

Do Life Science University graduates have the skills to co-create environmental and social policies?

Prof. Dr. Sebastian J. Goerg

25th of October 2024, 14th ICA Rectors and Deans Forum 2024
University of Zagreb, Croatia

Technical University of Munich

TUMCS for Biotechnology and Sustainability
TUM School of Management



Short-Bio



2018: Professor at the Technical University of Munich
TUMCS for Biotechnology and Sustainability

2018: Responsible for Bachelor and Master Bioeconomy

2022: Academic Program Director Professional Profile Bioeconomy
Responsible for all study programs in the field Bioeconomy

- BSc./MSc. Bioeconomy
- BSc./MSc. Chemical Biotechnology
- MSc. Biomass Technology (joint with BOKU WIEN)
- BSc./MSc. Sustainable Management & Technology
- MSc. Sustainable Energy and Processes
- BSc. Sustainable Engineering for Materials and Processes
- MSc. Biogenic Materials Science and Engineering

Expectations on Graduates

Educate graduates who are experts in their discipline but can also contribute to environmental and social policy development and are able to work on challenges at the intersection of science, industry, and policy.

- Disciplinary excellence
- Interdisciplinary competencies
- International perspectives
- Collaborative problem-solving
- Effective communicators

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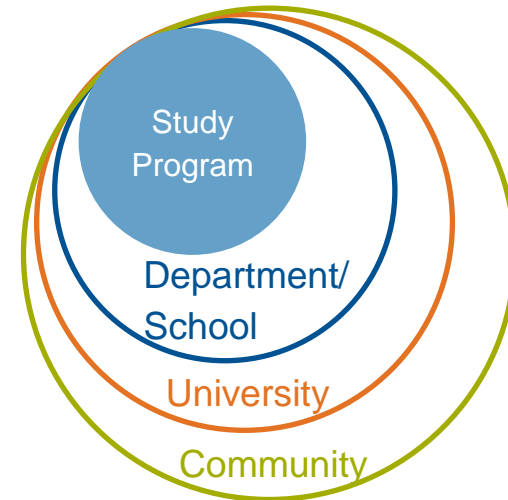


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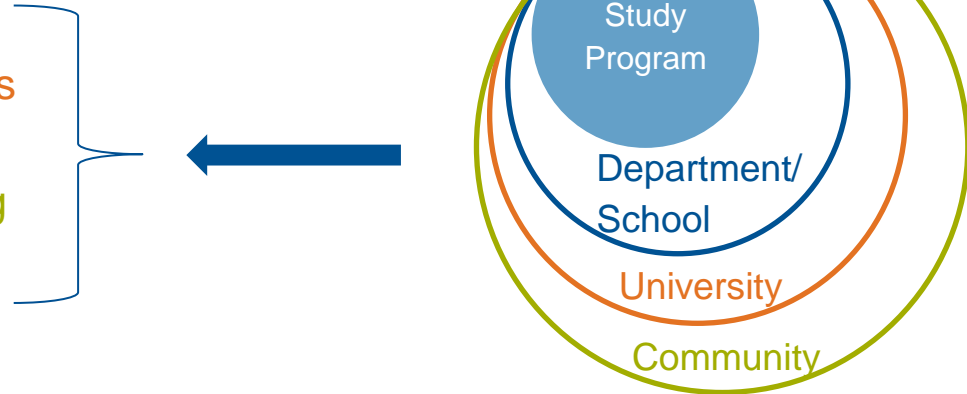


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TUMCS for Biotechnology and Sustainability



Research Mission

Circular bioeconomy with the final goal is to support (via education, research and innovation) the transition to a viable and sustainable, circular, low-carbon and/or bio-based economic system.



