 30 ECTS each for a total of 120 ECTS.

The cooperating universities award a joint degree "Master of Science" (abbreviated to "M. Sc.") with the title "Transdisciplinary Studies of Climate, Environment and Energy" on the basis of the successfully completed programme. The joint certificate, ToR and Diploma Supplement is issued by the coordinating partner university: Stockholm University.

The overall Master`s degree grade (in the German and Romanian grading system) for the programme is calculated from the average of all graded courses, as weighted by credit points. For the overall Master's degree grade on the Diploma Supplement, the grades are converted according to the following comparison table:

<table>
<tr><th>ECTS Grading Scale</th><th>UB</th><th>SU</th><th>UT</th></tr>
<tr><td>A</td><td>10</td><td>A</td><td>1,0-1,3</td></tr>
<tr><td>B</td><td>9</td><td>B</td><td>1,4-2,1</td></tr>
<tr><td>C</td><td>7, 8</td><td>C</td><td>2,2-2,8</td></tr>
<tr><td>D</td><td>6</td><td>D</td><td>2,9-3,6</td></tr>
<tr><td>E</td><td>5</td><td>E</td><td>3,7-4,0</td></tr>
<tr><td>FX</td><td rowspan="2">< 5</td><td>FX</td><td rowspan="2">4,1-5,0</td></tr>
<tr><td>F</td><td>F</td></tr>
</table>

## 2.3 Examinations Regulations of the Study Track

Examinations taken at the cooperating partner universities are carried out and assessed in accordance with the regulations that apply at the partner universities.

# 3 Study Track Content Overview

The study track overview by study progress is presented below:

| University | Type | Module Title | ECTS per Semester | | | | Total ECTS |
|---|---|---|---|---|---|---|---|
| | | | S1 | S2 | S3 | S4 | |
| **SU**<br>*Climate, Energy and Environment – A Transdisciplinary Perspective* | Mandatory | Systems Thinking | 3 | | | | **30** |
| | Mandatory | Climate, Environment and Energy – A Natural Science Perspective | 9 | | | | |
| | Mandatory | Climate, Environment and Energy – A Social Science Perspective | 9 | | | | |
| | Mandatory | Climate, Environment and Energy – A Humanities Perspective | 6 | | | | |
| | Mandatory | Creating Knowledge Through Transdisciplinary Methods | 3 | | | | |
| **SU**<br>*Environmental Toxicology* | Mandatory | Toxicology for Environmental Scientists | | 7.5 | | | **30** |
| | Mandatory | Risk Assessment and Regulation of Chemicals | | 7.5 | | | |
| | Mandatory | Environmental Field Studies | | 7.5 | | | |
| | Mandatory | Environmental Biogeochemistry | | 7.5 | | | |
| **UT**<br>*Environmental Chemistry* | Mandatory | Environmental Chemistry | | | 6 | | **30** |
| | Mandatory | Environmental Analytical Chemistry | | | 6 | | |
| | Mandatory | Modelling for Sustainable River Management | | | 6 | | |
| | Conditionally elective | 2 courses from the list provided:<br>• Global Change (6 ECTS)<br>• Biotransformation of Pollutants (6 ECTS)<br>• Isotopes in Ecosystem Sciences (6 ECTS)<br>• Inter- and Transdisciplinary Perspectives on Climate and the Environment (6 ECTS) | | | 12 | | |
| **SU / UT / UB*** <br>*Master Thesis* | Mandatory | Master Thesis | | | | 30 | **30** |
| | | | **30** | **30** | **30** | **30** | **120** |

**Students can choose SU or UT for the 4th semester, only if they are not resident in Germany or Sweden at the time of enrollment.*

# 4 Your semester at Stockholm University (SU)

The services provided at Stockholm University for the semester within the Study Environmental Chemistry and Toxicology are the same than the ones provided during the first semester (Common core) listed in the student handbook.

# 5 Your semester at Eberhard Karls University of Tübingen (UT)

## 5.1 Arrival and Welcome Activities

Starting out can be difficult. In the first few weeks, you will experience many new things. We aim to help you find your way around the University.

As an international student, you are invited to our Welcome Program, which includes a Help Desk, an academic writing workshop, a mini-workshop on study planning with the digital "Alma" system, and various peer-to-peer activities from students for students, for instance an advisory course on "How to study at a German university".

The University of Tübingen also offers a specific welcoming and introductory sessions here you can ask all your questions directly. Further information: Link

The Department of Geosciences at the University of Tübingen includes almost 40 professorships from the general fields of geology, mineralogy, environmental sciences, geography, and archaeological sciences. It is thus one of the largest departments of its kind at German universities.

## 5.2 Housing

It is difficult to find a room or an apartment in Tübingen at the beginning of your studies. The university has responded to the particularly tight situation on the housing market. The most common types of accommodation are the following:

- *Student residences:* A room in a student residence hall / dormitory is good value for money. Note that in Germany, all student residences are self-catering – you usually share a kitchen as well as sanitary facilities and have a single room on your own. Still, life in dormitories differs widely: In some dorms, residents do a lot together in their free time and form a close community; in others, they tend to keep to themselves. Accommodation in Tübingen can be found in halls of residence run by the Studierendenwerk.
- *Shared apartments:* A popular form of housing among students is sharing an apartment (Wohngemeinschaft, or WG for short). Similar to dormitories, life in WGs is various: Some apartments are shared by friends; in others, the flatmates aren't that close, but get together for joint activities from time to time. For some students, sharing a flat is an inexpensive way to live, but they are not that interested in forming a community. It's up to you what you make of a shared apartment. Most-used websites for sharing/finding shared apartments are: www.wg-gesucht.de, www.kleinanzeigen.de.

Further information: Link

All residents in Germany must register their place of residence with the local Residents' Registration Office (called "Bürgerbüro" in Tübingen) within two weeks of moving into their new accomodation. Book appointment in advance or complete the online registration by using your online ID function. Both forms of registration require a confirmation from your housing provider ("Wohnungsgeberbescheinigung") which can be either signed by your landlord and uploaded by you/handed in on site, or confirmed by your landlord electronically.

## 5.3 Living Expenses

The necessary allowance of a university student at the University of Tübingen per month would be:

| | |
|---|---|
| Cost of living (incl. transport) | 467 Euro |
| Rent | 500 Euro |
| Other expenditures (incl. health insurance) | 134 Euro |
| **Total expenses** | **1101 Euro** |

More Information for students at the University of Tübingen about student housing, canteens and cafeterias, studying abroad, student finances, studying with children, clubs and societies (music, the arts, theater, sport), mobility, insurances, and getting involved: Link.

## 5.4 Transport

Students at the University of Tübingen are entitled to a discounted semester ticket for local public transport. The semester ticket is valid on all buses and trains in the NALDO public transport network, which includes the greater districts of Tübingen, Reutlingen, Zollernalbkreis and Sigmaringen. No-one else is allowed to use your semester ticket. If you lose it, you must buy another one. Further Information: Link.

Here you can find more information on how to get to Tübingen.

## 5.5 Navigating Campus

The following map provides an overview of the campus. The campus is spread over the Altstadt, the Morgenstelle, the Kliniken and the Sand. The "Geo- und Umweltforschungszentrum" (Geo- and Environmental Center) hosts all groups active in environmental geosciences. It is located in close vincinity to the universities' further science departments.

In this interactive virtual guided tour of Tübingen (in German, produced in 2020, but still good for a first impression of the city), you can get to know some of the most relevant places in the city of Tübingen from the perspective of the students Amelie and Tony.

The University regularly hosts events that give interested members of the public, students and employees insights into topics being dealt with at the University. From concerts, exhibitions and conferences to public lectures - there is something for everyone. Further information: Link.

## 5.6 Student Health

Studying can pose many challenges, whether content-related, organizational or emotional. Psychologically difficult situations can arise at any stage of your studies. No matter whether you are dealing with study-related stress (e.g. coursework overload), with problems in your family or social life, or with economic or medical issues that may affect your mental health – the university offers you support through preventative services, counseling options, and competent contact points that you can turn to in situations of crisis. Further information: Link.

