


Sustainability *in Teaching* *-course*

Session 2
/ Zoom



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Aalto-universitetet
Aalto University



31.3.2023
12-15

Session outline and objectives

Session outline

1. Exploring further connections of different fields to sustainability & curriculum perspective

Break

2. Key competencies for sustainability

Break

3. Applying competencies into you own field

Learning outcomes of this session

During this session you will:

- Familiarise yourself with the different approaches to integrate sustainability into teaching on course or programme level
- Reflect on how key competencies for sustainability can be used in developing teaching in one's own subject field

Ways of working during sessions

1. Group work/discussions in breakout rooms:

Keep your camera on, if possible

Agree, who takes notes and reports to the whole group (if applicable)

BR Chair duties

- Handing out the floor, keeping track of time
- Securing respectful and balanced dialogue

2. Using the chat:

- For sharing material
- For asking questions / commenting → preferable to “Raise hand” to avoid a side discussion in the chat

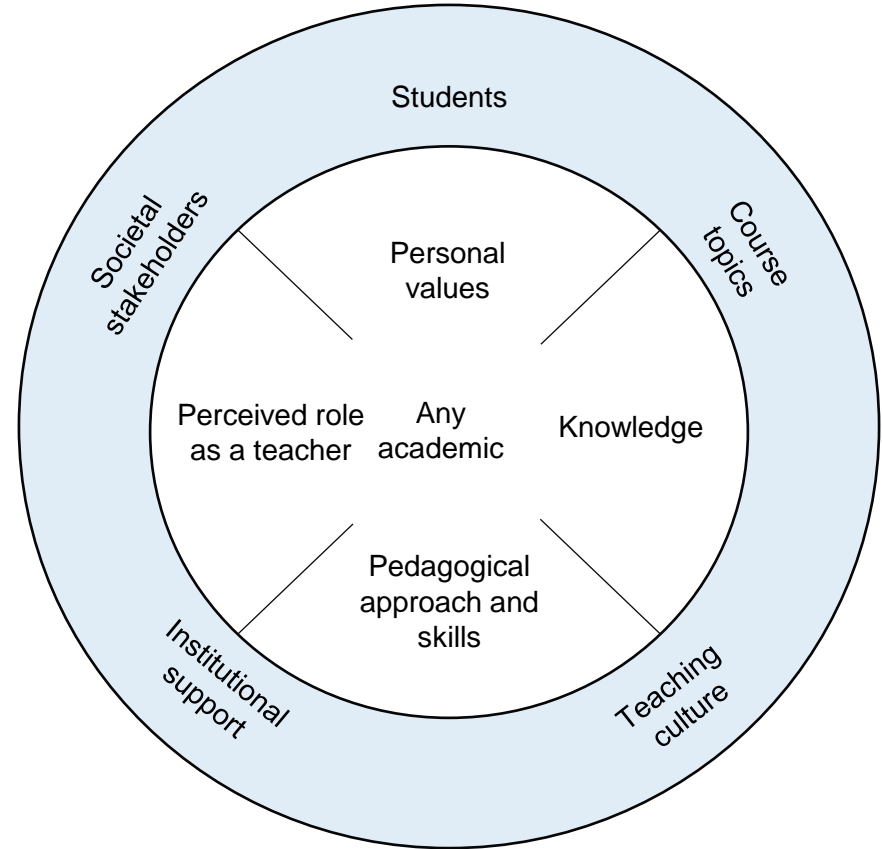
3. Remember to take real breaks!



What is influencing what are our possibilities to integrate sustainability?

- Academics are in a key role in integrating sustainability into higher education institutions (HEI).
- However, various things affect how we are able to integrate sustainability, they can be
 - personal (personal values),
 - related to the institutional context (teaching culture) or
 - external (societal stakeholders).

Thomas 2016, Barth 2013



Homework recap I: Influences

Limitations/obstacles:

- Stakeholders, challenges in implementing a systemic approach
- One-sided view or lack of discussion about sustainability within field
- Teaching culture not in line with own (sustainability) views
- Course ILOs do not support teaching of sustainability
- Students not always receptive of new creative teaching methods

Motivation:

- + Personal values
- + The field has a lot of impact on sustainability
- + Empowering the students
- + Pressure from the society
- + Lack of a holistic and systemic approach
- + Colleagues

Homework recap I - group discussion

General guidelines:

Breakout room: 10 min

- Random groups
- Room chair: last one in alphabetic (first name)

Topic of discussion:

- What did you identify as issues that influence the possibilities motivations obstacles

in developing your teaching?