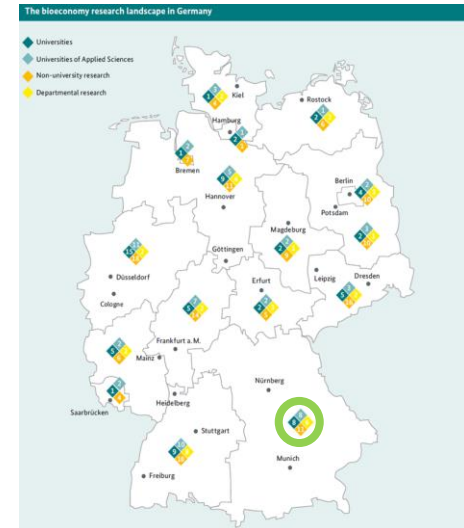
Bioeconomy in Germany

Opportunities for a bio-based and sustainable future

Report 2021



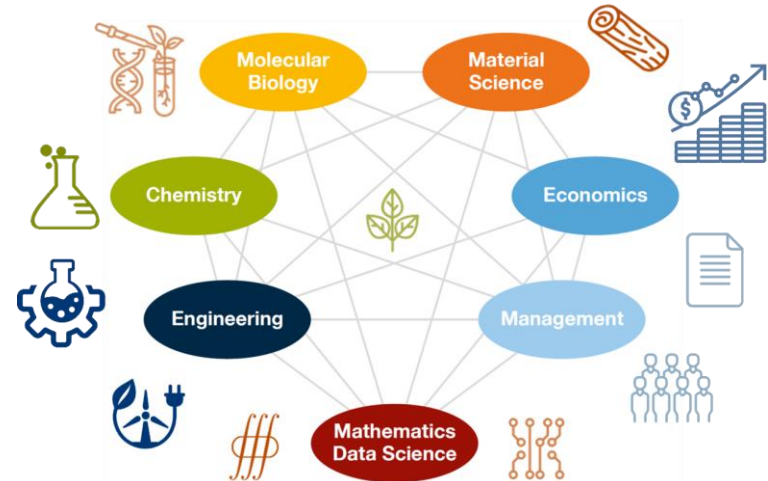
The German government believes that the bioeconomy can help to meet eleven of the 17 UN Sustainable Development Goals.



Mission of TUMCS: making bioeconomy happen

The mission of TUMCS is to enable the **transformation of the economy and society towards sustainability** via a profound interdisciplinary research and training in sustainable bio- and circular economy.

The unique selling point of TUMCS is that it bundles and connects the cross-cutting expertise and experts in the relevant fields of biotechnology, chemistry, economics, management, material science, process engineering and social sciences and placing them under one roof.

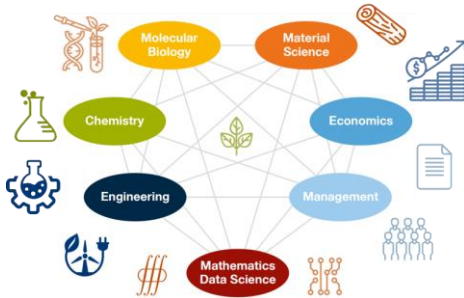


Mission of TUMCS: making bioeconomy happen



The transformation of industry and society:

- Intensified basic research (biological, chemical, physical, technical, engineering)
- Broad adjustments within society. Economic and social sciences can help with this adaptation



Teaching has to integrate these topics



Interdisciplinarity is essential for the realization of a bioeconomy



Research has to integrate these topics

Interdisciplinary Research and Teaching for the Bioeconomy

Chemical Biotechnology



B.Sc. / M.Sc.

Biomass Technology



M.Sc.
Joint Degree mit BOKU Wien

Technology of Biogenic raw materials



B.Sc. / M.Sc.