## 5.7 Special needs and Disability Support

Services for students with a disability or (chronic) illness: It is estimated that there are more than 4,000 students at the University of Tübingen whose ability to study is affected by illness and/or disability. In order to support such students, the University of Tübingen offers special counseling services that can be used at any stage of studies, or even before the start of studies.

We can support you in deciding on the appropriate type of study and university, in planning and organizing your studies, and in answering questions about possible alternatives. There is also the option of counseling in personally difficult situations. Important topics may also include financing your studies, getting access to necessary tools and resources, finding suitable housing, and assistance in everyday study routines. If you need an individual adjustment of study conditions, you can apply for disadvantage compensation ("Nachteilsausgleich"). Counseling is voluntary, confidential and open-ended. Further information: Link.

## 5.8 Resting and Contemplation Rooms

Whether you are preparing a group presentation, working individually or conducting research - the University Library offers you a variety of different work spaces. Further information: Link.

Since 2013, the university library has housed a "Room of Silence" in the transition between the Bonatzbau and the main building.It was set up by the University of Tübingen to be open to members of all religions for individual prayer and meditation. However, it can also serve as a retreat for people without religious convictions for a moment of silence and pause. Further information: Link.

In the Ammerbau on level 3 (A321), a resting and work room is available for students with disabilities or a (chronic) illness. The room is accessible without barriers and equipped with a height-adjustable desk, an armchair with stool and a yoga mat. Further information: Link.

## 5.9 Student Organisation

For students of all academic fields and study programs: Here you can find all our counseling services, events and workshops, as well as a range of useful information for studying at the University of Tübingen. The Student Counseling Service is there for you throughout your studies. We support you at the beginning and during all stages of your study program. We offer you a wide range of events, guidance materials, and of course individual counseling. We are a neutral service and will always treat your situation as confidential; i.e. the counseling is subject to professional discretion.

When do lectures start? Which courses can I take? And how do I take leave of absence? From planning your timetable, to expenses and paperwork, to getting assistance with your studies - the information below can help you get organized. For further information: Link.

The University of Tübingen offers a number of different services which give helpful advice if you are planning to study in Tübingen or if you are already enrolled here - whether you are just beginning, are well into your studies, or are finishing your studies and planning a career. Directly below, you will find a list of these services, sorted according to topic as well as according to the different phases of studying. For further information: Link.

Students at the University of Tübingen have various opportunities to become involved in University policymaking. The University of Tübingen is home to many student groups and initiatives which are active in the fields of politics, the environment, or in social policy. For further information: Link

The University sports programme opens for registration about a week before the semester begins and offers a wide range of options — from high-intensity fitness classes and team sports to stress-relief activities such as mindfulness training, nutrition seminars, and meditation workshops.

## 5.10 Language Courses

Learning German at the University of Tübingen

- Are you interested in taking a summer course or an intensive course at a famous German university during your semester break?
- Would you like to take the German proficiency exam (DSH) and get ready to study at a German university? Or would you like to improve your German while studying in Germany?
- The common language in your lab, your working group or in your classes is English, but would you like to be proficient enough to successfully handle everyday situations in German?
- Would you like to learn more about Germany and its people?
- The department “German as a Foreign Language and Intercultural Programs” offers German language classes, courses relating to the geography, history and institutions of Germany and language proficiency exams.

Learning Foreign Languages at the University of Tübingen

- Would you like to improve your languages skills while studying and acquire important additional qualifications for your future working life?
- Do you need a UNIcert certificate or a country specific certificate in order to be able to account for your language level?
- Are you studying at the University of Tübingen and are interested in voluntary additional language Training?

Language courses for students of the University of Tübingen are offered by the Foreign Language Center (FSZ). You can find more information about the courses here.

# 6 Your semester at the University of Bucharest (UB)

## 6.1 Arrival and Welcome Activities

The University of Bucharest offers a range of arrival and welcome activities to help new students integrate smoothly into university life. These initiatives are designed to familiarize students with the campus, academic procedures, and the vibrant community. Key activities include:

- **Welcome Sessions:** At the beginning of each semester, the university organizes welcome sessions for incoming students. These sessions provide essential information about academic programs, campus facilities, and student services. They also offer an opportunity to meet faculty members and fellow students.
- **Romanian Language Courses:** For international students, the University of Bucharest offers Romanian language courses during the academic year. These courses cater to different proficiency levels, including beginners and intermediate learners. Each module lasts for one semester and includes both oral and written assessments, awarding 6 ECTS upon completion. The courses are free of charge and include a Romanian language manual.
- **Buddy Network:** The university's Erasmus Student Network (ESN, https://unibucharest.esn.ro/) runs a Buddy Network program, pairing incoming students with current students. This initiative helps newcomers acclimate to the university environment, providing guidance on academic and social aspects of student life. The Buddy Network also organizes various events, trips, and cultural activities to enhance the student experience.
- **Orientation Events:** Throughout the academic year, the university hosts various orientation events, including campus tours, informational workshops, and social gatherings. These events aim to introduce students to the university's resources, support services, and extracurricular opportunities.

For more detailed information, please refer to the International Students Guide provided by the University of Bucharest.

## 6.2 Housing

The University of Bucharest offers approximately 5,300 accommodation places across 15 dormitories, covering nearly 80% of the student housing demand. Priority for on-campus housing is typically given to students with higher entrance examination scores. For detailed information on the available dormitories, including their facilities and contact details, you can visit the Student Dormitories page.

The accommodation process, including eligibility criteria and application procedures, is outlined on the Accommodation Process page. It's important to note that the university can accommodate students within the limits of available places. For those who do not receive on-campus housing, renting a private apartment is a common alternative. The university advises contacting a real estate agency for assistance, with typical rents for a two-room flat ranging between €250–€300 per

month, excluding utilities. Signing a rental contract is necessary, as it will be required by the Immigration Office when applying for a residence permit.

Additionally, private student residences in Bucharest, such as Arcca, Campus Est, and West Gate Studios, offer modern amenities and can be viable alternatives for accommodation. For more information on these options, you can refer to the Accommodation section on the Study in Bucharest website.

For further assistance, you can contact the International Relations and Foreign Students Office at the University of Bucharest:

- **Telephone:** +4021-305.46.41 / +4021-305.46.42
- **Email:** contact@externe.unibuc.ro
- **Address:** 90 Panduri Road, 4th floor, room 404, Bucharest, 050663, Romania

Office hours are Monday to Thursday, 11:00 – 13:00.

## 6.3 Living Expenses

The following table should give you an idea of the average cost of living. The figures may vary according to your personal lifestyle. Information on living expenses in Bucharest can be found here: https://studyinbucharest.com/life-in-bucharest/cost-of-living

**Subsistence**

- Meals 200 EURO/ month
- Local transportation 15 EURO/ month
- Pocket money 80 EURO/ month

**Accommodation in town (in private appartments rented)**

- Rent 250-400 EURO/ month (depending on the area)
- Facilities 100 EURO/ month

**Medical lnsurance is to be paid in each applicant's native country**

- Emergencies are free of charge

## 6.4 Transport

**Subway** - Bucharest is the only Romanian city which enjoys the benefits of the subway (www.metrorex.ro). There are four underground lines crossing the city: from north to south (M2-blue), from east to west (M3-red), a circular raute (Ml-yellow), and an exclusively northern raute, from 1 Mai Station to Gara de Nord (M4-green). You must buy a magnetic metro card for either 2 rides or 10 rides. Subways operate from• 5.00 am until 11.00 pm. Check the underground map for routes and stops.

**Buses,** Trolley Buses and Trams run throughout the entire city from dawn to 11.00 pm. Tickets and magnetic cards can be purchased from yellow pained kiosks with the logo RATB located near the intersections of the main streets or in bus stations. When you get on the bus validate the ticket by punching it in the little box on board. As for the schedules you can check: www.ratb.ro.

**Taxis -** Taxis a re usually picked u p on street corners where the cabbies hang out, rather than hailed on the street. Try to use only licensed metered taxis that have a lighted sign on top, and their name, number and rate on the car door.

