



Deutscher Akademischer Austauschdienst  
German Academic Exchange Service



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# Doctorate



## Graduate School of Battery Chemistry

University of Münster • Münster



## Overview

Degree	Dr rer nat (Doctor of natural sciences)
Teaching language	<ul style="list-style-type: none"><li>English</li></ul>
Languages	Courses are held in English.
Mode of study	Less than 50% online
Programme duration	6 semesters
Beginning	Winter semester
Application deadline	Please visit <a href="https://www.uni-muenster.de/Baccara/application/index.html">https://www.uni-muenster.de/Baccara/application/index.html</a> .
Tuition fees per semester in EUR	None
Combined Master's degree / PhD programme	No
Joint degree / double degree programme	No

### Description/content

The interdisciplinary research activities, from which you can choose a topic for your doctorate, are centred on theory and modelling, material synthesis, catalysis, analysis and characterisation, battery cell, recycling, sustainability and life cycle analysis.

- Theory and Modelling

Theoretical work is conducted on very different length- and time-scales: ab initio methods for the description of reaction processes, for the determination of electrochemical stabilities and for the optimisation of force fields; molecular dynamics simulations for improved understanding of structural and kinetic processes in electrolytes; and machine learning concepts for improved analysis of experimental and simulated data.

- Material Synthesis

Within this research focus, new molecules and solid materials are to be synthesised in a targeted

manner in order to positively influence key performance parameters such as internal resistance, temperature windows, battery life and intrinsic cell safety. The development of improved and sustainable synthesis pathways is also an important element.

- Catalysis

In the field of lithium-ion batteries, catalysed reactions are of particular interest. The time- and cost-intensive formation step after assembly and during the first charge is essentially based on a polymerisation reaction of electrolyte constituents and lasts from several hours to days. Polymer-based solid state batteries (SSBs) represent a broad field of research for catalysis research.

- Analysis and Characterisation

Individual molecular and solid materials as well as the complex "battery cell" system require a broad portfolio of methods and proven experts for local and global material analysis in order to characterise different interfaces and interphases and investigate the micro-structures and nano-structures of pure substances and composites.

- Battery Cell Technology

The battery cell serves as a technological demonstrator for developed materials. All developments of the previously described research disciplines converge in this research area. They are thoroughly electrochemical with regard to their interaction with the "battery cell" system and subjected to an in-depth post-mortem analysis (field of activity: "analysis and characterisation") in order to elucidate reaction mechanisms and damage patterns. These findings are reflected back to the respective focal points and the materials are iteratively optimised.

- Recycling, Sustainability and Life Cycle Analysis

The successful and sustainable recycling of a battery cell begins with the design of the materials and the manufacture of the components. According to the so-called "Design for Recycling" practice, innovative materials and processes are researched that enable the use of materials and, in the best-case scenario, individual components (e.g. electrodes) with minimal performance losses. Life cycle analyses can also be used to develop processes that enable the most energy-efficient separation and recovery of the individual cell materials, either as components or as raw materials.

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## Course Details

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### International elements

- International guest lecturers
- Specialist literature in other languages
- Language training provided
- Training in intercultural skills

Course-specific, integrated German language courses	Yes
Course-specific, integrated English language courses	No

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## Costs / Funding

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Tuition fees per semester in EUR	None
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<b>Semester contribution</b>	Students must pay a semester contribution fee of 317.48 EUR per semester. This includes a "semester ticket" covering public transportation in the greater Münster area and throughout Germany.  You can find more information here: <a href="https://www.uni-muenster.de/studieninteressierte/en/einschreibung/semesterbeitrag.shtml">https://www.uni-muenster.de/studieninteressierte/en/einschreibung/semesterbeitrag.shtml</a>
<b>Costs of living</b>	We recommend that students budget at least 900 EUR per month to cover personal expenses (accommodation, living expenses, health insurance).
<b>Funding opportunities within the university</b>	Yes
<b>Description of the above-mentioned funding opportunities within the university</b>	The granted salary for the position of doctorate research associate corresponds to the salary level TV-L E 13 (67%) as a part-time position.

## Requirements / Registration

<b>Academic admission requirements</b>	A Master's degree in chemistry or a related field
<b>Language requirements</b>	<ul style="list-style-type: none"> <li>• Excellent command of the English language</li> <li>• German language skills are not required, as we offer German courses as part of the programme.</li> </ul>
<b>Application deadline</b>	Please visit <a href="https://www.uni-muenster.de/Baccara/application/index.html">https://www.uni-muenster.de/Baccara/application/index.html</a> .
<b>Submit application to</b>	<a href="https://www.uni-muenster.de/Baccara/application/index.html">https://www.uni-muenster.de/Baccara/application/index.html</a>  <a href="https://www.uni-muenster.de/CPJobs/">https://www.uni-muenster.de/CPJobs/</a>

## Services

<b>Accommodation</b>	As in all popular university cities in Germany, accommodation is in high demand and is not easy to find in Münster – but it's not impossible either!  Please contact the International Office (Bachelor's and Master's students) or the CERes (doctoral candidates) of the university for advice. Please also note that the University of Münster (like most German public universities) does not have its own student halls of residence.
<b>Structured research and supervision</b>	Yes
<b>Research training / discussion</b>	Yes

### Support for international students and doctoral candidates

- Tutors
- Cultural and linguistic preparation
- Visa matters
- Accompanying programme
- Welcome event
- Buddy programme



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**Frank Glorius**  
Prof Dr

A distinct feature of the International Graduate School is the synergetic combination of basic and applied research – motivating and preparing young scientists for future careers in science and industry in a unique and ambitious way.

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## University of Münster

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With about 43,000 students and 5,500 academics, the University of Münster is one of the largest universities in Germany. It enjoys an outstanding reputation in the region and far beyond for its excellent research opportunities, high-quality teaching and promotion of junior researchers. Fifteen faculties with 280 degree programmes and some 30 research centres comprise the institutional backbone of the university. Besides its academic opportunities, the University of Münster offers a wide and varied range of extracurricular activities. Pursue your interests by participating in student societies, university theatre, choirs, orchestras, bands, and sports courses. Additionally, make sure to visit the university's museums and gardens to further enrich your experience.



### University location

Münster is located in north-west Germany, close to the border with the Netherlands. The city is a lively student town, famous for its bicycle-friendly atmosphere and student pubs. Of Münster's total population of approx. 319,400 inhabitants, over 62,800 are students at the different universities. Münster is a thriving centre of science and academia. It is a great place to live, learn and teach.

# Contact

**University of Münster**

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🌐 Course website: <https://www.uni-muenster.de/Baccara/>

● <https://twitter.com/SchoolBaccara>

🌐 <https://www.linkedin.com/company/baccara-gradschool/>

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# International Programmes in Germany - Database

[www.daad.de/international-programmes](http://www.daad.de/international-programmes)  
[www.daad.de/sommerkurse](http://www.daad.de/sommerkurse)

## Editor

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## GATE-Germany

Consortium for International Higher Education Marketing  
[www.gate-germany.de](http://www.gate-germany.de)

## Disclaimer

The data used for this database was collected and analysed in good faith and with due diligence. The DAAD and the Content5 AG accept no liability for the correctness of the data contained in the "International Programmes in Germany" and "Language and Short Courses in Germany".

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