

WT 2026/2027

Project module: Sustainable Operations: Designing Supply Chain Networks for a Regional Bioeconomy (10 CP)

Lecturer: Dr. Laura Frank

1. Content and Objective of the Project Module

The transition from fossil raw materials to renewable resources is one of the most critical challenges facing today's industrial landscape. To significantly reduce greenhouse gas emissions, environmental impacts, and import dependencies, existing supply chains, business models and infrastructures must be fundamentally transformed. In this context, the regional bioeconomy plays a key role: By utilizing locally available biomass and organic waste streams, regions can combine climate protection and supply security with local value creation. Ideally, this approach minimizes both the ecological footprint and production costs simultaneously.

Addressing this complex challenge requires system-level thinking and actionable insights, which forms the core of this project module. Using North Rhine-Westphalia (NRW) – one of Europe's major industrial hubs – as a regional case study, students will work in groups to investigate the design and feasibility of regional, bio-based value chains. Specifically, the module focuses on the value chain from biomass to ethylene glycol (EG) as a case study. Ethylene glycol is an important monomer with rising global demand, used among other things for PET production, yet it is still obtained largely from fossil raw materials. Re-engineering its supply chain from regional waste streams presents a realistic, highly relevant industry case study involving complex technological, economic, logistical, and environmental trade-offs.

Supported by teaching staff, groups will analyze the same regional case study from different analytical and stakeholder perspectives as proposed in predefined focus topics. They may use methods such as techno-economic analysis (TEA), supply chain modeling and optimization, life cycle assessment (LCA), and multi-criteria evaluation. Following an introduction to these methods, each group will work on their respective research questions in interdisciplinary teams. This module empowers students to navigate the complete research cycle from defining the research question and selecting appropriate methods to interpreting and contextualizing the results. By bridging academic rigor with practical application, students acquire hands-on expertise in supply chain assessment and modeling methodologies, sharpen their system-thinking capabilities, and learn how to derive actionable strategic recommendations for regional decision-makers and industrial stakeholders.

Specifically, students should in this Project Module:

- understand the challenges of transitioning from a fossil-based raw material and chemical industry to bio-based value chains in a regional bioeconomy,
- identify gaps, challenges and opportunities affecting the implementation of bio-based production routes,
- narrow down their research questions in line with proposed focus topics and identify appropriate methods to address them,
- select and apply a suitable analysis or modeling method for the research question developed, and compile the data it requires, e.g., technology and process data, regional residue flows, site and logistics structures, policy and market conditions,
- derive recommendations for the stakeholders involved based on the research findings.

The following focus areas outline possible starting points and perspectives in the regional NRW bioeconomy from which the groups can develop their own research questions:

- Life Cycle Assessment (LCA): Cradle-to-gate assessment of EG production from silage corn residues compared to the fossil-based reference pathway.
- Supply Chain Optimization: An optimization model for regional waste logistics and site selection in North Rhine-Westphalia.
- Techno-economic assessment (TEA): Cost drivers, scaling potential, and market risks of the biomass-based EG route from silage corn residues compared to the fossil-based EG route.
- Forecasting Model: Projection of the regionally available residue quantities and feedstock price ranges in North Rhine-Westphalia under varying climate and market scenarios, assessing the future volume and cost stability of the supply chain.

2. Target Group and Prerequisites

- Target Group: Master BWL (CDS, SC, ORM), Master WiWi (CDS, SC, ORM, GM), Master Wirt.-Ing (CDS, SC, ORM)
- Maximum Number of Participants: 18
- Language of Instruction: English
- No prior knowledge is required

3. Organizational Structure and Schedule

The project module will take place in the form of a block event on selected mandatory attendance dates (kick-off, introduction to scientific writing, interim presentation and final presentation). In between, we offer online consultation appointments. During the kick-off meeting, the concept of the course, specific topics and corresponding tasks will be presented. At the end of the kick-off meeting, groups are formed and the topics are then assigned.

As regular attendance at the plenary and group meetings is required, please check whether you can attend the dates listed below before registering. The groups will be supervised by Nadja Vierzigmann and Dr. Laura Frank at the Chair of Operations Management.

Project Modules are mandatory attendance courses! Please check before registering whether you can attend the dates listed below. Also, take note of the specific absence regulations for this module. Exam components are marked with an asterisk “*”.

