

# SUSTAINABLE CHEMISTRY

MASTER



→ PROFESSIONAL SCHOOL

[professional programme]

# CHEMISTRY FOR SUSTAINABILITY

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Chemistry provides the building blocks for virtually all of the products used in our everyday life. How can we make sure that the products and processes we use every day are in line with sustainable development? In a novel interdisciplinary curriculum, the M.Sc. Sustainable Chemistry teaches the interrelationship of chemistry and sustainability along the life cycle of chemical products, services and functions.

Through training in green chemistry, environmental chemistry, toxicology, and computational chemistry in combination with modules covering resources, sustainability assessment, international regulations, ethics and business models, participants are equipped with the necessary expertise for sustainability based decision making in the field of chemistry, its products, services and functions.

## YOUR ADVANTAGES AT A GLANCE

With our new Masters course, we aim to bring the mindset of sustainability system thinking and decision making into chemistry higher education.

- Learn how to assess the sustainability of chemical products and services
- Learn how to design chemical products that meet the requirements of function and environment
- Find out about alternative business models, services and functions of chemical products
- Learn about Circular Economy, its opportunities and limitations from the perspective of sustainable chemistry

# INTERDISCIPLINARY M.SC. IN CHEMISTRY

There is a growing need to place sustainability at the heart of the chemical enterprise, to acknowledge chemistry's central role for sustainability and mitigation of climate change. Key to this are skills and knowledge that go beyond conventional chemistry education. Still, training options for chemical experts are rare in this respect.

The worldwide first and unique M.Sc. Sustainable Chemistry fills this gap and provides interdisciplinary training ranging from the study of molecular structures to a macroscopic view on global processes and businesses. Experts from science, authorities, non-governmental organizations and industry offer diverse perspectives on the concept of sustainable chemistry, opening manifold options for graduates of the course to integrate acquired knowledge into practice, expand their network and explore new professional opportunities.

## CERTIFICATE COURSES

In addition to the full 90 CP programme, two options for 20 CP certificates will be offered:

- Sustainable Chemistry and Benign by Design: Modules Environmental Chemistry, Toxicology and Ecotoxicology, Modelling of Chemical Properties & Fate and Benign by Design
- Sustainable Chemistry and Regulatory Affairs: Modules Environmental Chemistry, Toxicology and Ecotoxicology, Law, International Regulations & Chemicals Management and Project Work Chemistry, Sustainability & the Agenda 2030 (5 CP variant)

4. Semester		MASTERS THESIS [20 CP]	
3 <sup>rd</sup> Semester	Law, International Regulations & Chemicals Management [5 CP]	Business Models & Strategies [5 CP]	Project Work Chemistry, Sustainability & the Agenda 2030 [10 CP]
2 <sup>nd</sup> Semester	Sustainable Chemistry & Renewable Energy [5 CP]	Benign by Design [5 CP]	Resources, Recycling & Circular Economy [5 CP]
1 <sup>st</sup> Semester	Concepts of Sustainable Chemistry [5 CP]	Environmental Chemistry [5 CP]	Toxicology & Ecotoxicology [5 CP]
			Modelling of Chemical Properties & Fate [5 CP]
			Green Chemistry [5 CP]
			C3 Society & Responsibility [5 CP]

# FOR PROFESSIONALS

## FLEXIBLE STUDYING

6| The study programme is designed so that students can continue working full-time during their studies. Course content is provided via Leuphana University's e-learning platform. In addition, three classroom sessions lasting 1 to 2 weeks each will take place on the Campus of Leuphana University. Classroom sessions include lectures, seminars and laboratory work and provide the opportunity for networking.

During e-learning phases, students will be required to self-study as well as work interactively in groups on online assignments. The self-study content will be guided by various materials (books, scripts etc.). Students will also be intensively supervised by their lecturers, the programme director and coordinator as well as the e-learning team during the online phases.

### THE PROFESSIONAL MASTERS PROGRAMMES OF THE PROFESSIONAL SCHOOL ARE

- **Tailored to your needs:** Content is designed to meet the requirements of working professionals. Study time per week is adjusted to allow studying while working full time.
- **Flexible:** Our e-learning platform supports self-organised learning and work in virtual work groups. This allows for high flexibility and enables you to individually plan your study time.
- **Transfer-oriented:** Scenarios of global relevance are discussed in groups and interdisciplinary projects, promoting knowledge exchange and transfer to practice.

7| Chemistry is a key enabler for sustainable development. This means that we have to put chemistry into the context of sustainability. The worldwide first master course "Sustainable Chemistry" aims to enable young professionals to understand the opportunities and limitations of this new perspective on chemistry and allows them to make a difference in their professional practice.