Finding meaningful connections to sustainability

Curriculum perspective

Homework recap II: Finding connections to sustainability

In general, you were able to find connections to at least one dimension of sustainability, while some fields were identified as being tightly linked to all the dimensions. For those whose field is clearly promoting one dimension (e.g., social or ecological), we encourage trying to see the connection to the other dimensions as well (often indirect). Some viewpoints from your reflections:

- The connection can be considered in two ways: in relation to the core foundations of the field (is the field itself based on an unsustainable paradigm), or how the field can develop its practices to contribute to sustainable development.
- Trade-offs exist in the focus areas of the field: promoting e.g., energy efficiency might risk preventing biodiversity loss.
- The research area might be focused on one sustainability dimension (e.g., social), but it does not exclude considering the ecological aspects of the used methodology (e.g., efficiency of the technology).
- The field is tightly connected to all sustainability challenges, but the teaching addresses only technical solutions
- Current working life, while promoting (resource) efficiency, risks the wellbeing of people.

Finding meaningful connections to sustainability

Curriculum perspective

Continuum of approaches within sustainability education

Systemic change

- Focus on systemic level, transition processes
- Multidisciplinary
- Focus in developing competencies to participate in transition processes, and in defining and solving complex problems

What stakeholders should we engage, when aiming to create an environmentally, socially and economically sustainable service?

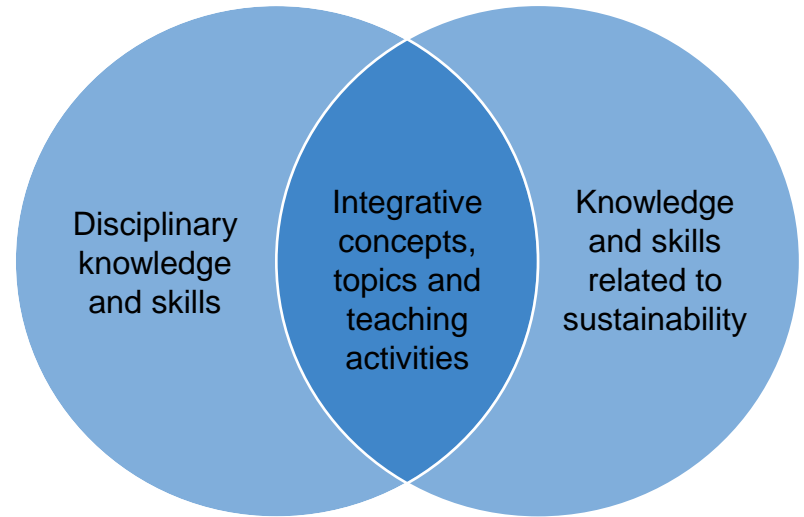
Disciplinary solutions

- Focus on disciplinary solutions
- Deep disciplinary knowledge
- Focus in developing competencies develop solutions based on single discipline e.g., optimisation of energy use.

How can the solution help minimizing CO₂-emissions?

Issues to consider when integrating sustainability into disciplinary contexts

- **Building meaningful connections** between sustainability and the discipline
- **Balancing between disciplinary and systems perspective** – optimally including both!
- **Being mindful about the tensions:** sustainability in the disciplinary context and sustainability as challenging the disciplinary context and norms
- **Learner-centered approach:** providing a point of entry for students: experiential learning activities and self-reflection



Barth 2015, Sandri 2021

Two levels of integration

Course development

What are the meaningful connections to sustainability in the course I teach?

How can the course contribute to programme level learning outcomes?



How do the courses support achievement of desired graduate competencies?

Curriculum development

What is are the desired sustainability related graduate competencies?

Key questions when integrating sustainability into curriculum

1. What's the future we envision?

2. Why does our programme exist?

3. What competencies and capabilities do our graduates need?

4. What should our curriculum look like?

5. How to implement the change?

Some tools and method for development

Futures workshop

Learning café on programme purpose and role

Developing the intended learning outcomes

Curriculum mapping to identify gaps and development possibilities

Making a development plan

Break

10 minutes



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Competencies in sustainability

Some background on competencies

Competence* = a functionally linked complex of knowledge, skills, and attitudes that enable successful task performance and problem solving (Wiek et al. 2011)

Alternative way of defining what ought to be learned: knowing, doing, being

Different interpretations of competence:

- Competence as something that the student/graduate can do (and perform) in practice. These are often measurable.
- Competence as personality development. Slow process that cannot be directly observed or measured.

The sustainability competencies are connected to both interpretations.