When?	What?	Where?	Who?
Monday, 19.10.2026 15:00 - 18:00	Kick-off Meeting: - Organizational matters - Introduction to topics and methodologies - allocation to groups	In presence (C102, Kackertstr. 9)	Plenary (compulsory attendance)
Wednesday, 28.10.2026 12:30-14:30	Introduction to Scientific Writing	In presence (C102, Kackertstr. 9)	Plenary (compulsory attendance)
by arrangement	Group meeting with the supervisor	online	Team
until Sunday, 29.11.2026 18:00	Submitting presentation slides to the group supervisor	E-Mail	Team
Monday, 30.11.2026 15:00-17:30	Interim presentation*: Presentations by all groups with discussion	In presence (C102, Kackertstr. 9)	Plenary (compulsory attendance)
by arrangement	Group meeting with the supervisor	online	Team
until Tuesday, 19.01.2027, 18:00	Submitting presentation slides to the group supervisor	E-Mail	Team
Wednesday, 20.01.2027, 12:00 - 15:00 h	Final presentation*: Presentations by all groups with discussion	In presence (C102, Kackertstr. 9)	Plenary (compulsory attendance)
until Friday, 29.01.2027, 12:00	Submission of project paper*: in electronic form		Team

* Exam component

4. Examination Requirements

At the end of the project module, students must submit a paper documenting their project results. The requirement is 15 pages per group member. Each group also presents its results during a final presentation session (20-minute presentation + 10 minutes of discussion per group). Additionally, an interim presentation is part of the examination (15-minute presentation + 10 minutes of discussion per group). The papers are completed in interdisciplinary teams but are graded according to individual contribution. Therefore, each group member's work must be clearly identifiable in the paper to allow for individual assessment. Similarly, all group members should contribute as equally as possible to both the interim presentation and the final presentation session. Participation in the group discussions during the interim and final presentations is included in the evaluation of the colloquium.

The final grade is made up of the paper (65%) and colloquia (interim and final presentation) (35%).

5. Absence Regulation (Module-specific Information)

Attendance is mandatory for all dates. The tolerated absence time is a maximum of 15% of the total attendance time and also includes additional, individually agreed group appointments with the supervisor (not included in point 3). Group appointments must be attended jointly by all group participants and generally take place as online appointments. Please note that absences excused by a medical certificate are included. There is no provision for substitute work, as the achievement of the learning objective depends in particular on interaction with the lecturers and fellow students.

Students should meet regularly outside the compulsory dates. Although attendance at group meetings without the supervisor is not compulsory, it is the responsibility of the respective candidate to explain their involvement in the group project in a transparent and comprehensible manner in the event of frequent absences.

6. Registration for the Course

Current Information on the Registration Process, including Deadlines, will likely be available from the end of September on the website:

[Project Modules - RWTH AACHEN UNIVERSITY, Faculty of Business Administration - English \(rwth-aachen.de\)](https://www.rwth-aachen.de/en/project-modules)

7. Registration for the Exam

Upon the system assignment (fixed place) to the project module course, automatic exam registration will be carried out by the WiWi Examination Management. Therefore, a separate exam registration for students in project modules is not necessary (exception: waiting list). For the exam registration process after receiving a spot, please refer to the website: ([Project Modules - RWTH AACHEN UNIVERSITY, Faculty of Business Administration - English \(rwth-aachen.de\)](https://www.rwth-aachen.de/fba/en/project-modules)). Cancellation is possible via the system after registration. You can withdraw from the exam up to 14 days before the first exam session via the PV on RWTHonline. Please also notify the course instructor.

8. Deregistration / Cancellation / Absence / Illness

General regulations for all project modules can be found on the website of the Faculty of Business Administration under: [Project Modules - RWTH AACHEN UNIVERSITY, Faculty of Business Administration - English \(rwth-aachen.de\)](https://www.rwth-aachen.de/fba/en/project-modules)

9. Contact Person for Questions

Module Content

Nadja Vierzigmann
Kackertstraße 7, Room 142
52072 Aachen
nadja.vierzigmann@om.rwth-aachen.de

Dr. Laura Frank
Kackertstraße 7, Room 150
52072 Aachen
laura.frank@om.rwth-aachen.de

Course Registration:

Cathrin Schwaebe
Templergraben 64, Room 621
zuteilung@wiwi.rwth-aachen.de

Exam Registration:

Dr. Sandra Silvertant
Examination Coordinator
Templergraben 64, Room 622
pruefungen@wiwi.rwth-aachen.de