Prof. Dr. KLAUS KÜMMERER, Study Programme Director

Practising Sustainable Chemistry requires a bird's eye perspective on the function of chemistry and how it should be applied in order to contribute to sustainable development. If you are interested to learn about chemistry with the mindset of sustainability, this programme is for you!

Dr. MYRIAM ELSCHAMI, Study Programme Developer

I welcome this new course on Sustainable Chemistry. An understanding of sustainability and its vital role in the future chemical industry is essential to the training of the modern chemist.

Prof. Dr. JAMES CLARK, University of York, Programme Lecturer





**LEUPHANA PROFESSIONAL  
SCHOOL** — ADDITIONAL  
QUALIFICATION FOR WORKING  
PROFESSIONALS AT UNIVERSITY  
LEVEL | HIGHLY FLEXIBLE  
COURSE STRUCTURE |  
ATTRACTIVE LEARNING  
ENVIRONMENT | PERFECT  
WORK-LIFE-LEARNING-BALANCE

# YOUR ADVANTAGES AT A GLANCE

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## ONLINE-BASED DEGREE

The M.Sc. Sustainable Chemistry curriculum is tailored to professionals who wish to study part-time while continuing to work. The 4 semesters of the programme can by design be completed in two years. However, if more time is required, this can be extended to up to five years. The programme's flexible structure provides extensive e-learning elements in combination with selected clustered classroom and laboratory sessions, allowing your studies to be optimally integrated into your daily schedule. An effective programme coordination and e-tutoring will make sure you are consistently supervised and guided throughout the degree.

## NEW PROFESSIONAL OPTIONS

There is a growing demand for professionals with composite training in chemistry and sustainability. As a graduate of the programme, you will be uniquely qualified to implement sustainable chemistry in academia, authorities, industry and related vocational fields.

## INTERNATIONALLY-RECOGNIZED DEGREE

All study programmes at Leuphana Professional School are externally accredited according to German higher education guidelines, ensuring high quality standards are met at all times.



## INTERNATIONAL AND INTERDISCIPLINARY

The programme is aimed at an international community. You will work on internationally relevant topics in international groups, providing the opportunity to learn from each other about regional perspectives on questions that concern us all.

## PROFESSIONAL NETWORK

You will get to know renowned international lecturers and practitioners. Additionally, you will work and connect with your fellow students. This way your professional network will expand in the field of sustainable chemistry, across institutions, and internationally.

## MAKING A DIFFERENCE

As a graduate of the M.Sc. Sustainable Chemistry you have the skills to apply chemistry to contribute to sustainable development, thus tackling the most pressing challenge of our time. You will be trained to think in systems, and where to address and shape change.

## CARRY ON WITH A PHD

Interested to learn even more? Successful completion of the programme entitles to the pursuit of a PhD.

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# YOUR PATH TO THE M.SC. APPLICATION

12| The programme is offered once a year. Applications for the March intake are due on the 10<sup>th</sup> of December.

## ADMISSION REQUIREMENTS

The Masters programme is designed for professionals with a background in chemistry, biochemistry, and chemical as well as bio- and environmental engineering, pharmacy, or related fields who wish to acquire further qualification in the field of sustainability in chemistry.

### Applicants for the M.Sc. Sustainable Chemistry need to:

- Hold a first university degree in the field of chemistry or related fields,
- Have professional experience of at least one year,
- Have sophisticated English skills (e.g. 92 points in the online TOEFL test or other relevant proof.)

## HOW MUCH DOES THE COURSE COST?

The fees amount to 19.000 EUR total, plus around 200 EUR (current value) in semester fees. Costs relating to the degree may be deducted from tax subject to country specific tax regulations.



# CONTACT AND ADVISING. FIND OUT DETAILS

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WOULD YOU LIKE TO RECEIVE MORE DETAILED INFORMATION?

Not sure whether you fulfill the requirements? Or interested in a certificate in “Sustainable Chemistry and Benign by Design” or “Sustainable Chemistry and Regulatory Affairs”? Please do not hesitate to contact us and make use of our counselling services.