Biogenic Materials



B.Sc. / M.Sc. ab WiSe 2023/24

Bioeconomy

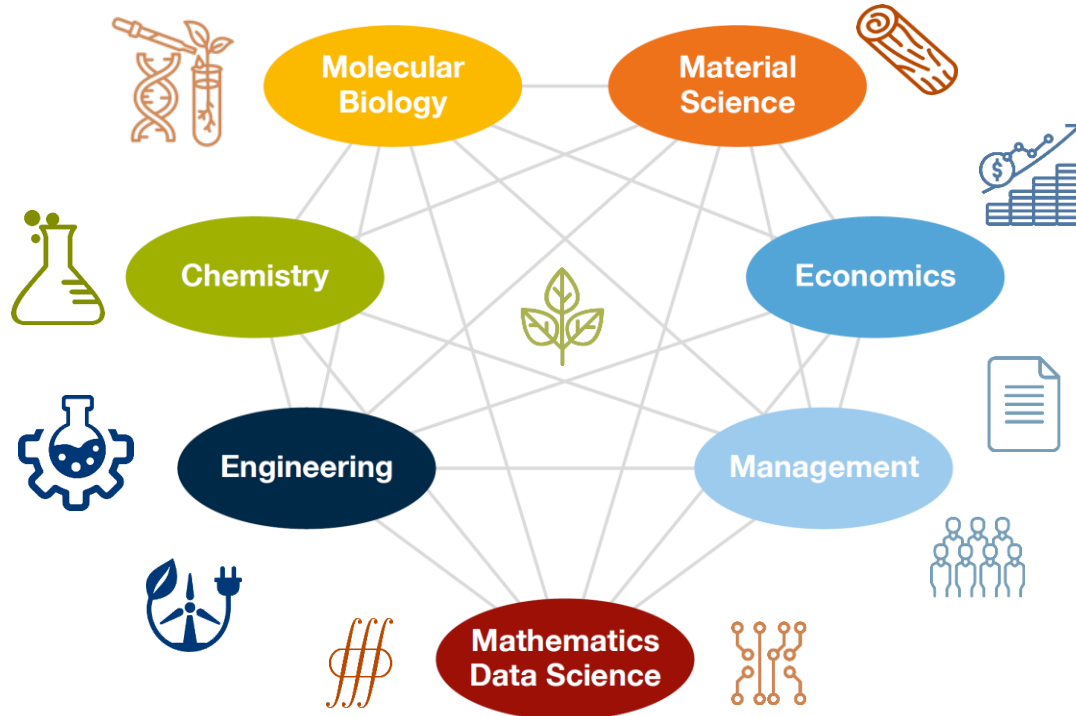


B.Sc. / M.Sc.

Sustainable Management & Technology



B.Sc. / M.Sc.
MGT



Expectations on Graduates

Example B.Sc. Bioeconomy

- Disciplinary excellence

Semester	Module								Credit Points/ Prüfungsanzahl
1.	Environmental Resources in a Changing World (Pflicht) Klausur 5 CP	Physics (Pflicht) Klausur 5 CP	Statistics (Pflicht) Klausur 5 CP ★	Mathematics (Pflicht) Klausur 5 CP ★	Microeconomics (Pflicht) Klausur 6 CP ★	Management Science (Pflicht) Klausur 6 CP ★			32/6
2.	Fundamentals of Thermodynamics (Pflicht) Klausur 5 CP	Organic Chemistry (Pflicht) Klausur 5 CP	Empirical Research Methods (Pflicht) Klausur 6 CP ★	Macroeconomics (Pflicht) Klausur 6 CP ★	Material Flow Analysis and Life Cycle (Pflicht) Klausur 6 CP ★	Supply Chain Management (Pflicht) Klausur 3 CP ★			31/6
3.	Foundations of Biology (Pflicht) Klausur 5 CP	Wood-Based Resources (Pflicht) Klausur 5 CP	Production of Biogenic Resources (Pflicht) Klausur 5 CP	Foundations of Programming (Pflicht) Klausur 5 CP ★	Intermediate Microeconomics (Pflicht) Klausur 6 CP ★	Environmental Management (Pflicht) Klausur 5 CP ★			31/6
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5. Mobilitätsfenster	Governance of Bioeconomy (Pflicht) Klausur 5 CP ★	Concepts in Physics and Chemistry in Nature (Wahl) Klausur 5 CP	Behavioral Economics (Wahl) Klausur 6 CP ★	Introduction to Development Economics (Wahl) Klausur 6 CP ★	Seminar in Innovation and Technology Management (Wahl) Wissenschaftliche Vortragsleistung 6 CP ★				28/5
6.	Bachelor's Thesis (Pflicht) Wissenschaftliche Ausarbeitung 10 CP		Evidence Based Management and Policy (Pflicht) Wissenschaftliche Ausarbeitung 10 CP		Projekt zu öffentlichen Diskursen und wissenschaftlichen Leitern (Pflicht) Prüfungsparcours 6 CP	English for Academic Purposes (Wahl) Klausur 3 CP			29/5

