The B.Sc. Bioeconomy at the Technical University of Munich

Prof. Dr. Sebastian J. Goerg

ICA-CoP Bio-Edu Colloquium 2022
19th May 2022

Technical University of Munich

TUMCS for Biotechnology and Sustainability
TUM School of Management

AACSB ACCREDITED EQUIS ACCREDITED ASSOCIATION OF MBAS ACCREDITED

TUM Campus Straubing for Biotechnology and Sustainablity is an Interdisciplinary Research Institute of the TUM

- Same status as a faculty / school
- Truly interdisciplinary, with scientists from the natural sciences, engineering, economics, and management
- Focus of research and teaching is on topics in the area of bioeconomy, biotechnology, and sustainability in general.
- Currently 22 professors and roughly 880 students

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Renewable Ressources


Residual Materials / Waste


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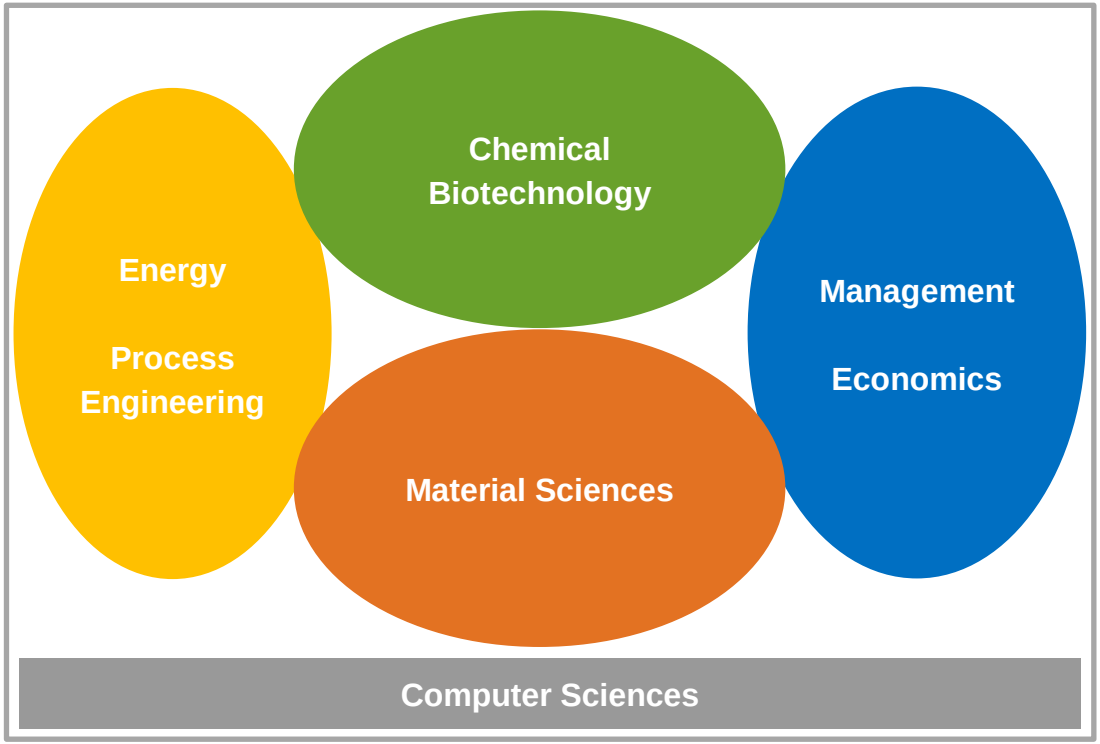