Information on public transport in Bucharest can be found here: https://studyinbucharest.com/life-in-bucharest/transport

## 6.5 Navigating Campus

Navigating the University of Bucharest campus is essential for students to efficiently locate faculties, administrative offices, and other key facilities. Below is a guide to help you find your way around.

**Campus Overview**

- The University of Bucharest comprises multiple buildings and faculties spread across the city.
- The **main administrative building (Rector's Office)** is located at **90 Panduri Street, Sector 5, Bucharest**, and houses faculties such as Psychology and Educational Sciences, Sociology and Social Work, and Chemistry.
- More information about campus locations can be found **here**.

**Campus Map**

- For a detailed layout of the university's facilities, including **student dormitories, dining halls, and IT&C services**, visit the official **campus page**.

**Student Guide**

- The university provides a comprehensive **Student's Guide**, covering accommodation, transportation, and student services.
- Access the guide **here**.

**Resources for International Students**

- If you're an **international student**, the university offers tailored resources to help you adjust to campus life and the city.
- More details are available on the **international students' page**.

**Contact Information**

For specific inquiries or further assistance, you can contact the university:

- **Address:** 90 Panduri Street, Sector 5, 050663, Bucharest, Romania
- **Email:** office@g.unibuc.ro
- **Phone:** +40 21 305 97 30
- Faculty-specific contact details are available **here**.

## 6.6 Student Health

Through psychological counselling we get involved in finding solutions to overcome problematic situations which can affect a student's experience as a whole, starting from the entrance examination to graduation, by taking into account:

- getting through emotional difficulties
- support for self-knowledge
- the evaluation of values, interests and professional abilities
- stress management during exam sessions

You can register for a counselling sesion here.

The students of the University of Bucharest benefit from free medical services, offered by the Medical Consulting Room found in the Mihail Kogălniceanu Dormitory.

The Medical Consulting Room belongs to the Bucharest Hospital Administration and has 12 employees (8 medics and 4 nurses), covering General Medicine and Stomatology specializations.

At the University of Bucharest, students have access to free medical services through the Medical Consulting Room located in the Mihail Kogălniceanu Dormitory. This facility is staffed by a team of 12 professionals, including 8 doctors and 4 nurses, specializing in General Medicine and

Stomatology. The consulting room operates Monday to Friday, from 08:00 to 19:00. All University of Bucharest students, regardless of their faculty or department, are eligible to utilize these services. https://unibuc.ro/student-ub/campus/asistenta-medicala-gratuita/?lang=en

**Contact Information:**

- **Phone:** +4021.315.71.87 ext. 138
- **Address:** 36-46 Mihail Kogălniceanu Blvd, Mihail Kogălniceanu Complex, Sector 5, Bucharest

## 6.7 Special Needs and Disability Support

The University of Bucharest declared its institutional commitment to the social mission of ensuring an accessible, inclusive and open-minded educational environment and meeting the needs of students with disabilities in an attempt to remove barriers to access to higher education for vulnerable groups.

Thus, a series of measures were adopted aimed at supporting young people with special needs in fully accessing the opportunities and the administrative and educational services offered by the University of Bucharest.

At the same time, the University of Bucharest proposes and undertakes to strengthen the administrative capacity by diversifying the means of communication and support services and also to integrate accessibility standards in future projects aimed at adapting the physical and digital infrastructure to the needs of people with disabilities.

Here you can find the support services offered by the University of Bucharest.

## 6.8 Resting and Contemplation Rooms

The students of the University of Bucharest have access to the Central University Library, one of the most modern in Europe (www.bcub.ro). lt has 12 specialized reading rooms, a reference section, a lending division and department for textbooks and other facilities fully computerized, with full permanent Internet access and access to Search -OCLC (Online Computer Library Centre). The Central University Library is located in Piata Revolutiei.

Each faculty of the University has also its own library where you can find books in the domain you study.

## 6.9 Student Unions

The University of Bucharest offers a diverse range of student organizations that enhance academic, cultural, and social experiences. Here are some key associations:

- **Association of Students at the University of Bucharest (ASUB)** – Represents students across all faculties, advocating for their rights and organizing events to support personal and professional development.
- **Erasmus Student Network (ESN) UniBucharest** – Supports international students in integrating into university life through cultural events and social activities.

For more details on these and other student organizations, visit the University of Bucharest's official website.

A free weekly guide named Sapte seri (Seven Evenings) will teil you everything: you want to know about cinemas, theatres, nightclubs, restaurants, pubs, spart rooms, art events, music, concerts, exhibitions and many other things. The guide is available in all public places, from the university buildings to cinemas and restaurants (www.sapteseri.ro). Also a good gl1ide of all restaurants, pubs and clubs in Bucharest is www.afterhours.ro.

Besides that, all newspapers in Bucharest offer in their cultural pages information on cinema and theatre performances.

## 6.10 Language Courses

The **University of Bucharest** offers various **language courses** for students, including:

- **Foreign Language Centre** – Courses in English, French, German, Spanish, Chinese, Arabic, and more. Details here
- **Preparatory Year for Romanian** – For international students studying in Romanian. More info
- **Summer Courses** – Intensive Romanian language & culture programs. Check here

The Foreign Language Centre of the University of Bucharest awards certificates for the following languages: Romanian, English, French, German, Italian, Spanish, Hungarian, Russian, Czech, Slovakian, Polish, Bulgarian, Turkish, Arabic, Chinese etc.

Here you can find further information: Link.

# 7 Description of the Curriculum

| **Legend** | |
|---|---|
| **Grading System:** | g = graded<br>ng = not graded (pass/fail)<br>nE = no exam |
| **Type of Exams/ Study Requirement:** | WE = written assessment<br>OE = oral assessment<br>A = assignment / term paper, written report<br>R = report, presentation<br>LP = lab protocol / journal<br>SP = successful participation<br>PF = portfolio examination<br>MT = Master Thesis |
| **Duration of Assessment:** | Duration of the assessment in *min* |
| **Weighting:** | Weighting of grade for the module |
| **CH:** | Credit Hours |
| **Status:** | c = compulsory<br>op = optional |
| **Type of Lecture:** | L = lecture<br>S = seminar<br>E = exercise/tutorial<br>FC = field course<br>LC = laboratory course<br>PR = project |
| **CR:** | Credits (ECTS) |

## 7.1 First Semester at SU

| **Module Number: TRACEE_ST** | **Module Title: System Thinking** | | **Type of Module: Mandatory** |
|---|---|---|---|
| **Credits (ECTS)*** | 3 CP | | |
| **Workload* - Contact Time - Private Study** | Workload: 90 h | Contact Time: Depends on the selected courses | Private Study: Depends on the selected courses |
| **Duration of Module* Module Coordinator** | 1 semester | Stockholm University | |
| **Regular Cycle*** | Every academic year | | |
| **Language** | English | | |
| **Learning- / Teaching Forms*** | Seminar, group work, collaborative learning, case studies, presentation<br>(Will be informed at the beginning of the selected course) | | |
| **Module Content*** | • Definition and core concepts of systems thinking<br>• Understanding complexity in environmental, social, and technological systems<br>• Characteristics of complex systems: emergence, nonlinearity, self-organization, and adaptation<br>• The role of uncertainty in systems analysis<br>• Introduction to complexity science and its relevance to climate, environment, and energy studies<br>• Integrating knowledge across disciplines: natural sciences, social sciences, engineering, and policy<br>• Transdisciplinary research: involving stakeholders in system design and problem-solving<br>• Designing sustainable systems using a systems thinking approach<br>• Ethical considerations and ensuring equity in system design | | |
| **Qualification Goals*** | Students will be able to discuss systems thinking and its history, central system concepts, as well as types of systems and their properties.<br><br>Students will develop a comprehensive understanding of system thinking principles. They will gain the ability to identify and analyze complex systems in the context of climate, environment, and energy.<br><br>Students will be able to apply system thinking frameworks to address interdisciplinary challenges related to climate change, environmental sustainability, and energy transitions. This includes recognizing the interdependencies between social, ecological, and technological systems.<br><br>Students will learn how to engage in transdisciplinary collaboration, integrating knowledge from diverse fields such as science, policy, engineering, and social sciences. They will enhance their ability to communicate complex system dynamics to both experts and non-experts.<br><br>Students will be trained to critically evaluate and design sustainable solutions to address global challenges. They will develop the ability to assess the long-term consequences of interventions within interconnected environmental, social, and energy systems. | | |

