

The Limits to Growth: Sustainability and the Circular Economy

Lecture 0: Organization

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- Updated versions of these slides will be available in our [Github repository](#).

Team



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Research Group

- **Emerging Technologies for the Circular Economy → ETCE**
- Research focus:
 - Intersection of IT and sustainability
 - Circular Economy
 - Self-organized, decentralized and distributed systems
 - Machine-to-Everything Economy (M2X Economy)
- Other courses:
 - Requirements Engineering (WS – M.Sc.)
 - Emerging Technologies for the Circular Economy (SS – M.Sc.)

Research Group

- ETCE Website – [Link](#)
 - Course material
 - Theses/project topics

- Our research in action:
 - ZDF documentary (German) – [Link](#)
 - Klartext Preis 2020 (German) – [Link](#)

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- Our research in action:
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You want join us? Write us an email!

→ benjamin.leiding@tu-clausthal.de

Course Content

- Basics of climate change, environmental pollution, and dwindling non-renewable resources
- Introduction to the circular economy, sustainability, and related concepts (biocapacity, etc.)
- Sustainability goals
- Feedback loops and tipping points
- Implications of closed systems with a finite supply of resources
- Technology-focused and technology-critical approaches towards sustainability
- Circular Societies

Learning Outcome

- Understanding the concept of a circular economy, sustainability, and related concepts (biocapacity, etc.).
- Gain a basic understanding of causes, dimensions, and the characterization of climate change, environmental pollution, and dwindling non-renewable resources.
- Being able to make high-level, transdisciplinary assessments of decisions and measures in a social, economic, and political context.
- The ability to critically assess upcoming technological solutions enabling/facilitating sustainability and the circular economy.

Lecture Plan

Date	Lecture Title
30.10.2024	L00 - Organisation L01 - Introduction
06.11.2024	L02 - Challenges I - Climate Change
13.11.2024	L03 - Challenges II - Environmental Pollution and Resources
20.11.2024	L04 - A History of Political (In-) Action (MOOC)
27.12.2024	L05 - Overshoot, the Limits to Growth and Planetary Boundaries
04.12.2024	L06 - LifeCycle Assessment (LCA) (MOOC)
11.12.2024	L07 - Ethics and Morals of Sustainability
18.12.2024	L08 - Circular Economy (Flipped Classroom → MOOC@Home + Live Lecture)
08.01.2025	L09 - Circular Societies (MOOC)
15.01.2025	L10 - Beyond the Circular Economy I
22.01.2025	L11 - Invited Lecture (Gabriel from the CatFarm project)
29.01.2025	L12 - Beyond the Circular Economy II
05.02.2025	L13 - Complex Societies and Technology L14 - Summary
12.02.2025	Exam Q&A

MOOC == Watch@Home



Lecture Plan

FLIPPED CLASSROOM

Course Organization

- Course website - [Link](#)
- News and updates:
 - Everyone: Please join the public Matrix room by using this Link:
<https://matrix.to/#/#public--LTG-Course-SS23:matrix.org>
 - We will share news and updates here and you will also have the chance to ask questions to us and your fellow students.
 - CLZ students + DigiTec will additionally receive information via StudIP ([Link](#))
- Slides will be uploaded to Github ([Link](#))
 - Please report bugs ;)
- Lecture recordings will be available on StudIP and on Github
- Questions? Write us an email: etce-ltg@tu-clausthal.de ← **We will only respond to emails written to this specific email address!**



Course Organization - Asynchronous Learning & MOOC content

- **Massive Open Online Course**
 - Remote and (often) asynchronous online courses *not* just for students enrolled in a specific university, but *ideally* open for everybody
 - Usually consist of pre-recorded lectures, interactive content and online quizzes
 - Some of you might have visited MOOC on platforms such as edX, LinkedIn Learning, Coursera, Udacity, etc. before
- We are currently developing a MOOC for the Limits to Growth Lecture
- This semester will be a test run for this asynchronous and digital learning content
 - We are very happy about any feedback you can give us to improve the course further! Just write us an email: etce-ltg@tu-clausthal.de

Course Organization - Asynchronous Learning

- This semester we will include asynchronous learning for some of the lectures
 - Consisting of short pre-recorded videos and interactive content
- You will get further information about these two sessions during the semester
 - You will find the lecture videos on the course website

13.11.2024	L03 – Challenges II – Environmental Pollution and Resources	MOOC == Watch@Home
20.11.2024	L04 – A History of Political (In-) Action (MOOC)	
27.12.2024	L05 – Overshoot, the Limits to Growth and Planetary Boundaries	
04.12.2024	L06 – LCA (MOOC)	
11.12.2024	L07 – Technology and Sustainability (MOOC)	
18.12.2024	L08 – Circular Economy (MOOC)	
08.01.2025	L09 – Circular Societies (MOOC)	
15.01.2025	L10 – Beyond the Circular Economy I (MOOC)	

The MOOC lectures will **not** be live lectures. Instead, you will find pre-recorded videos and other content on our website.

