



TU Clausthal

International Semester Modeling and Simulation in Chemical and Process Engineering

October – March



Internationales Zentrum Clausthal (IZC)
International Center Clausthal (IZC)



Clausthal University of Technology

Clausthal University of Technology (TUC) is an internationally renowned institution with a long tradition of quality education recognized and valued by many national as well as international companies.

We are a small university with around 4,800 students from all over the world. Students can enjoy excellent study conditions in the fields of engineering, natural sciences and management.

Research and education at Clausthal University of Technology are focused on Energy and Raw Materials, Natural Science and Materials Science, Economics, Mathematics, Computer Science, Mechanical Engineering and Process Engineering.

In three innovative centers, the Energy Research Center Niedersachsen (EFZN), the Clausthal Cen-



ter of Materials Engineering (CZM) and the Center of Simulation Science (SWZ), we aim to link applied research in natural sciences, engineering and economics.

Young people enjoy a different and unique way of studying in Clausthal: it is the personal atmosphere and the practice-oriented education that make us distinctive. Beyond that, students and employees enjoy the international atmosphere at TUC, the extensive nature of the Harz Mountains and more than 60 different kinds of sports ranging from skiing to sailing and mountain biking offered by the Sports Institute.

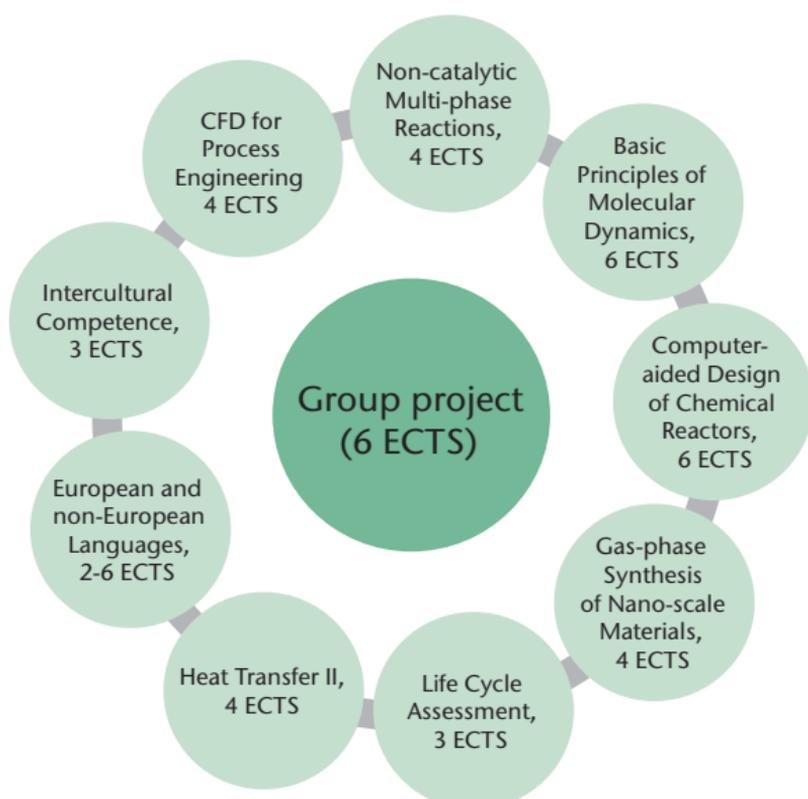
The superb worldwide reputation of Clausthal University of Technology is regularly reflected in comparative university rankings where TUC enjoys a leading position.



During the winter semester, we offer exchange students as well as TU students the possibility to participate in seminars held in English with a focus on modeling and simulation in chemical and processing engineering. The main component of this international semester is a group project. In this group project, an international team of maximum five students investigates a current problem in the field of chemical and process engineering. To help the team find the solution to their investigated problem, a variety of seminars are available from the list below. In addition to specific seminars, the students' level of intercultural competences is advanced by participating in language classes and cultural competence courses. Methodological skills, especially in the autonomous processing of engineering research and development tasks, will be broadened in an international context. The international semester amounts to 30 ECTS so that it can be credited as a full semester. We recommend staying an additional semester to complete the final thesis at Clausthal University of Technology.