| **Prerequisites for the allocation of credits /grades (if necessary weighting)*** | *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
|---|---|---|---|---|---|---|---|---|---|
| | *Selected Courses* | *various* | *c* | - | *3* | *Written or oral* | - | *g* | - |
| **Applicability*** | - | | | | | | | | |
| **Participation Prerequisites*** | No prerequisites | | | | | | | | |

| Module Number: TRACEE_NSP | Module Title: Climate, Environment and Energy – A Natural Science Perspective | | Type of Module: Mandatory |
|---|---|---|---|
| **Credits (ECTS)*** | 9 CP | | |
| **Workload*** **- Contact Time** **- Private Study** | Workload: 270 h | Contact Time: Depends on the selected courses | Private Study: Depends on the selected courses |
| **Duration of Module*** **Module Coordinator** | 1 semester | Stockholm University | |
| **Regular Cycle*** | Every academic year | | |
| **Language** | English | | |
| **Learning- / Teaching Forms*** | Seminar, group work, collaborative learning, case studies, presentation (Will be informed at the beginning of the selected course) | | |
| **Module Content*** | • Introduction to Natural Science Perspectives on Climate, Environment, and Energy<br>• Climate Science and its Drivers<br>• The Earth System and Interactions<br>• Biodiversity and Ecosystem Dynamics<br>• Energy Systems and Natural Resource Use<br>• Climate-Environment-Energy Interactions<br>• Environmental Pollution and Contaminants<br>• Climate Change Impacts on the Earth System<br>• Climate Change Mitigation and Adaptation from a Natural Science Perspective<br>• The Role of Natural Science in Environmental Policy and Global Governance<br>• Emerging Topics in Natural Sciences and Environmental Change | | |
| **Qualification Goals*** | Students will be able to desscribe energy and matter and their transfer within the Earth's system, as well as solutions for future energy supply. They can describe global biogeochemical cycles, ecosystem services, and biodiversity, as well as the risks they face due to global environmental changes.<br><br>Students will be able to explain the climate system, drivers and feedback mechanisms, as well as Earth's past, present, and future climate. They will develop the ability to explain key concepts such as the greenhouse effect, energy flow, carbon cycles, ecosystem dynamics, and the interactions between natural and human systems.<br><br>Students will be able to apply systems thinking to complex environmental and energy challenges, recognizing the interconnectedness of climate, ecosystems, and energy systems. They will be proficient in analyzing the interactions and feedbacks between natural systems, human activities, and technological interventions.<br><br>Students will develop the ability to effectively communicate complex scientific concepts related to climate, environment, and energy to both specialist and non-specialist audiences. They will be able to convey the significance of scientific data and findings to policymakers, stakeholders, and the general public in an accessible and compelling manner.<br><br>Students will be equipped to integrate scientific knowledge into environmental and climate policy development. They will learn how to use natural science data to inform decision-making processes, especially in the context of global climate negotiations, energy transitions, and sustainable development.<br><br>Students will develop interdisciplinary skills, collaborating with experts from various fields (e.g., social sciences, engineering, policy) to address complex climate and environmental issues. They will also refine their critical thinking skills to assess and challenge existing scientific theories and assumptions, contributing to more effective, evidence-based solutions.<br><br>Students will understand the ethical implications of environmental and climate science. They will develop a strong commitment to sustainability and social responsibility, considering the long-term impacts of scientific solutions on global ecosystems, human communities, and future generations. | | |

| **Prerequisites for the allocation of credits /grades (if necessary weighting)*** | *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
|---|---|---|---|---|---|---|---|---|---|
| | *Selected Courses* | *various* | *c* | - | *9* | *Written or oral* | - | *g* | - |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Applicability*** | - | | | | | | | | |
| **Participation Prerequisites*** | No prerequisites | | | | | | | | |

| Module Number: TRACEE_SSP | Module Title: Climate, Environment and Energy – A Social Science Perspective | | | | | Type of Module: Mandatory | | | |
|---|---|---|---|---|---|---|---|---|---|
| Credits (ECTS)* | 9 CP | | | | | | | | |
| Workload* - Contact Time - Private Study | Workload: 270 h | Contact Time: Depends on the selected courses | | | | Private Study: Depends on the selected courses | | | |
| Duration of Module* Module Coordinator | 1 semester | | | | Stockholm University | | | | |
| Regular Cycle* | Every academic year | | | | | | | | |
| Language | English | | | | | | | | |
| Learning- / Teaching Forms* | Seminar, group work, collaborative learning, case studies, presentation (Will be informed at the beginning of the selected course) | | | | | | | | |
| Module Content* | • Introduction to Social Science Perspectives on Climate, Environment, and Energy<br>• The Political Economy of Climate Change and Environmental Issues<br>• Environmental Policy and Governance<br>• Social Movements, Public Opinion, and Climate Activism<br>• Energy Systems and Social Equity<br>• Ethics, Responsibility, and Climate Justice<br>• Social Science Methods for Climate and Environmental Research<br>• Future of Climate, Environment, and Energy Governance | | | | | | | | |
| Qualification Goals* | Students will gain a deep understanding of the key concepts and theoretical frameworks from social sciences (e.g., sociology, economics, political science, anthropology) used to analyze climate change, environmental issues, and energy transitions.<br><br>Students can describe past, present, and future economics, politics, and policies on energy systems, environment, and climate change. They are able to discuss the international, European, and national legal framework for climate, environmental, and energy policies and the transition.<br><br>Students are able to discuss knowledge, behaviour and action in relation to climate change, as well as the role of communication and education in addressing environmental and climate challenges.<br><br>Students will develop the ability to assess the social implications of climate change, such as environmental justice, vulnerability, inequality, and power relations. They will analyze how social factors, including gender, race, class, and access to resources, intersect with climate impacts and energy systems.<br><br>Students will acquire the skills to analyze environmental and climate policies, governance structures, and institutions at local, national, and international levels. They will evaluate the effectiveness of different policy responses, such as carbon pricing, climate adaptation strategies, and renewable energy transitions, through a social science lens.<br><br>Students will understand the global-local dynamics of environmental and energy systems, analyzing how global climate change and energy policies interact with local contexts, cultures, and practices. | | | | | | | | |
| Prerequisites for the allocation of credits /grades (if necessary weighting)* | *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
| | *Selected Courses* | *various* | *c* | - | *9* | *Written or oral* | - | *g* | - |
| Applicability* | - | | | | | | | | |
| Participation Prerequisites* | No prerequisites | | | | | | | | |