Dates/Times/Locations

- Lecture:

- Wednesday **1:15 pm to 2:45 pm** (Berlin time) – 30.10.2024 to 05.02.2025
- Location: Goslar Gotec (Am Stollen 19 C, 38640 Goslar, Germany) or via BigBlueButton ([Link](#))

- Exercise / Q&A:

- Wednesday **3:00 pm to 4:00 pm** (Berlin time) – 30.10.2024 to 12.02.2025
- Location: Goslar Gotec (Am Stollen 19 C, 38640 Goslar, Germany) or via BigBlueButton ([Link](#))

Exercises

- Individual work → no group submissions
- Submission of **each** exercise is **mandatory**
- You pass by submitting an exercise – even if it is an empty page
- You will receive feedback on your submission
- Exercise = learning feedback

Some exercises require you to submit your work. All such exercises should be submitted the following link, using password “LTG2425”:

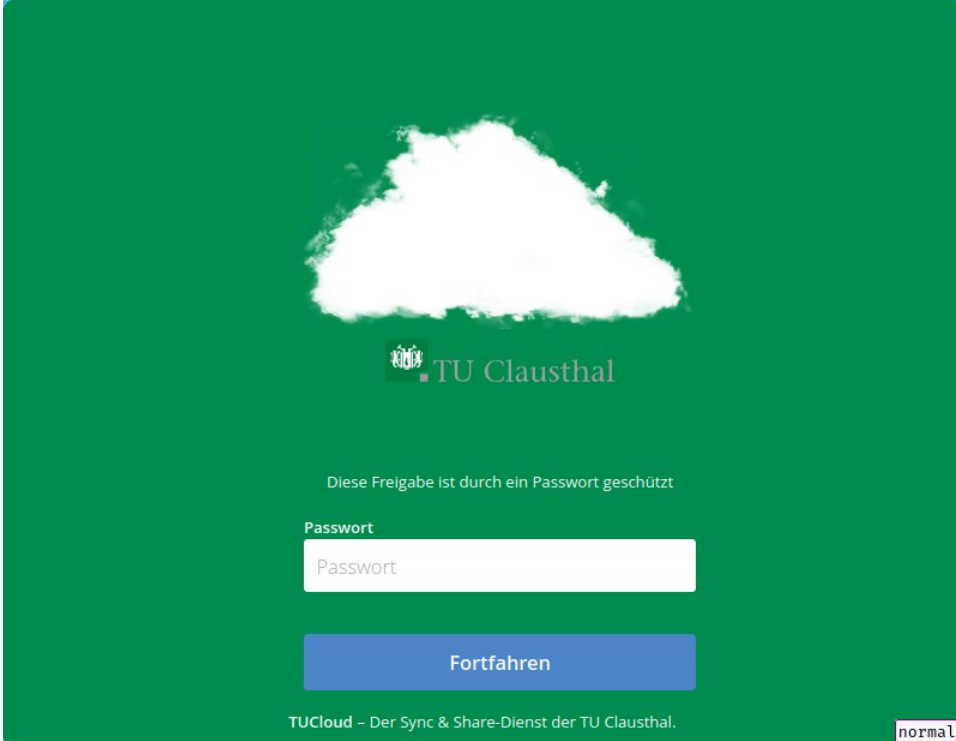
<https://tucloud.tu-clausthal.de/index.php/s/KGQqI0R6VoPwtNY>

- We do not accept email submissions, please use the file drop link to upload your submissions.
- **Important:** Always include your full name, your student email address and your student ID, so that we can track your submission.

Exercises

Submission Instructions

- Step 1: Enter the password, “LTG2425”



The image shows a login screen for TUCloud, a sync and share service from TU Clausthal. The background is a solid green color. At the top center is a white cloud icon. Below the cloud is the TU Clausthal logo. Underneath the logo, the text "Diese Freigabe ist durch ein Passwort geschützt" (This release is protected by a password) is displayed. Below this text is a label "Passwort" followed by a white input field containing the placeholder text "Passwort". Below the input field is a blue button with the text "Fortfahren" (Continue). At the bottom of the screen, the text "TUCloud – Der Sync & Share-Dienst der TU Clausthal." is visible on the left, and a small "normal" label is on the right.

Exercises

Submission Instructions

- Step 2: Upload a file, e.g. “E01-My_Name.pdf”
 - Once you upload a file, you cannot delete it
 - Unless otherwise specified, we only accept PDF files.
 - Ensure that your full name, and the exercise is mentioned in the filename **AND** inside the PDF file itself.
 - In addition, please include your student email address in the pdf file.