Leuphana Universität Lüneburg  
Institute for Sustainable and Environmental Chemistry  
**Dipl. humanbiol. Lisa Keßler, M. Sc**  
Study Programme Coordinator  
Universitätsallee 1  
21335 Lüneburg, Germany  
Phone +49.4131.677-4110  
schem@leuphana.de

## AT A GLANCE

Degree	Master of Science (M.Sc.)
Credit Points	90
Length of Study	4 semesters
Language	English
Start Date	March
Application Deadline	December 10
Costs	19.000 Euro total plus the current term contribution of 200 Euro per term
Programme Director	Prof. Dr. Klaus Kümmerer

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[www.leuphana.de/sustainable-chemistry](http://www.leuphana.de/sustainable-chemistry)

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**Information for Applicants to the  
M.Sc. Sustainable Chemistry of  
Leuphana Professional School**



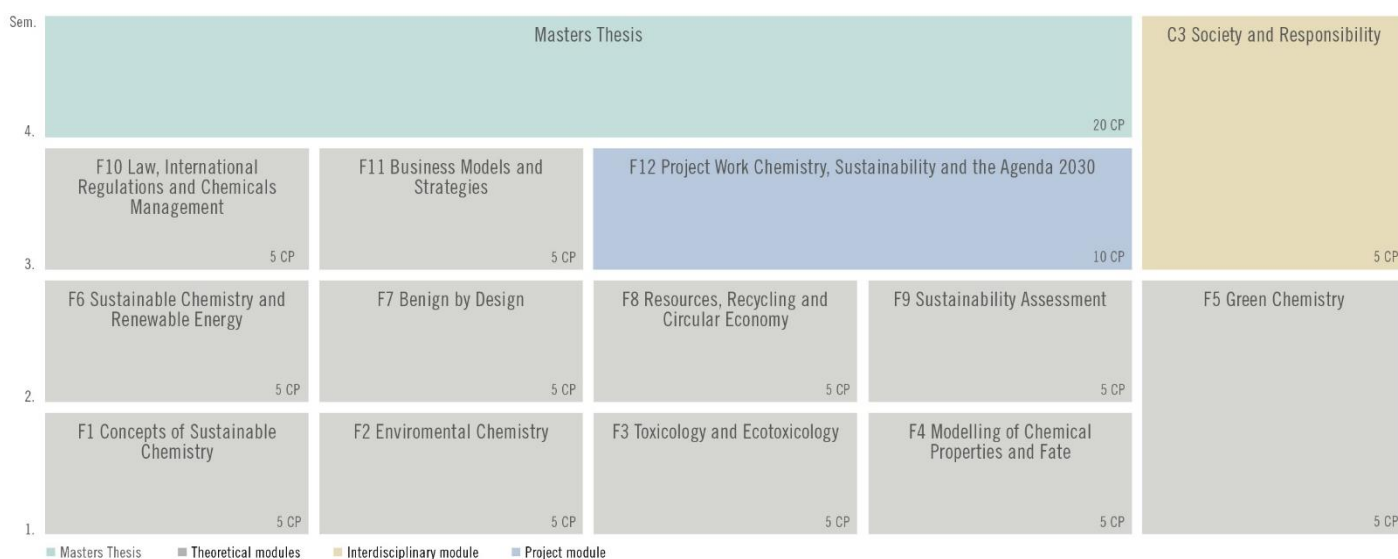
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## 1. Programme Overview M.Sc. Sustainable Chemistry

The M.Sc. Sustainable Chemistry is a two-year Masters programme for professionals with a first university degree in chemistry or a related discipline. It aims at providing interdisciplinary training in sustainable chemistry from the molecular level to overarching topics such as resources, business models, international regulations relevant to chemistry, sustainability ethics and sustainable development. Most of the teaching and learning takes place online. In the course of the programme, there are only three classroom sessions held on the campus of Leuphana University.



**Figure 1: Module Overview M.Sc. Sustainable Chemistry**

### 1. Semester:

The first semester of the programme is dedicated to introducing the topic of sustainable chemistry and to providing training in sub-disciplines of chemistry that are relevant to sustainable chemistry. The semester starts with module F1 Concepts of Sustainable Chemistry and a classroom session at Leuphana University, where students get to know each other and learn about the concept of sustainable chemistry in lectures and seminars. Lessons learnt in this classroom session are then deepened online with literature, discussions and assignments about sustainable chemistry. After completing the first module, training is provided for the remaining four modules of the semester that cover Green Chemistry, Environmental Chemistry, Toxicology and Chemo Informatics. The first semester ends with another classroom session that features laboratory classes in environmental chemistry and toxicology.

### 2. Semester:

The second semester is taught entirely online. The modules covered here are more overarching in nature, and build on the knowledge gained in the first semester. This is especially the case for module F7 Benign by



Design, which integrates knowledge in environmental chemistry (F2), toxicology (F3) and chemo informatics (F4) into conceptual approaches for the design of chemicals and products that meet the requirements of function and environment. The other modules cover the material basis of renewable energies, resources, recycling and circular economy as well as sustainability assessment strategies.