| Module Number: TRACEE_HP | Module Title: Climate, Environment and Energy – A Humanities Perspective | | Type of Module: Mandatory |
|---|---|---|---|
| **Credits (ECTS)*** | 6 CP | | |
| **Workload*** **- Contact Time** **- Private Study** | Workload: 180 h | Contact Time: Depends on the selected courses | Private Study: Depends on the selected courses |
| **Duration of Module*** **Module Coordinator** | 1 semester | Stockholm University | |
| **Regular Cycle*** | Every academic year | | |
| **Language** | English | | |
| **Learning- / Teaching Forms*** | Seminar, group work, collaborative learning, case studies, presentation<br>(Will be informed at the beginning of the selected course) | | |
| **Module Content*** | • Introduction to Humanities Perspectives on Climate, Environment, and Energy<br>• Environmental Ethics and Justice<br>• Cultural Narratives and Climate Change<br>• History of Environmental Thought and Action<br>• Philosophy of Nature and Human-Nature Relationship<br>• The Role of Art and Literature in Shaping Environmental Consciousness<br>• Technology, Innovation, and Cultural Responses to Climate and Energy Challenges<br>• Future Visions: Imagining Sustainable Futures | | |
| **Qualification Goals*** | Students will develop a deep understanding of how the humanities (e.g., philosophy, history, literature, ethics, cultural studies) contribute to the analysis of climate change, environmental issues, and energy systems.<br><br>Students can discuss historical, literary, aesthetic, and philosophical aspects of environmental thinking and addressing concerns about climate and the environment. Students will understand the historical roots of current environmental and energy crises, exploring past environmental transformations, colonialism, industrialization, and their lasting impacts on contemporary climate and energy systems.<br><br>Students will explore how literature, art, and media have represented and influenced public perceptions of climate change, energy, and the environment. They will develop the ability to analyze environmental storytelling, symbolism, and cultural expressions of sustainability, environmental degradation, and the Anthropocene.<br><br>Students will explore how climate change and environmental issues are framed through political, social, and economic discourse, and how these narratives shape public policy, scientific understanding, and collective action. They will analyze how different narratives (e.g., crisis, opportunity, denial) influence the public's perception of climate change and environmental issues, and how these narratives can be leveraged to promote climate action.<br><br>Students will develop the skills to collaborate across disciplines, integrating humanistic perspectives with natural and social science research to address climate, environmental, and energy challenges. They will learn how to bridge the gap between scientific knowledge and societal values, ensuring that policy and solutions reflect not only technical feasibility but also cultural and ethical considerations.<br><br>Students are able to analyse sociocultural paradigms and rhetorical strategies in climate and environmental communication. | | |

| **Prerequisites for the allocation of credits /grades (if necessary weighting)*** | *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
|---|---|---|---|---|---|---|---|---|---|
| | *Selected Courses* | *various* | *c* | - | *6* | *Written or oral* | - | *g* | - |
| **Applicability*** | - | | | | | | | | |
| **Participation Prerequisites*** | No prerequisites | | | | | | | | |

| **Module Number:**<br>**TRACEE_CK** | **Module Title:**<br>**Creating Knowledge Through Transdisciplinary Methods** | | **Type of Module:**<br>**Mandatory** |
|---|---|---|---|
| **Credits (ECTS)*** | 3 CP | | |
| **Workload***<br>**- Contact Time**<br>**- Private Study** | Workload:<br>90 h | Contact Time:<br>Depends on the selected courses | Private Study:<br>Depends on the selected courses |
| **Duration of Module***<br>**Module Coordinator** | 1 semester | Stockholm University | |
| **Regular Cycle*** | Every academic year | | |
| **Language** | English | | |
| **Learning- / Teaching Forms*** | Seminar, group work, collaborative learning, case studies, presentation<br>(Will be informed at the beginning of the selected course) | | |
| **Module Content*** | • Introduction to Transdisciplinary Knowledge Creation<br>• Methods and Tools for Creating Knowledge through Transdiciplinary Methods<br>• Collaborative Knowledge<br>• Creation in Transdisciplinary research: Case Studies | | |
| **Qualification Goals*** | Students can describe methods for involving society in different cultural contexts for knowledge generation and case studies of transdisciplinary research.<br><br>Students will acquire a comprehensive understanding of the principles and practices of transdisciplinary research, particularly the role of community collaboration in generating knowledge. They will understand how integrating local and community-based knowledge with scientific expertise can lead to more effective solutions for climate, environment, and energy challenges.<br><br>Students will acquire skills to effectively translate and disseminate research findings in accessible formats for diverse community audiences, ensuring that research benefits are shared and understood by those directly affected. They will develop strategies for knowledge translation that respect community preferences and enhance local capacity for decision-making and action. | | |

| **Prerequisites for the allocation of credits /grades (if necessary weighting)*** | *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
|---|---|---|---|---|---|---|---|---|---|
| | *Selected Courses* | *various* | *c* | - | *3* | *Written or oral* | - | *g* | - |

| | |
|---|---|
| **Applicability*** | - |
| **Participation Prerequisites*** | No prerequisites |

## 7.2 Second Semester at SU

| **Module Number: MI7015** | **Module Title: Toxicology for Environmental Scientists** | | **Type of Module: Mandatory** | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Credits (ECTS)*** | 7.5 CP | | | | | | | | |
| **Workload* - Contact Time - Private Study** | Workload: 225 h | Contact Time: Depends on the selected courses | | Private Study: Depends on the selected courses | | | | | |
| **Duration of Module* Module Coordinator** | 1 semester | | J.Martin | | | | | | |
| **Regular Cycle*** | Every academic year | | | | | | | | |
| **Language** | English | | | | | | | | |
| **Learning- / Teaching Forms*** | Lectures, seminars, exercises, laboratory experiments and a project work | | | | | | | | |
| **Module Content*** | This course addresses toxicological fundamental principles with the aim of understanding the hazards that chemical pollutants pose to living organisms. The course provides knowledge about standard methods for toxicity testing, technical terminology, dose-response relationships, and the estimation of chemical and biological factors affecting the toxicity of pollutants under different exposure scenarios.<br>The course covers:<br>• Experimental methods and basic statistics used in toxicological testing<br>• Key toxicological concepts, such as dose-response relationships, target receptors, and mechanisms of action<br>• Toxicological effects at the molecular, individual, and population levels<br>• Absorption, distribution, metabolism, and excretion (ADME), taking into account the unique anatomy and biochemistry of exposed organisms, as well as the physicochemical properties of different chemical pollutants | | | | | | | | |
| **Qualification Goals*** | The students can<br>• explain how environmental pollutants can be absorbed in living organisms, distributed to different tissues, metabolized, and excreted<br>• explain, at the molecular level, how various properties of environmental pollutants can cause different toxic effects<br>• discuss the possibilities and limitations of various testing methods used to study the toxic effects of environmental pollutants.<br>• apply relevant statistical methods to analyse toxicological datasets<br>• communicate in writing and orally about ADME (absorption, distribution, metabolism, and excretion) and the toxicity of an environmental pollutant | | | | | | | | |
| **Prerequisites for the allocation of credits / grades (if necessary weighting)*** | *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
| | *Selected Courses* | *various* | *c* | - | *7.5* | *Written or oral* | - | *g* | - |
| **Applicability*** | - | | | | | | | | |
| **Participation Prerequisites*** | Requires knowledge equivalent to<br>• Bachelor of Science, or its equivalent, including at least 30 ECTS in chemistry | | | | | | | | |

| Module Number: MI8022 | Module Title: Risk assessment and regulation of chemicals | | Type of Module: Mandatory |
|---|---|---|---|
| Credits (ECTS)* | 7.5 CP | | |
| Workload* - Contact Time - Private Study | Workload: 225 h | Contact Time: Depends on the selected courses | Private Study: Depends on the selected courses |
| Duration of Module* Module Coordinator | 1 semester | M. Ågerstrand | |
| Regular Cycle* | Every academic year | | |
| Language | English | | |
| Learning- / Teaching Forms* | Lectures, seminars and individual project work | | |
| Module Content* | • The course explores the general principles of regulatory risk assessment of chemicals<br>• Concepts that will be covered include: Hazard assessment, dose-response, exposure assessment, and risk characterization<br>• An overarching theme will be the use of different types of scientific data in risk assessment and how data are evaluated and weighed in the process<br>• In addition, the course will introduce the system for regulating chemicals within the European Union and internationally | | |
| Qualification Goals* | The students can<br>• demonstrate understanding of the methodology and principles of hazard and risk assessments of chemicals<br>• demonstrate understanding of how scientific data is assessed, valued and used for hazard and risk assessment of chemicals<br>• demonstrate understanding of the chemicals regulation in Europe and international agreements and treaties<br>• critically examine a risk assessment | | |

| Prerequisites for the allocation of credits / grades (if necessary weighting)* | *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
|---|---|---|---|---|---|---|---|---|---|
| | *Selected Courses* | *various* | *c* | - | *7.5* | *Written or oral* | - | *g* | - |