Key competencies for sustainability

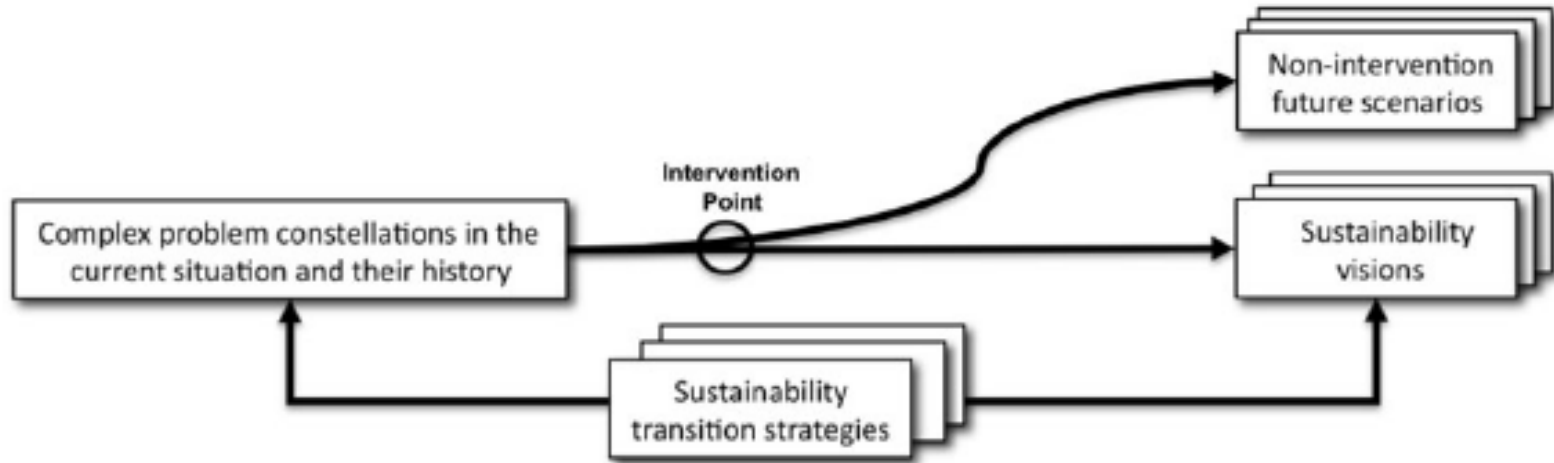
Competence framework developed by Wiek et al. (2011 and 2016):

- **Most referenced** sustainability competence framework
- Based on an *integrated sustainability research and problem-solving framework*
- Focus on competencies that are needed for “**change agents**” or “**transition managers**” (Wiek et al. 2011)
- **Interlinked and interdependent:** each competence plays a part in the problem-solving process
- **In order to be *sustainability* competencies, topical knowledge on sustainability is essential.**
- Recently developed further: **intrapersonal and implementation competencies** (Brundiens et al., 2021).

Systems thinking	Anticipatory / futures thinking
Strategic-thinking	Normative / values-thinking
Interpersonal / collaborative	Integrated problem-solving
Intrapersonal / Self-awareness	Implementation