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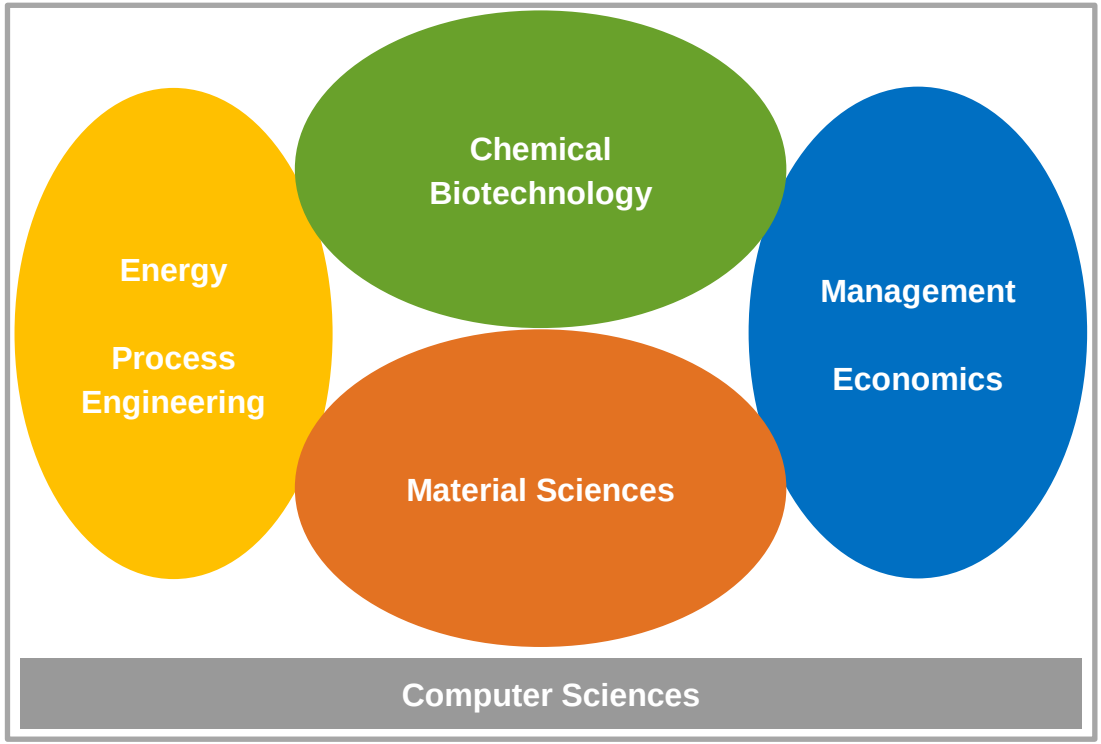


Energy

Materials

Short history of the TUM Campus Straubing

Founding of KoNaRo and of the Science Center in Straubing

1998-2001

Update 2.0:
B.Sc. Nachwachsende Rohstoffe

Goal:
- 12 professors
- 500 students

2012

Founding of the TUM Campus Straubing

TUMCS

2017

2008

M.Sc. Nachwachsende Rohstoffe

2015

Update 3.0:
8 study programs

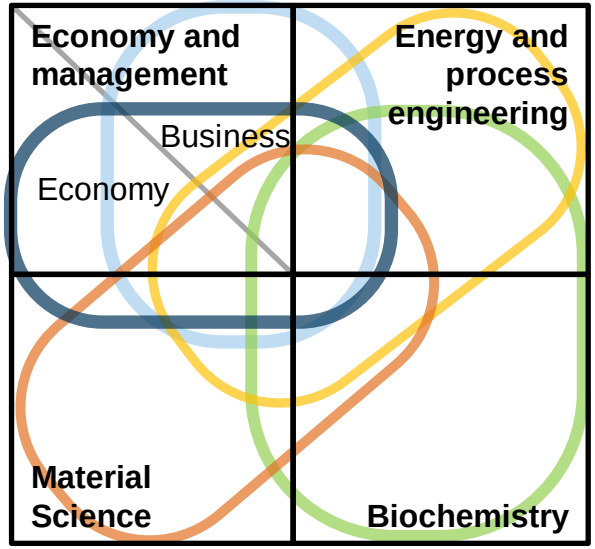
Goals:
- 30 professors,
- 1000 students

2021

Dedication of the Building *Sustainable Chemistry* Uferstraße 53

Overview of study programs at Campus Straubing

Interdisciplinary study programs with focus on bioeconomy, biotechnology, and sustainability



- Chemische Biotechnologie (BA, 2017)
  Chemical Biotechnology (MA, 2020)
- Sustainable Management & Technology (BA, 2021)
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- **Bioökonomie (BA, 2018)**
  Bioeconomy (MA, 2020)
- Technologie Biogener Rohstoffe (BA, 2020)
  Technology of Biogenic Resources (MA, 2021)
- Biogene Werkstoffe (BA, 2020)
  Biogenic Materials (MA, 2022)

BSc. Bioökonomie

Who should study BSc. Bioökonomie / MSc. Bioeconomy ?

You care about societal challenges?

You want to shape the transition towards a more sustainable economy?

You are interested in economics and management questions?

You care about policy questions?

You are interested in natural sciences and technical aspects?

You are not afraid of math?

Motivation for the BSc. Bioökonomie

The **bioeconomy** aims to **change the raw material base from fossil to biogenic raw materials**.

This structural change involves the **knowledge-based production** and **use of biological resources** to provide **products**, **processes** and **services** in **all economic sectors** as part of **a sustainable economic system**.

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The bioeconomy is based on the **latest scientific findings** and **builds a bridge between technology, ecology, society and the economy** and as well as their interactions. Thus, the bioeconomy encompasses **various scientific disciplines** and **numerous application industries** in which the **natural sciences** and **economics** work closely together in an **interdisciplinary** and **transdisciplinary** manner.