| | |
|---|---|
| Applicability* | - |
| Participation Prerequisites* | Requires knowledge equivalent to<br>• Large Scale Challenges to Climate and Environment, 15 credits (MI7014)<br>• Toxicology for Environmental Scientists, 7.5 credits, (MI7015) |

| Module Number: MI8021 | Module Title: Environmental Field Studies | | Type of Module: Mandatory |
|---|---|---|---|
| Credits (ECTS)* | 7.5 CP | | |
| Workload* - Contact Time - Private Study | Workload: 225 h | Contact Time: Depends on the selected courses | Private Study: Depends on the selected courses |
| Duration of Module* Module Coordinator | 1 semester | S. Jonsson | |
| Regular Cycle* | Every academic year | | |
| Language | English | | |
| Learning- / Teaching Forms* | Lectures, seminars and excursions | | |
| Module Content* | • The course discusses the principles of planning and conducting field investigations in environmental science<br>• Field excursions provide knowledge of the composition and structure of different environmental compartments: Soil systems, inland water systems, coastal systems and the lower atmosphere<br>• Hands-on experience with sampling and measurement of core environmental properties as well as demonstration of state-of-the-art techniques<br>• Each field excursion is followed by seminars and exercises where biogeochemical concepts and processes are evaluated | | |
| Qualification Goals* | The students can<br>• describe the composition and function of environmental compartments using biogeochemical concepts and core parameters<br>• design and plan field investigations<br>• give examples of state-of-the-art field techniques<br>• describe basic principles behind the field sampling and measurement methods<br>• interpret and draw quantitative and qualitative conclusion from environmental data and be aware of sources of uncertainties<br>• reflect on advantages and limitations of model-, experimental- and field-based studies | | |

| Prerequisites for the allocation of credits /grades (if necessary weighting)* | *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
|---|---|---|---|---|---|---|---|---|---|
| | *Selected Courses* | *various* | *c* | - | *7.5* | *Written or oral* | - | *g* | - |

| | |
|---|---|
| Applicability* | - |
| Participation Prerequisites* | Knowledge equivalent to 30 credits on<br>• the Master's programme in Environmental Science with a focus on Environmental Chemistry and Toxicology<br>• Or the Master's programme in Environmental Science with a focus on Atmosphere, Biogeochemistry, Climate including the course Large Scale Challenges to the Climate and the Environment, 15 credits, (MI7014) |

| Module Number: MI8017 | Module Title: Environmental Biogeochemistry | | Type of Module: Mandatory |
|---|---|---|---|
| Credits (ECTS)* | 7.5 CP | | |
| Workload*<br>- Contact Time<br>- Private Study | Workload:<br>225 h | Contact Time:<br>Depends on the selected courses | Private Study:<br>Depends on the selected courses |
| Duration of Module*<br>Module Coordinator | 1 semester | S. Jonsson (2024), B. Wild (2025) | |
| Regular Cycle* | Every academic year | | |
| Language | English | | |
| Learning- / Teaching Forms* | Lectures, exercises and seminar workshops | | |
| Module Content* | • The course explores interactions between natural systems, biogeochemical cycles and anthropogenic (human-induced) perturbations with focus on the local-regional scale<br>• The course will provide knowledge about:<br>• Biogeochemical processes in soil, inland waters, coastal ocean, sediments and lower atmosphere<br>• Interactions between biogeochemical cycles of several elements, and their seasonal and regional variations<br>• Key anthropogenic perturbations and their interactions with regional biogeochemical cycles<br>• Effects of natural processes and perturbations on the fate and bioavailability of contaminants<br>• The role of biogeochemistry in environmental management concepts and tools, such as in ecosystem services and the EU Water Framework Directive | | |
| Qualification Goals* | The students can<br>• describe coupled biogeochemical cycling of carbon, nutrients and other elements in local-regional terrestrial and aquatic systems<br>• explain how anthropogenic perturbations, such as eutrophication and acidification, interact with biogeochemical cycles<br>• outline environmental cycling of contaminants and their coupling to cycling of other elements and anthropogenic perturbations<br>• discuss consequences of anthropogenic perturbation on biogeochemical cycles for e.g. ecosystem services | | |

| Prerequisites for the allocation of credits /grades (if necessary weighting)* | *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
|---|---|---|---|---|---|---|---|---|---|
| | *Selected Courses* | *various* | *c* | - | *7,5* | *Written or oral* | - | *g* | - |

| | |
|---|---|
| Applicability* | - |
| Participation Prerequisites* | Requires knowledge equivalent to<br>• Large Scale Challenges to Climate and Environment, 15 credits (MI7014) |

## 7.3 Third Semester at UT

| **Module Number: M 207** | **Module Title: Environmental Chemistry** | | | | | **Type of Module: Mandatory** | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Credits (ECTS)*** | 6 | | | | | | | | |
| **Workload* - Contact Time - Private Study** | Workload: 180 h | Contact Time: 90 h / 6 SWS | | | | Private Study: 90 h | | | |
| **Duration of Module* Module coordinator** | 1 semester | | | Zarfl | | | | | |
| **Regular Cycle*** | Every winter semester, recommended for 1st semester | | | | | | | | |
| **Language** | English | | | | | | | | |
| **Learning- / Teaching Forms*** | Lectures, Exercises, Tutorial, Teamwork | | | | | | | | |
| **Module Content*** | • Chemical thermodynamics in aqueous systems<br>• Sorption and partitioning processes of organic and inorganic compounds<br>• Sorption kinetics<br>• Practical applications and case studies | | | | | | | | |
| **Qualification Goals*** | • Role of particles as sorbents, vectors and reactants for contaminants<br>• Quantitative understanding of partitioning and sorption mechanisms of organic and inorganic compounds in the hydrosphere<br>• Knowledge of sorption QSARs for various classes of contaminants<br>• Sorption kinetics and retarded diffusion in porous media<br>• Assessment of contaminant release and cleanup strategies at contaminated sites | | | | | | | | |
| **Prerequisites for the allocation of credits / grades (if necessary weighting)*** | *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
| | *Environmental Chemistry Lecture* | *L* | *c* | *2* | *6* | *WE* | *120* | *g* | *1* |
| | *Environmental Chemistry Exercises* | *E* | *c* | *2* | | | | | |
| | *Environmental Chemistry Tutorials* | *E* | *c* | *2* | | | | | |
| **Applicability*** | MSc Applied & Environmental Geoscience (c), MSc Geoökologie (e), MSc Geowissenschaften (e) | | | | | | | | |
| **Participation Prerequisites*** | Basic knowledge in Chemistry, Physics, Hydrogeology | | | | | | | | |

| Module Number: M 218 | Module Title: Environmental Analytical Chemistry | | Type of Module: Mandatory |
|---|---|---|---|
| Credits (ECTS)* | 6 | | |
| Workload* - Contact Time - Private Study | Workload: 180 h | Contact Time: 90 h / 6 SWS | Private Study: 90 h |
| Duration of Module* Module Coordinator | 1 semester | Zwiener | |
| Regular Cycle* | Every winter semester (recommended for the 1st semester) | | |
| Language | English | | |
| Learning- / Teaching Forms* | The module combines classroom lectures and exercises with a one week laboratory practical course, which allows students to apply their theoretical classroom knowledge and gain practical laboratory skills. Regular homework and lab presentations give feedback on individual study progress. | | |
| Module Content* | The module focuses on:<br>• Analysis of new emerging and polar compounds in environmental media<br>• Basic principles of atmospheric pressure ionization techniques and mass spectrometry<br>• Advanced applications of instrumental analytical techniques with liquid chromatography-mass spectrometry<br>• Special approaches for ultratrace analysis | | |
| Qualification Goals* | Students understand the properties of polar compounds. They acquire the theoretical competence to select appropriate problem-oriented analytical methods for environmental pollutants.<br>At the same time the acquired practical skills allow them to handle sophisticated analytical instruments and to develop suitable analytical methods for variable contamination scenarios on demand.<br>Both, the theoretical knowledge and the practical laboratory skills are key competences for environmental scientists. | | |

