Valid from 2025.HS

Module description: Material and Energy Systems

Module Code	w.MA.XX.MES.23HS
ECTS Credits	3
Language of Instruction/Examination	English
Module Description	Sustainability is the practice of using natural resources, such as water, soil, or air responsibly so that they can support both present and future generations. The module “Material and Energy Systems” focuses on understanding material and energy flows in natural and man-made systems as a conceptual model for the circular economy. Principles and types of natural ecosystems, the interaction of biotic communities and abiotic factors, and the influence of human uses are discussed. Energy and material flows in the continuum between pioneer and mature natural and anthropogenic ecosystems are examined and compared with engineered technical solutions such as agricultural, solid waste management, water, and wastewater systems.
Organizational Unit	Zurich CTR f Sustainability Leadership
Module Coordinator	Dirk Steuerwald
Deputy Module Coordinator	Daniel Matthias Meier
Program and Specialization	• Circular Economy Management
Legal Framework	Academic Regulations MSc in Circular Economy Management dated 02.06.2022, Appendix to the Academic Regulations for the degree program in Circular Economy Management, first adopted on 23.09.2022
Module Category	**Module Type** Compulsory
Prerequisite Knowledge	
Contribution to Program Learning Objectives (by the concerned Module)	• Professional Competence • Methodological Competence • Social Competence • Self-Competence
Contribution to Program Learning Objectives	**Professional Competence** • Knowing and Understanding Content of Theoretical and Practical Relevance • Apply, Analyze, and Synthesize Content of Theoretical and Practical Relevance • Evaluate Content of Theoretical and Practical Relevance **Methodological Competence** • Problem-Solving & Critical Thinking • Scientific Methodology • Work Methods, Techniques, and Procedures • Information Literacy • Creativity & Innovation **Social Competence** • Written Communication • Oral Communication • Teamwork & Conflict Management • Intercultural Insight & Ability to Change Perspective **Self-Competence** • Self-Management & Self-Reflection • Ethical & Social Responsibility • Learning & Change

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Module Learning Objectives

Students...
- Analyze, compare, and explain material and energy flows in ecological systems using simple examples.
- Recognize and explain the connection between biodiversity and the intensity of material and energy flows, e.g., based on agriculture.
- Assess the influence of human uses on material and energy flows of selected ecosystems.
- Recognize the influence of one's own actions, for example, as a circular economy manager, on the material and energy flows of ecosystems and formulate options for action.

Module Content

- Material cycles and energy flows in ecological systems.
- Typification of ecosystems (“pioneer” ecosystems to “mature” ecosystems) and transferability to CE systems.
- Ecosystems and biodiversity.
- Ecosystem services in the agricultural transformation

Links to other modules

This module is linked to the following modules:
- w.MA.XX.BIMA.23HS
- w.MA.XX.SSEC.23HS
- w.MA.XX.LCSA.23HS

Digital Learning Resources

- Reader
- Teaching Materials

Methods of Instruction

- Interactive Instruction
- Lecture
- Explorative Learning
- Exercises
- Literature Review

Social Settings Used:
- Group Work

Type of Instruction

	Classroom Instruction	Guided Self-Study	Autonomous Self-Study
Lecture	23 h	-	
Excercise	5 h	17 h	
Project Work	-	-	
Seminar	-	-	
Total	**28 h**	**17 h**	**45 h**

Performance Assessment

End-of-module exam	Form	Length (min.)	Weighting
-			
Permitted Resources			

Others	Assessment	Format	Length (min.)	Weighting
Written Assignment	Pass/Fail	Gruppenarbeit	0	0.00
Written Assignment	Pass/Fail	Gruppenarbeit	0	0.00
Written Assignment	Pass/Fail	Gruppenarbeit	0	0.00
Written Assignment	Pass/Fail	Gruppenarbeit	0	0.00
Written Assignment	Pass/Fail	Gruppenarbeit	0	0.00
Written Assignment	Pass/Fail	Gruppenarbeit	0	0.00
Written Assignment	Pass/Fail	Gruppenarbeit	0	0.00

Classroom Attendance Requirement

None

Compulsory Reading

Recommended Reading

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Comments	