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For the rapidly growing number of activities in the bioeconomy, university graduates need to be **prepared for interdisciplinary challenges**. Therefore, it is necessary to train students who have an **economic understanding**, can **work with biological, chemical-material, and technical methods**, and can think in **local and global circular processes / supply chains**.

Our graduates…

- learn the the basics of economics and engineering/natural sciences
- can combine biological, chemical and technical knowledge with economic and social issues

- can develop and shape the structural change necessary for the bioeconomy and a sustainable economy
- understand the necessary societal and economic processes
- able to plan projects independently due to their interdisciplinary knowledge
- take up professional activities in the area of public administration, research, industry and consulting.

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

1	Physics 5CP	General Chemestry 5CP	Statistics 5CP	Mathematics 5CP	Microeconomics 6CP	Environmental Management 5CP	**Credits per Term 31**
2	Basics Thermodynamics 5CP	Green Chemistry 5CP	Organic Chemistry 5CP	Macroeconomics 6CP	Material Flow Analysis and Life Cycle Assessment 6CP	Supply Chain 3 CP	**30**
3	Cell and Microbiology 5CP	Wood Based Resources 5CP	Production Biogenic Resources 5CP	Foundations of Scientific Programming 5CP	Intermediate Microeconomics 6CP	Entrepreneurship 3 CP	**29**
4	Introduction to Process Engineering 5CP	Electives I 6CP	Empirical Research Methods 6CP	Policy and Innovation 5CP	Introduction Environmental and Resource Economics 5CP	Circular Economy 6CP	**30**
5	Bioprocess Engineering 5CP		Electives II 6CP	Electives III 5CP	Electives IV 5CP	Management Science 6 CP	**30**
6	General Elective 5CP	Bachelor's Thesis 10CP		Evidence Based Management and Policy 10CP		Governance of the Bioeconomy 5CP	**30**

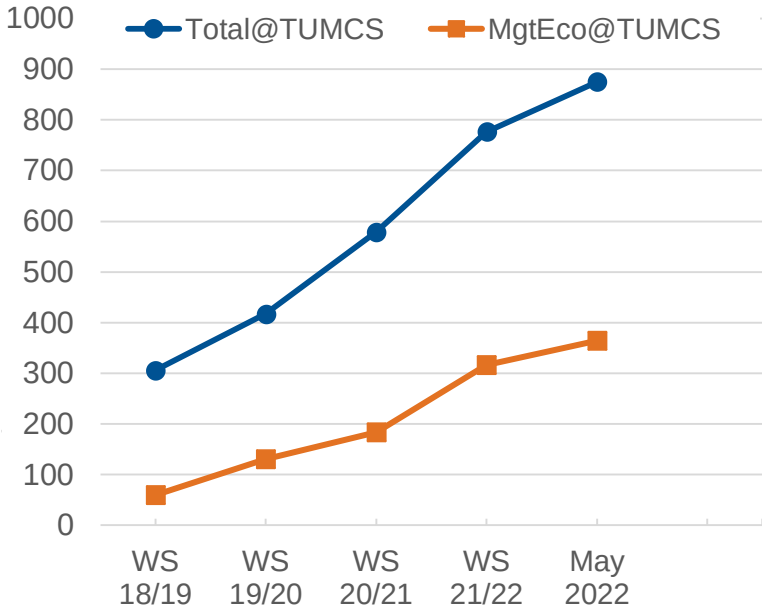
Engineering and Natural Sciences
- Technical foundations
- Chemical foundations
- Biological foundations

Basics Mathematics/Statistics/Computer Science

Economics and Business
- Economics and Economic Policy
- Circular Economy
- Management

Management and Economics at TUMCS: Education

Current number of students:



Professional education

Certificate program Sustainable Management &Technology

jointly with IL3
since April 2022

Sustainability Dialogue

Regular meetings with members from e.g., Daimler Mobility, DHL, Deutsche Telekom, Henkel, SAP, Südzucker, Audi,….

jointly with IL3

since October 2019

Degree programs

M.Sc Bioeconomy

current students: 35
international: 64%
since WS 20/21

M.Sc. Sustainable Management &Technology

current students: 49
international: 60%
since WS 21/22

B.Sc. Bioeconomy

current students: 130
international: 16%
since WS 18/19

B.Sc. Sustainable Management &Technology

current students: 58
international: 44%
since WS 21/22

B.Sc. Management & Technology NaWaRo

current students: 62

phase out

Some first reflections

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- **Type of Students**
  - We attract different students than in our other study programs
    (including BSc. Sustainable Management & Technology)
  - This is a hard program (students need broad talents) and some fail
  - Some students use the program as an “orientation program”

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- **Learning outcomes**
  - Cautiously optimistic that our students acquired the knowledge and skills that we hoped for
  - Good feedback from project partners
  - Good feedback from students

Contact

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