| Prerequisites for the allocation of credits / grades (if necessary weighting)* | *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
|---|---|---|---|---|---|---|---|---|---|
| | *Environmental Analytical Chemistry* | *L* | *c* | *3* | *3* | *WE* | *120* | *g* | *0,5* |
| | | *LC* | *c* | *3* | *3* | *LP* | - | *g* | *0,5* |

| | |
|---|---|
| Applicability* | The module is an elective module in the MSc Applied & Environmental Geoscience, MSc Geoökologie, MSc Geowissenschaften |
| Participation Prerequisites* | Basic knowledge in chemistry, environmental analytics and statistics. |

| Module Number: M 236 | Module Title: Modelling for Sustainable River Management | | Type of Module: Mandatory |
|---|---|---|---|
| **Credits (ECTS)*** | 6 | | |
| **Workload* - Contact Time - Private Study** | Workload: 180 h | Contact Time: 60 h / 4 SWS | Private Study: 120 h |
| **Duration of Module* Module Coordinator** | 1 semester | Zarfl | |
| **Regular Cycle*** | Every wintersemester | | |
| **Language** | English | | |
| **Learning- / Teaching Forms*** | Lecture and accompanying seminar (exercises, presentations, discussions) | | |
| **Module Content*** | • Introduction into different mathematical modelling approaches to describe environmental processes with a specific focus on freshwater ecosystems (including differential systems but beyond), parameter estimation techniques and uncertainty analysis<br>• Understanding interdependent environmental system dynamics within the (socio-)hydrological cycle across scales and system boundaries<br>• Application of models to environmental challenges<br>• Models as tools for decision/discussion support/ sustainable water management | | |
| **Qualification Goals*** | The students are familiar with a variety of modelling approaches and their suitability for specific research questions related to environmental processes. They can deal with uncertainty in parameter values and model structure; evaluate model results and simulated system dynamics. They are aware of current developments in environmental systems analysis and can discuss strengths and weaknesses of applied model approaches. Drawing from a solid understanding of mathematical modeling and socio-hydrological interdependencies, they can critically analyse the role of conceptual and mathematical models in decision support and sustainable water management across spatial and temporal scales. | | |

**Prerequisites for the allocation of credits /grades (if necessary weighting)***

| *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
|---|---|---|---|---|---|---|---|---|
| *Modelling and Simulation for Environmental Process Understanding* | *L* | *c* | *2* | *6* | *A* | - | *g* | *0.5* |
| | *S* | *c* | *2* | | *R* | - | *g* | *0.5* |

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| **Applicability*** | M.Sc. Geoökologie/Geoecologie, M.Sc. Applied & Environmental Geoscience |
| **Participation Prerequisites*** | recommended: BSc course "Modellierung in den Geo- und Umweltwissenschaften" |

| Module Number: M 229 | Module Title: Global Change | | | | | Type of Module: Elective | | | |
|---|---|---|---|---|---|---|---|---|---|
| Credits (ECTS)* | 6 | | | | | | | | |
| Workload* - Contact Time - Private Study | Workload: 180 h | Contact Time: 75 h / 5 SWS | | | | Private Study: 105 h | | | |
| Duration of Module* Module Coordinator | 1 Semester | | | Rehfeld | | | | | |
| Regular Cycle* | every Winter Semester | | | | | | | | |
| Language | English | | | | | | | | |
| Learning- / Teaching Forms* | Per week: 3 h lecture (2 h + 1 h), 2 h seminar (2 student talks of 15 minutes plus discussion with two opposing hypotheses and groups, 2 students per talk) | | | | | | | | |
| Module Content* | • Analytical Climate System<br>• Climate of Today (modern climate change including observation and models)<br>• Climate System of the Past<br>• Future Global Change including climate and resources<br>• Impacted Systems (regions, species, pollution, land use)<br>• Counter Measures | | | | | | | | |
| Qualification Goals* | Quantitative scientific understanding of global change (especially climate, resources, pollution), how to measure and model global-change variables in time and in sub-systems, technological options for countermeasures The students know the current state of research and are able to present and communicate the underlying concepts in presentations and discussions. | | | | | | | | |
| Prerequisites for the allocation of credits / grades (if necessary weighting)* | *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
| | *Global Change* | *L* | *C* | *39* | *4* | *WE* | *2* | *g* | *66,6* |
| | | *S* | *C* | *26* | *2* | *R* | *1* | *g* | *33.3* |
| Applicability* | Compulsory: M.Sc. Applied & Environmental Geoscience; Elective: M.Sc. Geoökologie/Geoecology | | | | | | | | |
| Participation Pre-requisites* | - | | | | | | | | |

| Module Number: M 233 | Module Title: Biotransformation of Pollutants | | Type of Module: Elective |
|---|---|---|---|
| Credits (ECTS)* | 6 | | |
| Workload* - Contact Time - Private Study | Workload: 180 h | Contact Time: 45 h / 3 SWS | Private Study: 135 h |
| Duration of Module* Module Coordinator | 1 Semester | Joshi | |
| Regular Cycle* | Every winter semester | | |
| Language | English | | |
| Learning- / Teaching Forms* | Lectures, presentation by students, group projects | | |
| Module Content* | • Environmental significance of different pollutant classes<br>• Geochemical principles controlling the abiotic transformation of pollutants<br>• Physiological and biochemical basis for biotransformation of pollutants<br>• Differences between environmental systems and compartments within systems determining pollutant turnover<br>• Transformation reactions and pathways for various organic (e.g. BTEX, chlorinated hydrocarbons) and inorganic pollutants (e.g. radionuclides, nitrate)<br>• Advances in applied remediation techniques and methods to assess pollutant turnover | | |
| Qualification Goals* | • Gain knowledge about prominent pollutant compound classes present in the environment as well as their abiotic and biotic transformation reactions<br>• Learn how environmental conditions affect abiotic and biotic pollutant turnover<br>• Apply knowledge gained over the semester to design remediation schemes at contaminated sites and monitor remediation progress | | |

| Prerequisites for the allocation of credits / grades (if necessary weighting)* | *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
|---|---|---|---|---|---|---|---|---|---|
| | *Biotransformation of pollutants* | *L* | *c* | *1* | *2* | *R* | *-* | *g* | *1* |
| | | *S* | *c* | *2* | *4* | | | | |

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| Applicability* | MSc Applied & Environmental Geoscience, MSc Geoökologie |
| Participation Pre-requisites* | Content from MSc module Environmental Chemistry,<br>Basic knowledge about environmental microbiology (recommended) |

| Module Number: M 240 | Module Title: Isotopes in Ecosystem Sciences | | Type of Module: Elective |
|---|---|---|---|
| Credits (ECTS)* | 6 | | |
| Workload* - Contact Time - Private Study | Workload: 180 h | Contact Time: 90 h/ 6 SWS | Private Study: 90 h |
| Duration of Module* Module Coordinator | 1 Semester | Dippold, Stock | |
| Regular Cycle* | every winter semester | | |
| Language | English | | |
| Learning- / Teaching Forms* | A diverse spectrum of teaching methods is to be used comprising lectures with interactive video section on practical steps in the work with isotopes and individual exercises. Besides introducing into a wide field of possible isotope applications, the course aims to teach the skills in defending project concepts of isotope-based study designs. For this, an interactive seminar simulating a reviewer panel project defense situation will be organized. | | |
| Module Content* | The module starts with an introduction into isotope biogeochemistry and tracerbased approaches, the understanding of stabile and radioactive isotopes + methods to analyze them (incl. radiation protection). Thereafter, the focus will be on the isotope application in process based research, i.e. identifying processes and rates in C cycle and organic matter transformation in the terrestrial environment. What specifics occur at the interface plant-soil/biosphere-geosphere? How can incubation studies with isotopes contribute to our understanding on mineralization, soil-atmosphere interactions, contaminant degradation and microbial ecology? Comparable topics will be targeted in the nitrogen and phosphorus cycle always considering bulk or compound-specific isotope analysis. Additionally, water isotopes and their application in ecohydrology but also microbial growth dynamics will be targeted. Radiocarbon dating, erosion quantification, radionuclide-based imaging, and further methods, their advantages and shortcomings will be discussed. | | |
| Qualification Goals* | The course addresses M.Sc. students, who intend to use a set of isotope-based natural abundance or tracer methods. Students will learn to apply complex and potentially coupled isotope methods in scientific studies. They will learn to conceptualize an isotope-based study and to present its design and outcome in front of a theoretical reviewer panel simulating a proposal defense. | | |

| Prerequisites for the allocation of credits / grades (if necessary weighting)* | *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
|---|---|---|---|---|---|---|---|---|---|
| | Isotopes in Ecosystem Sciences | *L* | *c* | *3* | *6* | *R&A* | *15* | *g* | *1:1* |
| | | *S/E* | *c* | *3* | | | | | |