Anonymes Hochladen



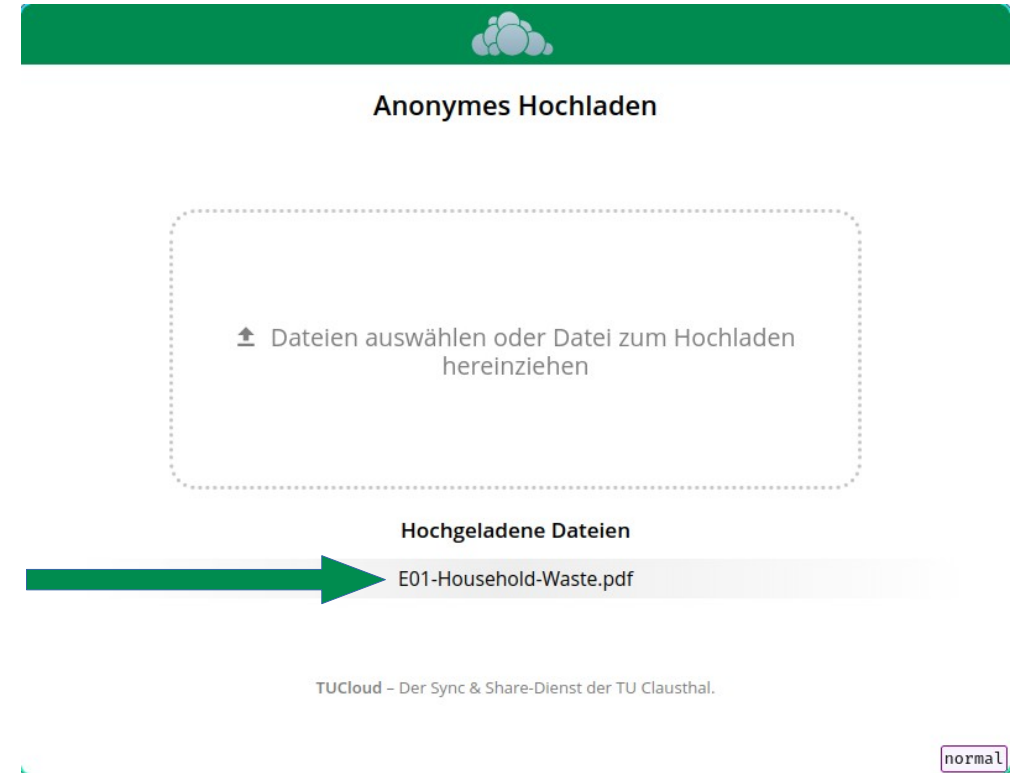
TUcloud – Der Sync & Share-Dienst der TU Clausthal.

normal

Exercises

Submission Instructions

- Step 3: If your exercise was successfully uploaded, it will be visible. Please do not upload duplicates.



Examination

- Prerequisite for admission to the final exam (all criteria have to be fulfilled):
 - Submit all exercises
- **Final exam:**
 - **Most likely on the 19.02.25 - 21.02.25**
 - Either written exam (120min) **or** oral examination (20-25min)

Examination

- Prerequisite for admission to the final exam (all criteria have to be fulfilled):
 - Submit all exercises
- **Final exam:**
 - **Most likely on the 19.02.25 - 21.02.25**
 - Either written exam (120min) **or** oral examination (20-25min)
- **Note for external students** → You do not have to register as a guest student at TU Clausthal! You pass the exam and get a written confirmation from us which you can present to your local examination office.

Self-Study Star

Self-Study Star → 

- Slides with the self-study star indicate optional/additional study material that is **not** mandatory but could be helpful or interesting

Literature

- This course is not based on a single book and you **do not** need to buy a book to pass the exam.
- Donella H. Meadows, Jorgen Randers, and Dennis L. Meadows. *The Limits to Growth* (1972).
- Donella H. Meadows, Jorgen Randers, and Dennis L. Meadows. *Limits To Growth: The 30-Year Update* (2004).
- Baccini et al. *Metabolism of the Anthroposphere: Analysis, Evaluation, Design* (2012).
- Walter R. Stahel. *The Circular Economy: A User's Guide* (2019).
- XR. *This is not a Drill* (2019)
- W. Brian Arthur. *The Nature of Technology: What It Is and How it Evolves* (2011).
- David Wallace-Wells. *The Uninhabitable Earth, Annotated Edition* (2017).
- James Lawrence Powell. *The 2084 Report: An Oral History of the Great Warming* (2020).
- Rutger Bregman. *Utopia for Realists* (2017).

Literature

- (German) Stefan Rahmstorf, Hans Joachim Schellnhuber. *Der Klimawandel* (2019).
- David Archer, Stefan Rahmstorf. *The Climate Crisis* (2010).
- Gabrielle Walker, David King. *The Hot Topic: How to Tackle Global Warming and Still Keep the Lights on* (2008).

Further Resources

- Climate University – Teaching and learning for a sustainable future – [Link](#)
- Circular Societies (German) – [Link](#)
- Server Infrastructure for a Global Rebellion – [Link](#)

Questions?