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Sustainable Engineering of Products and Processes

Bachelor of Science (B.Sc.)

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Engineering The Future

The professional work of many engineers is changing. In the past, the focus was mostly on solving detailed technical problems in research, development, and use of products. Today, comprehensive answers to global challenges, e.g. climate change and the problem of limited resources, call for new approaches. Long-term successful solution strategies need comprehensive thinking by considering the whole life cycle of products and systems, the economic balance, and societal impact.

This fundamental change must be reflected in the education of future engineers. They need technical knowledge and engineering skills as well as hands-on experience in methodologies of comprehensive assessment and evaluation. The future challenges in the fields of mobility, in products design and manufacture, in process engineering, and in energy supply require global thinking and sustainable action. Therefore, TU Braunschweig offers an international Bachelor Programme in Sustainable Engineering to open-minded, outcome-oriented students from all over the world.

At a Glance

Degree	Bachelor of Science
Standard period	6 Semesters
Language	English, German
Start of studies	Winter semester
Attendance	180 CP
Admission	Pre-study internship required language skills*
Faculty	Mechanical Engineering

** If your German language skills do not meet these requirements, you may still be admitted if you can prove at least basic knowledge (A1 level). In this case, you can take German classes as part of your studies, and need to fulfill the language requirements until the end of the 3rd semester.*

Become One of Us

We want you! Nonetheless, there are some requirements in order to be accepted as a student of Sustainable Engineering.

Required language skills in German:

German Abitur, completed 2-years of school education in German, German as school subject in the last 8 years or successful completion of the DSH 1, Test-DaF 4x3 or a comparable test

- **Required language skills in English:** University entrance qualification in an English-speaking country, completed 2-years of school education in English language, English as school subject in the last 8 years or successful completion of an internationally-recognized test
- **Pre-study internship** Before entering the study programme, an 8-weeks internship must be completed during which you obtain basic mechanics skills.

Same Fundamentals Different Specialisation

Sustainable Energy & Process Engineering is focused on processes of energy or material conversion that enable our everyday supply of heat and electricity as well as products such as sugar, toothpaste or medicines. Whilst engineering of these processes has been very successful to enable mass production at low cost, sustainability requires a holistic optimization, also considering aspects such as climate impact, waste and pollution, impact on society on a global scale, or dwindling resources. Novel approaches, ranging from continuous integrated production processes, biologically inspired systems to miniaturization, promise the combination of economic and ecological benefits.

Sustainable Production Technical products are complex systems that affect the environment through the use of energy and raw materials as well as through the generation of emissions. Solutions towards achieving a sustainable development demand a life cycle-oriented approach. The aim is to minimise costs and optimise revenues as well as minimise risks and environmental impacts throughout the entire product life cycle. Digital twins - the connection of the physical world with digital models - establish a framework to evaluate both energy and material efficiency in a production process.

Sustainable Mobility considers ground-based transport and air traffic as an overall system. Facing a global share of 24% of carbon-dioxide emissions due to transport systems based on fossil fuels, a new balance of technical, economic and ecological considerations is needed when designing the future means of transport. Disruptive technologies, such as "green" hydrogen, the electrification of drive/propulsion systems, and machine learning algorithms will contribute to shaping this paradigm shift of mobility. Beyond traffic simulation and aircraft/vehicle design, intermodal interaction of the transport systems must be incorporated into a sustainable mobility concept.

Perspectives Sustainable engineering will make a great impact on the future of our planet that goes beyond building better technologies. Appreciation for natural systems and resources, economic development opportunities, and the promise of a life in dignity for all humans are at stake. Sustainability can only succeed as a joint effort. Cross-disciplinary knowledge sharing, social and environmental responsibility, and an ethical framework are core values of the new generation of future-oriented engineers.

Let Us Act Together Now

The world needs people with the courage and skills to tackle the challenges of sustainability around us and find solutions. Be one of us! More and more corporations and research institutes search for engineers who know about novel and effective ways of solving challenging problems and act environmentally responsible. We will provide you with a quality education in engineering. You will open the door to performing high quality research, and to participating in scientific breakthroughs in sustainability.

Same Fundamentals Different Specialisation

The contents of the study programme are divided into five parts: Compulsory modules, modules in your area of specialisation, integrated modules and project work, an internship at a company of your choice and last but not least the Bachelor thesis that you select to prove your ability to perform scientific work. The lectures are made available in both languages, English and German.

Different Fields – One Goal

Technological change and a sustainable future are inseparably linked. The areas of individual and collective mobility, development and manufacturing of products, and efficient material conversion and energy supply require sustainable alternatives as well as methods and knowledge for their technical implementation. International thinking and acting is necessary to realize effective and sustainable technical solutions in the globalized economy.