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|---|---|
| Applicability* | M.Sc. Geoökologie/Geoecology, M.Sc. Applied & Environmental Geoscience |
| Participation Prerequisites* | - |

| Module Number: ITP | Module Title: Inter- and Transdisciplinary Perspectives on Climate and the Environment | | | | | Type of Module: Elective | | | |
|---|---|---|---|---|---|---|---|---|---|
| Credits (ECTS)* | 6 CP | | | | | | | | |
| Workload* - Contact Time - Private Study | Workload: 180 h | Contact Time: 60 h / 4 SWS | | | | Private Study: 120 h | | | |
| Duration of Module* Module Coordinator | 1 semester | | | | GUZ | | | | |
| Regular Cycle* | Every winter semester | | | | | | | | |
| Language | English | | | | | | | | |
| Learning- / Teaching Forms* | Lectures, collaborative projects, serious games, active learning exercises, discussion and interaction with international guest experts, civic engagement and service learning | | | | | | | | |
| Module Content* | The module covers pressing global issues such as climate change, the water crisis and ecosystem degradation through an inter- and transdisciplinary approach that will equip students with skills needed to explore and address interconnected environmental and social challenges. At the intersection of Earth System Sciences and transdisciplinary real-world engagement, global planetary challenges are approached in a collaborative and solution-oriented way. Innovative teaching methods focus on bringing in diverse student perspectives from different study fields in an engaging way. By combining interdisciplinary insights with a global perspective, the module empowers participants to contribute meaningfully to solutions that respect planetary boundaries and contribute to a sustainable and just future. The module consists of at least two seminars addressing topics such as:<br>• Nature-based solutions for carbon drawdown<br>• Global policies on climate adaptation and mitigation measures<br>• Environmental communication<br>• Disaster risk and resiliency | | | | | | | | |
| Qualification Goals* | • Analyse Earth surface and environmental processes and their societal impacts in different regions of the world<br>• Discuss and explain climate action including mitigation and adaptation strategies<br>• Communicate effectively about climate and environment to understand, motivate and empower public audiences, and inspire action in all sectors of society | | | | | | | | |
| Prerequisites for the allocation of credits /grades (if necessary weighting)* | *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
| | *Elective Courses* | *S* | *c* | *4* | *6* | - | - | *g* | - |
| Applicability* | - | | | | | | | | |
| Participation Prerequisites* | - | | | | | | | | |

## 7.4 Fourth Semester (Masterthesis) at SU or UT or UB

| **Module Number: TRACEE_MT** | **Module Title: Master thesis** | | **Type of Module: Mandatory** |
|---|---|---|---|
| **Credits (ECTS)*** | 30 CP | | |
| **Workload* - Contact Time - Private Study** | Workload: 900 h | Contact Time: 30 h / 2 SWS | Private Study: 870 h |
| **Duration of Module* Module Coordinator** | 1 semester | The Master's thesis can be completed at Stockholm University or University of Tübingen or University of Bucharest. Students can choose SU or UT only if they are not resident in Germany or Sweden at the time of enrollment. (according to the examination regulations by the respective partner university) | |
| **Regular Cycle*** | During the third semester, students will be asked to submit a proposal for a thesis project. The TSTC (Transdisciplinary Stream and Thesis Committee) will communicate on the procedure for the submission of proposals and decide on students' project proposals for thesis and degree projects, with particular consideration to the transdisciplinary aspects and in accordance with specific regulations at SU or UT or UB where the student will carry out the thesis project. | | |
| **Language** | English | | |
| **Learning- / Teaching Forms*** | Master thesis, Transdiciplinary Research Project, Colloquium, Presentation<br>(according to the regulations of the respective partner university) | | |
| **Module Content*** | **Stockholm University:**<br>• Students at Stockholm University would register to the course: "Transdisciplinary Studies of Climate, Environment and Energy, Independent Project".<br>• The independent project is 30 ECTS and aims to provide experience and advanced knowledge in scientific and transdisciplinary work within the fields of climate, environment, and/or energy. Key elements include planning, execution, and reporting. Additionally, students will practice literature review, writing a scientific report, and presenting research results orally in seminars.<br>• The course is divided into two parts (More information is available in the syllabus of the course):<br>→ Part 1: Planning (5 ECTS). Assessment is based on a written report<br>→ Part 2: Implementation (25 ECTS). Assessment is based on an oral and written presentation of the independent project. | | |
| | **University of Tübingen**<br>• The independent research project is 30 ECTS and aims to provide experience and advanced knowledge in scientific and transdisciplinary work within the fields of climate, environment, and/or energy. Key elements include planning, execution, and reporting. Additionally, students will practice literature review, writing a scientific report, and presenting research results orally.<br>• Students have to complete the following:<br>→ Contacting a supervisor for the Master's thesis topic<br>→ Compilation of a research proposal of the agreed topic<br>→ Preparation of the Master's thesis<br>→ Poster presentation of the thesis' results on the Master's Day<br>→ Presentation of the thesis' results in the research group | | |
| | **University of Bucharest**<br>At the University of Bucharest, students are required to enroll in the course **"Independent Project in Transdisciplinary Studies of Climate, Environment, and Energy – Research Activities, Master's Thesis Preparation."**<br><br>This independent project, worth **30 ECTS**, is designed to provide students with hands-on experience and advanced knowledge in scientific and transdisciplinary research within the fields of **climate, environment, and energy**. Key components of the course include **planning, execution, and reporting**, along with opportunities to develop essential research skills such as:<br><br>• Conducting a **literature review**<br>• Writing a **scientific report**<br>• **Presenting research findings** in seminars<br>For additional details, students are encouraged to refer to the **course syllabus**. | | |

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| | Throughout the semester, under the guidance of their coordinators, students will focus on collecting, analyzing and interpreting data, conducting in-depth analyses of academic literature related to their thesis topic, writing reports, presenting intermediary research results, and understanding the ethics of transdisciplinary research. This process is designed to ensure a transdisciplinary approach to their final thesis.<br><br>Additionally, students will receive support in engaging with relevant external stakeholders, including representatives from environmental agencies, research institutes, chemical and pharmaceutical companies, public health organizations, NGOs etc. |
| **Qualification Goals*** | Students will be able to design, execute, and critically assess a transdisciplinary research project that integrates knowledge, methods, and perspectives from multiple disciplines to address relevant topics in the field of climate, environment, and energy challenges.<br><br>Students will be able to critically review existing literature, and develop innovative, transdisciplinary frameworks. Students will be able to present their research findings in a clear, structured, and accessible manner, tailored to both academic and non-academic audiences, including policymakers, local communities, and other relevant stakeholders.<br><br>They may demonstrate the ability to communicate complex transdisciplinary concepts in diverse formats, including written reports, presentations, and policy briefs. |

**Prerequisites for the allocation of credits /grades (if necessary weighting)***

| *Courses* | *Type of Lecture* | *Status* | *CH* | *CR* | *Type of Exam* | *Duration of Exam* | *Grading System* | *Weighting* |
|---|---|---|---|---|---|---|---|---|
| *Master Thesis* | *See regulation by the universities* | - | - | *30* | *MT* | - | *g* | *100* |

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| **Applicability*** | - |
| **Participation Prerequisites*** | 30 CP Modules of semesters 1<br>30 CP Modules of semester 2+3 |

## Contact us

Do you have any questions?
Please do not hesitate to contact us!

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