Legende: hellgrau = Pflichtmodule, dunkelgrau = Fundamentals, hellblau = Wahlmodule, schwarz = allgemeinbildendes Modul, dunkelblau = Abschlussarbeit / Projekt

Expectations on Graduates

Example B.Sc. Bioeconomy

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- Interdisciplinary competencies

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Knowledge, skills, and competencies

- understand economic processes and apply methods for impact evaluations
- understand and model environmental and resource economic issues
- understand and apply methods from circular economy and conduct life cycle assessments
- integrate methods from economics into decision making
- master mathematical and scientific methods to abstract and analyze problems in their basic structure
- have basic knowledge of natural sciences and engineering and can solve concrete problems
- can recognize inter- and transdisciplinary problems and to propose potential solutions
- are sensitive to non-technical requirements of professional activities, esp. in political processes
- have become acquainted with selected fields of technology and are thus able to bridge the gap between scientific and engineering fundamentals and economic policy recommendations
- can work in groups and to effectively communicate their results and solution
- can independently acquire new knowledge from the relevant subject areas

Expectations on Graduates

Example M.Sc. Sustainable Energy and Processes

Profiles	Processes	Energy	Material	Sustainability and Economics
Master 1. Semester	Conceptual Design of Fluid Separation 5 ECTS 4 SWS Pflichtmodul WS	Technical Thermodynamics and Balancing 5 ECTS 5 SWS Pflichtmodul WS	Conceptual Design of Bioprocesses 5 ECTS 4 SWS Pflichtmodul WS	Mechanical Processing of biogenic Materials 5 ECTS 4 SWS Pflichtmodul WS
	Basics of Numerical Methodes 6 ECTS 4 SWS Wahlmodul WS	Renewable Utilisation 5 ECTS 4 SWS Wahlmodul WS	Corrosion and Surface Technologies 5 ECTS 4 SWS Wahlmodul WS	Introduction to Management of Renewable Ressources 5 ECTS 4 SWS Wahlmodul WS
Master 2. Semester	Advanced Downstream Processing 5 ECTS 4 SWS Pflichtmodul SS	Energy & Economics 5 ECTS 4 SWS Pflichtmodul SS	Sustainable Fibre Technologies 5 ECTS 4 SWS Wahlmodul SS	
	Carbon Capture, Storage and Utilization 5 ECTS 4 SWS Wahlmodul SS	Energy Efficient Buildings 5 ECTS 4 SWS Wahlmodul SS	Biogas Technology 5 ECTS 4 SWS Wahlmodul SS	Principles of Economics 5 ECTS 4 SWS Wahlmodul SS
	Electrobiotechnology 5 ECTS 4 SWS Wahlmodul SS	Modelling and Optimization 6 ECTS 4 SWS Wahlmodul SS	Sustainable Energy Materials 6 ECTS 4 SWS Wahlmodul SS	Sustainability and Law 6 ECTS 4 SWS Wahlmodul SS
Master 3. Semester	Energy and Process Engineering Project 8 ECTS 8 SWS Pflichtmodul WS	Energy Process Engineering 6 ECTS 5 SWS Pflichtmodul WS		
	Production of Renewable Fuels 5 ECTS 4 SWS Wahlmodul WS	Energy and Process Research Lab 8 ECTS 8 SWS Wahlmodul WS		Principles of Life Cycle Assessment 6 ECTS 4 SWS Wahlmodul WS
	Catalysis 5 ECTS 4 SWS Wahlmodul WS	Geothermal Energy Systems 5 ECTS 4 SWS Wahlmodul WS	Windpower 4 ECTS 2,5 SWS Wahlmodul WS	Operations Research 6 ECTS 4 SWS WS