Requirements

- Advanced knowledge in Process Engineering
- Minimum B2 level English



Mandatory

- Group project, 6 ECTS

Electives

CFD for Process Engineering

Seminar by Prof. Dr.-Ing. Gregor D. Wehinger
4 ECTS

In this seminar the students learn how to apply a modern computational fluid dynamics (CFD) software to solve process engineering problems. Contents:

- Fundamentals of CFD simulations
- Hands-on training of CFD software STAR-CCM+
- Solving current process engineering problems with CFD in small groups
- Presentation of the results at a poster party

Non-catalytic Multi-phase Reactions

Lecture by Prof. Dr.-Ing Thomas Turek
4 ECTS

The course deals with basic understanding and mathematical modeling on non-catalytic reactions including gas-liquid and gas-solid systems. Contents:

- Gas-liquid mass transfer with and without chemical reactions
- Mathematical models for mass flux and enhancement factors
- Non-catalytic gas-solid reactions
- Design of multiphase reactors

Basic Principles of Molecular Dynamics

Lecture by Prof. Dr. Nina Gunkelmann
6 ECTS

The aim of the lecture is to give an in-depth understanding in molecular dynamics methods including interatomic interaction in metals, semiconductors, ceramics and biomolecules. Using a classical molec-

ular dynamics code, basic material properties will be derived from atomistic simulations. Contents:

- Fundamentals of molecular dynamics simulations
- Energy minimization and derivation of static properties from interatomic interactions
- Postprocessing techniques and structure identification

Computer-aided Design of Chemical Reactors

Seminar by Prof. Dr.-Ing. Gregor D. Wehinger

6 ECTS

The aim of this seminar is to provide students with competences in modeling and design of chemical reactors. Contents:

- Fundamentals of chemical reactor modeling
- Hands-on training of process engineering software Aspen Custom Modeler
- Modeling and implementation of different types of reactors
- Group work on real-world problems

Gas-phase Synthesis of Nano-scale Materials

Lecture by Prof. Dr. Alfred Weber

4 ECTS

The aim of this lecture is to give in-depth insights into methods and processes of gas-phase synthesis of nano-scale materials. Contents:

- Particle transport and transport processes inside particles
- Growth, vaporization, and nucleation of particles
- Coalescence and collision
- Reactions of gas-phase synthesis

Heat Transfer II

Lecture by Prof. Dr.-Ing. Roman Weber

4 ECTS

This lecture extends knowledge of heat transfer to the fields of radiation phenomena. Contents:

- Fundamentals of thermal radiation
- Radiation exchange between surfaces
- Radiation description in participating media
- Solar radiation

Life Cycle Assessment

Seminar by Dr.-Ing. Christine Minke MBA

3 ECTS

The course life cycle assessment (LCA) combines theory and hands-on exercises using LCA software and the ecoinvent database. Contents:

- Context of sustainability and life cycle assessment
- Expert preparation of life cycle inventories according to ISO 14040/44
- Environmental impact and indicators
- Critical analysis of LCA results

Intercultural Competence

Various lecturers

3 ECTS

Interacting with people from different cultural backgrounds has become an important part of our daily lives. To benefit from cultural diversity, this course is designed to develop your intercultural competences.

- understanding culture and its impact on behavior in an international working environment
- developing communication strategies and skills to work successfully in international teams.

Language Training: European and non-European Languages

Various lecturers

2–6 ECTS

Besides German language courses, Clausthal University of Technology offers Arabic, Chinese, English, French, Italian, Polish, Russian and Spanish language courses. Beginners and advanced learners will find their individual course levels.



International Center Clausthal (IZC)

In cooperation with the university management and the institutes, the International Center Clausthal (IZC) coordinates the international relations and activities of Clausthal University of Technology (TUC). The IZC is the central service point for international and German students as well as for university staff and faculty.

The IZC Language Center offers a wide range of language courses. For students and university staff participation in these language courses is free. Furthermore the IZC Language Center coordinates language tandems.

We are looking forward to welcoming you at Clausthal University of Technology!

Contact

International Center Clausthal (IZC)

Graupenstraße 11

D-38678 Clausthal-Zellerfeld

international@tu-clausthal.de

www.izc.tu-clausthal.de/en

www.icvt.tu-clausthal.de