### 3. Semester:

The third semester also takes place online only. The modules of this semester are even more overarching and cover business models and strategies as well as international regulations relevant for the implementation of sustainable chemistry. Apart from that, training is provided in ethics, leadership and change management in the complementary module C3. This is a shared module between all of the Master programmes at Leuphana Professional School, extending over two semesters, and a great chance to exchange with participants from other backgrounds. Finally, in the third semester knowledge gained throughout the programme is applied in a project work on a topic of interest, placing the topic into the broader context of sustainable chemistry and sustainable development.

### 4. Semester:

This semester is dedicated to the Masters thesis. Participants work on a chosen topic from the context of sustainable chemistry and write a thesis. In parallel, the complementary module C3 is completed. At the end of the semester, participants convene for the third and last time at Leuphana University to present and discuss their theses and to celebrate a farewell.

### **Overview Content of Classroom Sessions:**

<b>Session</b>	<b>Content</b>
<b>First Session</b>	Introduction to Sustainable Chemistry, Getting to know each other
<b>Second Session</b>	Laboratory training in environmental chemistry and toxicology
<b>Third Session</b>	Presentation of Master Theses, Farewell

## **2. Certificate Courses in Sustainable Chemistry**





In addition to the 90 CP M.Sc. programme, two options for shorter certificates (20 CP each) are offered:

### 1. Sustainable Chemistry and Benign by Design:

*Modules F2 Toxicology and Ecotoxicology, F3 Environmental Chemistry, F4 Modelling of Chemical Properties and Fate, F7 Benign by Design.*

This certificate combines relevant content from toxicology and environmental chemistry with the *in silico* prediction of chemical properties and fate and ultimately outlines strategies and approaches to integrate this knowledge into a more benign design of chemical compounds and products.

### 2. Sustainable Chemistry and Regulatory Affairs:

*Modules F2 Toxicology and Ecotoxicology, F3 Environmental Chemistry, F10 Law, Regulations and International Chemicals Management, F12 Project Work Sustainable Chemistry and Agenda 2030 (5CP Variant).*

This certificate conveys relevant content from toxicology and environmental chemistry together with knowledge on international and national regulations relevant to sustainable chemistry. Gained knowledge regarding e.g. the process of authorising new products that comply with existing regulations, will be applied and practiced in a small-scale version (5CP) of the project module.

## 3. Important Dates M.Sc. Sustainable Chemistry for the Cohort 2022

Date	Event
25/26.06.2021	<b>Information Day</b> "University studies for professionals" with Info Session and Q&A for the M.Sc. Sustainable Chemistry Registration via: <a href="mailto:psevents@leuphana.de">psevents@leuphana.de</a>
10.12.2021	Application Deadline
14.03.2022	Start of the programme
14. – 18.03.2022	First Classroom Session
Summer 2024	Second Classroom Session
Spring 2023	Third Classroom Session

### 4. Advice for Visa applications:



In the course of the two-year M.Sc. programme, three classroom sessions on site of Leuphana University will take place. The duration of the classroom sessions is one to two weeks each. **A tourist visa is sufficient** for this duration of stay.

Participants who require a visa for travelling to Germany are advised to schedule an appointment at the embassy in the country of their origin as soon as possible, to make sure that visa application processing can be carried out on time. A helpful timeline to consider is the following:

1. Ideally approximately 6 months before travelling: Contact embassy and book appointment.
2. Approximately 6 weeks before travelling: Go to embassy (appointment arranged before) and apply for tourist visa.

**Please note:** The first classroom session takes place at the beginning of the first semester 14th – 18th of March 2022. The application deadline and final admission to the Masters Programme is in December 2021. In order to make sure that visa applications for the first classroom session can be processed on time, you may have to arrange an appointment at the embassy **BEFORE** you have been **officially admitted** to the programme. This is not a problem however, as you do not need any documents at this stage. You only have to arrange an appointment. By the time of your appointment at the embassy (app. 6 weeks before travelling), you will have received all the necessary documents from Leuphana Professional School to apply for your visa.

## 5. Information on Fees and Financing for the M.Sc. Sustainable Chemistry

### Tuition Fees:

Tuition fees for the M.Sc. Sustainable Chemistry amount to 19.000 Euro. This fee can be paid in instalments such that at least 25% of the tuition fees (i.e. 4800 Euro) are covered per semester. If desired, this amount can be broken down further to smaller instalments (e.g. 2400 Euro every 3 months).