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- Interdisciplinary competencies

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Mobility window

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- Interdisciplinary competencies
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 - In Curriculum
 - Exchange
 - On campus
 - Extra-Curricular

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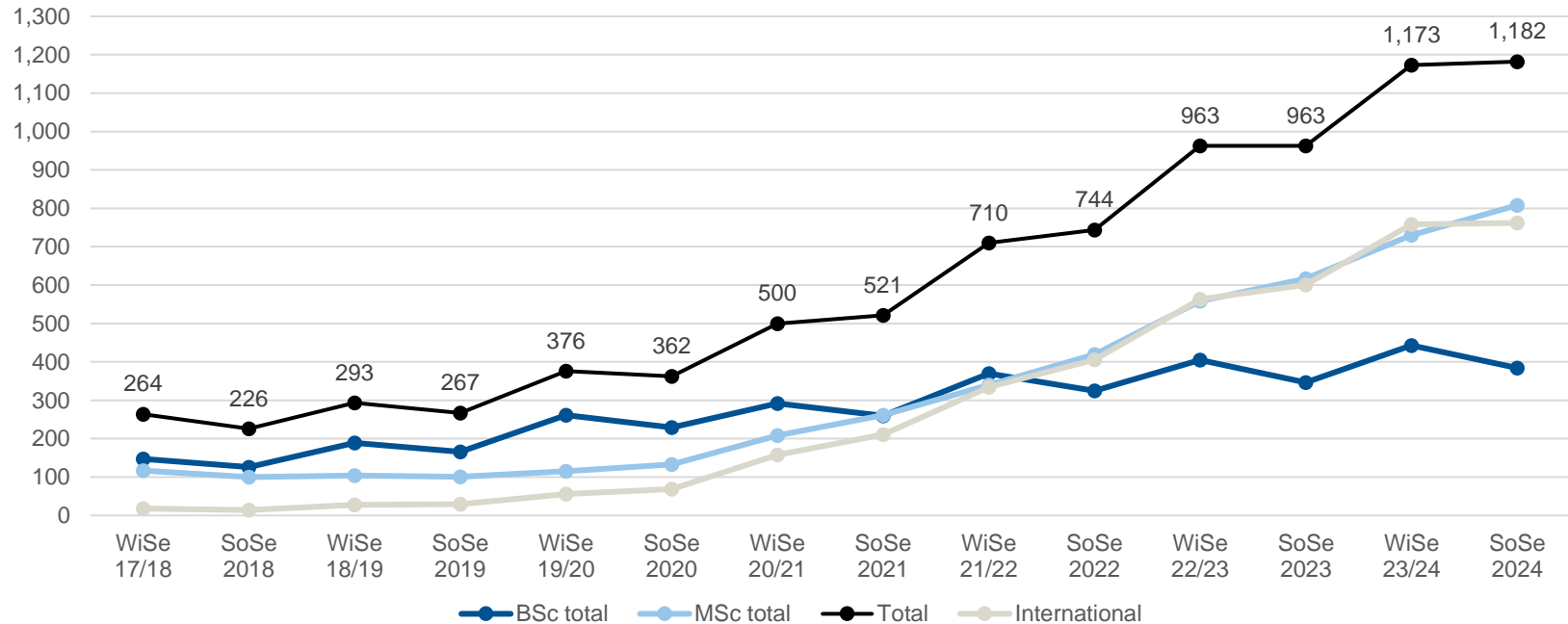
Mobility window