### Semester Contribution:

In addition to the tuition fees, a semester contribution is due each semester. It comprises the Studentenwerk contribution, a student contribution (AStA) and an administrative charge. Students at the Professional School are issued with a student ID card that offers a wide range of benefits such as discounts on cultural events and special student prices from a number of providers. As soon as possible after admission to the programme, participants will be informed about details on payment procedures, and options of setting up individual instalment schedules for covering the tuition fees.



## **Possible Scholarships and Sources of Funding:**

- DAAD:  
<https://www.daad.de/deutschland/stipendium/datenbank/en/21148-scholarship-database/>
- Institute for International Education:  
<https://www.iie.org/Programs>
- EUROPEAN UNION SUPPORT TO HIGHER EDUCATION IN THE ASEAN REGION:  
<https://www.share-asean.eu/activities/scholarship>
- International Cooperation Department Vietnam:  
[www.vied.vn](http://www.vied.vn)
- Study Portals Scholarship:  
<https://www.scholarshipportal.com/>
- Scholarship Positions:  
<https://scholarship-positions.com/category/masters-scholarships/>
- Scholarships for Development:  
<http://www.scholars4dev.com/category/country/europe-scholarships/germany-scholarships/>

## **6. Contact and Information:**

- *For programme specific information, please contact:*

### **Contact:**

[Schem@leuphana.de](mailto:Schem@leuphana.de)

[lisa.kessler@leuphana.de](mailto:lisa.kessler@leuphana.de)

Phone: +49 4131 677 4110

### **Information:**

[www.leuphana.de/sustainable-chemistry](http://www.leuphana.de/sustainable-chemistry)



- *For general information and counselling services around studying at Leuphana Professional School, please see:*

**Information:**

<https://www.leuphana.de/en/professional-school/service.html>

- *For information about fees and financing, please contact:*

**Contact:**

[psfinanzierung@leuphana.de](mailto:psfinanzierung@leuphana.de)

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**Information:**

<https://www.leuphana.de/en/professional-school/information-for-applicants/financing-your-studies.html>

# SUSTAINABLE CHEMISTRY AND BENIGN BY DESIGN

CERTIFICATE COURSE



→ PROFESSIONAL SCHOOL

[professional programme]



# BECOME A CHANGE AGENT FOR SUSTAINABILITY IN THE FIELD OF CHEMISTRY

This certificate is designed for professionals seeking to develop skills for targeted (re)design of chemicals. Based on insights from environmental chemistry and toxicology, (re)design of chemicals is explored. The emphasis lays on the potential and applicability of benign by design, as well as existing gaps in experimental and *in silico* data required for widespread application of the approach. After completion, you are equipped with profound knowledge about molecular (re)design of chemicals with reduced environmental and toxicological impact.

The online-based certificate is complemented by an on-campus laboratory phase.

## CONTENTS

Environmental Chemistry | Toxicology and Ecotoxicology |  
Modelling of Chemical Properties and Fate | Benign by Design

AT A GLANCE	
Degree	Certificate of Advanced Studies (CAS)
Credit Points	20
Length of study	2 semesters
Language	English
Start date	March
Application deadline	December 10 <sup>th</sup>
Costs	4.900 Euro total plus the current semester fees of 207 Euro per semester
Admission requirements	A first university degree chemistry or related fields, at least one year of professional experience, English language skills

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[www.leuphana.de/certificates-sustainable-chemistry](http://www.leuphana.de/certificates-sustainable-chemistry)

# SUSTAINABLE CHEMISTRY AND REGULATORY AFFAIRS

CERTIFICATE COURSE



→ PROFESSIONAL SCHOOL

[professional programme]

# BECOME A CHANGE AGENT FOR SUSTAINABILITY IN THE FIELD OF CHEMISTRY

This certificate is designed for professionals seeking to deepen their knowledge on international chemicals management in the context of Sustainable Chemistry. Based on insights from environmental chemistry and toxicology, major policy frameworks for the management of chemicals on a national and global level will be introduced. Implications of Sustainable Chemistry for regulatory affairs and vice versa will be discussed. After completion, you are equipped with profound knowledge on regulatory compliance in the light of the Agenda 2030.

The online-based certificate is complemented by an on-campus laboratory phase.

## CONTENTS

Environmental Chemistry | Toxicology and Ecotoxicology | Law, International Regulations, and Global Chemicals Management | Project Work Chemistry, Sustainability and the 2030 Agenda

AT A GLANCE	
Degree	Certificate of Advanced Studies (CAS)
Credit Points	20
Length of study	2 semesters
Language	English
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