- Disciplinary excellence
- Interdisciplinary competencies
- International perspectives

The screenshot shows the website for the TUM Global & Alumni Office. The main heading is "Going abroad with TUM". Below it, there is a sub-heading "Study abroad" with a right-pointing arrow and "Internship abroad" with a right-pointing arrow. The "Study abroad" section includes a photo of students sitting on a bench outdoors. The "Internship abroad" section includes a photo of a student sitting on a bicycle on a path overlooking a city. The website also features a sidebar with navigation links like "Home", "About us", "TUM Global News", "Partnerships & Initiatives", "Worldwide locations", "Going abroad", "Study", "Internships", "Research and Teaching", "Training", "Thinking green", "Promoting equity!", "TUM Without Borders", and "Coming to TUM". On the right side, there is a "TUM Global & Alumni Office" contact information and a "Scholarships for global stays abroad" section with a right-pointing arrow.

Study and Teaching

Development of student numbers



Expectations on Graduates

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Mobility window

- Disciplinary excellence
- Interdisciplinary competencies
- International perspectives

How can we succeed in realizing a global sustainability strategy that will protect life on our planet? Anyone dealing with this topic must develop an understanding for the situation of other people and cultures and their respective problems.



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Expectations on Graduates

Project studies not only with industry but also with local municipalities and city administration



Urban greening and improving climate resilience



Sustainable Office Management

- Disciplinary excellence
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Expectations on Graduates



Actively encourage and support student lead activities, especially ones that result in interaction with the broader public

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Expectations on Graduates



Bioeconomy Youth Ambassadors who for two years, they carry the voice of youth in bioeconomy and:

- lead by example, inform and inspire others about sustainable and circular bioeconomy;
- reach out to communities: students and civil society, and engage decision-makers;
- raise awareness about the role of the bioeconomy in everyone's life especially in youth communities;
- support the ongoing youth and education related processes of the European Union.

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Some random final thoughts

Necessary skills to co-create environmental and social policies? Graduates need to be able to contribute their expertise effectively and engage with other perspectives

- Tension between a broad versus a deep focus in the curriculum
 - How much disciplinary focus is necessary/possible?
 - How much interdisciplinary focus is necessary/possible?
- Diversity among students with an interest in policy-making
 - Does every graduate need qualifications in this area?
 - More specialized programs for those interested? In form of Micro-Credentials?
 - How many extra-curricular activities do we want?
- Contact with policy decision-makers
- How to think about life-long learning and our alumni in this context?

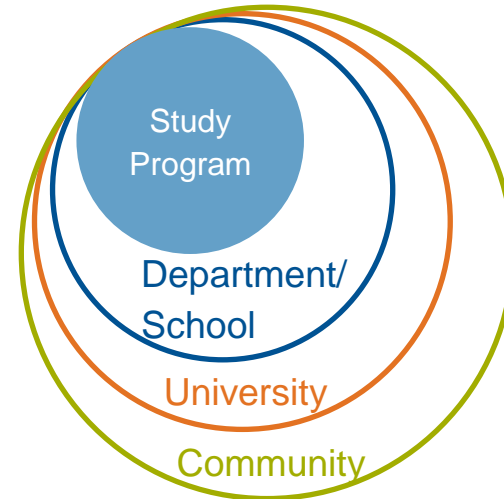
Erasmus+ and research funding slashed in EU's 2025 budget plans

euro news.



BIOECONOMY CHANGEMAKERS FESTIVAL
 Youth as driver of transformative change
 11-17 March 2024

SATELLITE STRAUBING



Contact

Prof. Dr. Sebastian J. Goerg
Professorship for Economics

Technical University of Munich
TUMCS for Biotechnology and Sustainability
TUM School of Management

Am Essigberg 3
94315 Straubing

s.goerg@tum.de
www.eco.cs.tum.de