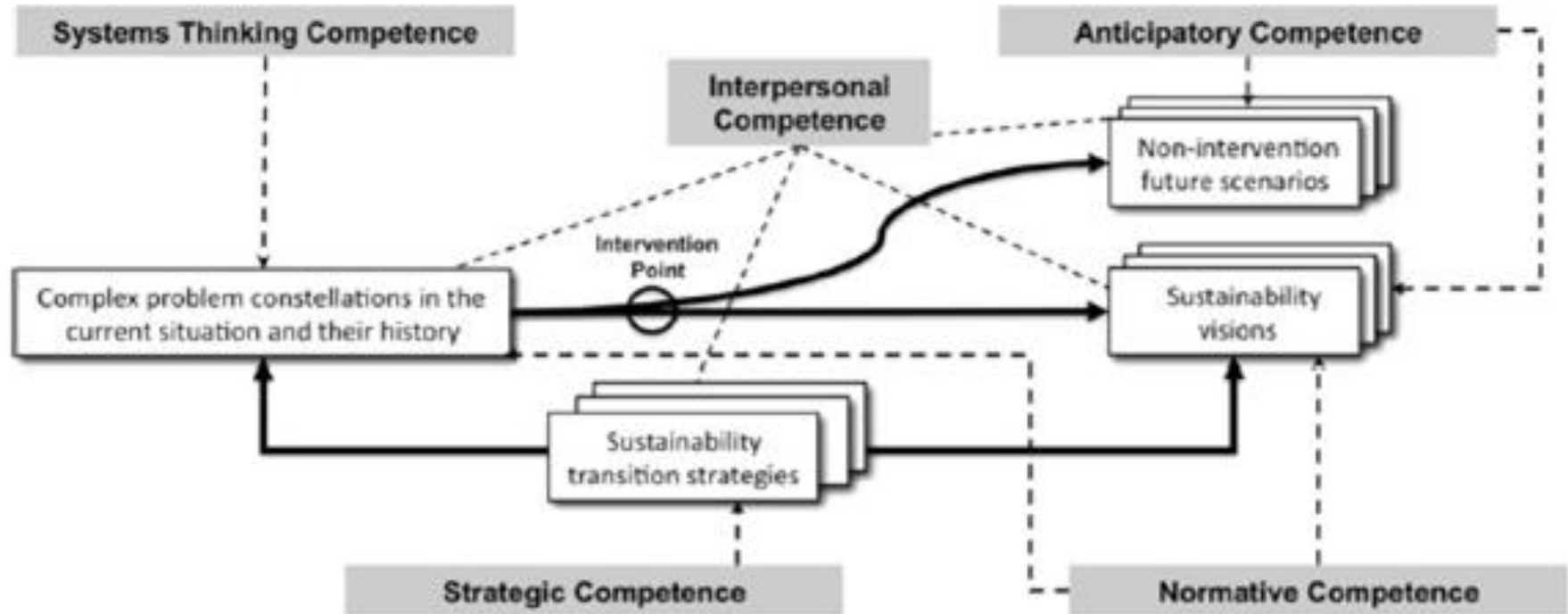
Sustainability competencies

(Wiek et al. 2011)



Sustainability competencies

(Wiek et al. 2011)



Sustainability competencies

(Wiek et al. 2011)

Analyse complex problem in current state and its history

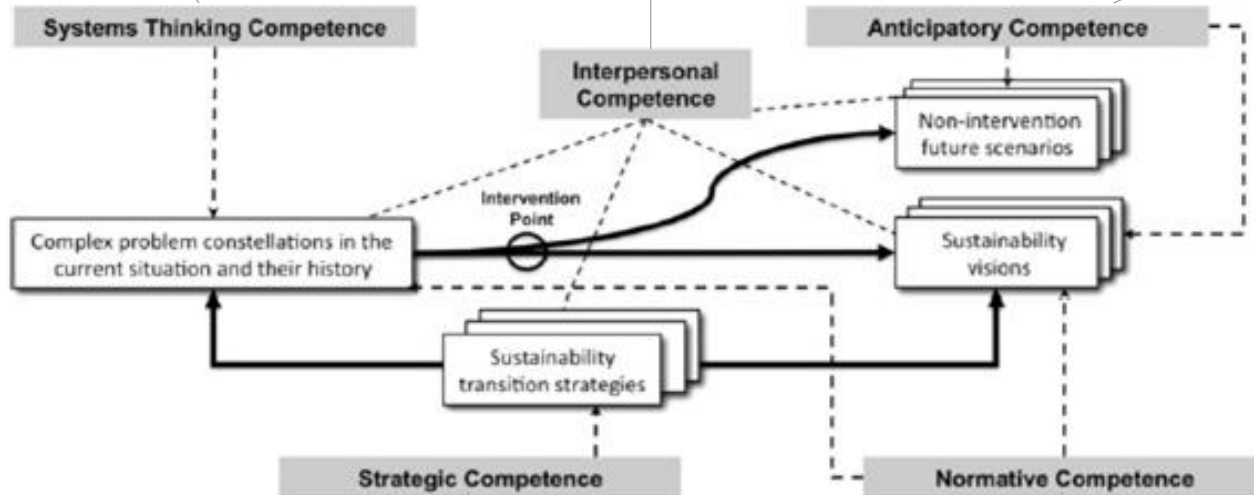
- Structures, subsystems,
- Feedback loops, cause-effect

Collaborate in each step of the problem-solving process

- Inter-/transdisciplinary collaboration
- Leadership, empathy

Craft future sustainability visions, create non-intervention scenarios

- Possible/desirable futures
- Path dependencies
- Scenarios



Develop sustainability transition strategies

- Intentions, action
- Success factors, obstacles

Map, specify, apply, reconcile and negotiate sustainability values

- Justice, fairness,
- Risk, trade-offs, ethical

Key competencies, topical knowledge and academic skills

Academic skills

Basic capacities in critical thinking, communication, pluralistic thinking, research, data management, also self-regulated learning and generic problem-solving skills

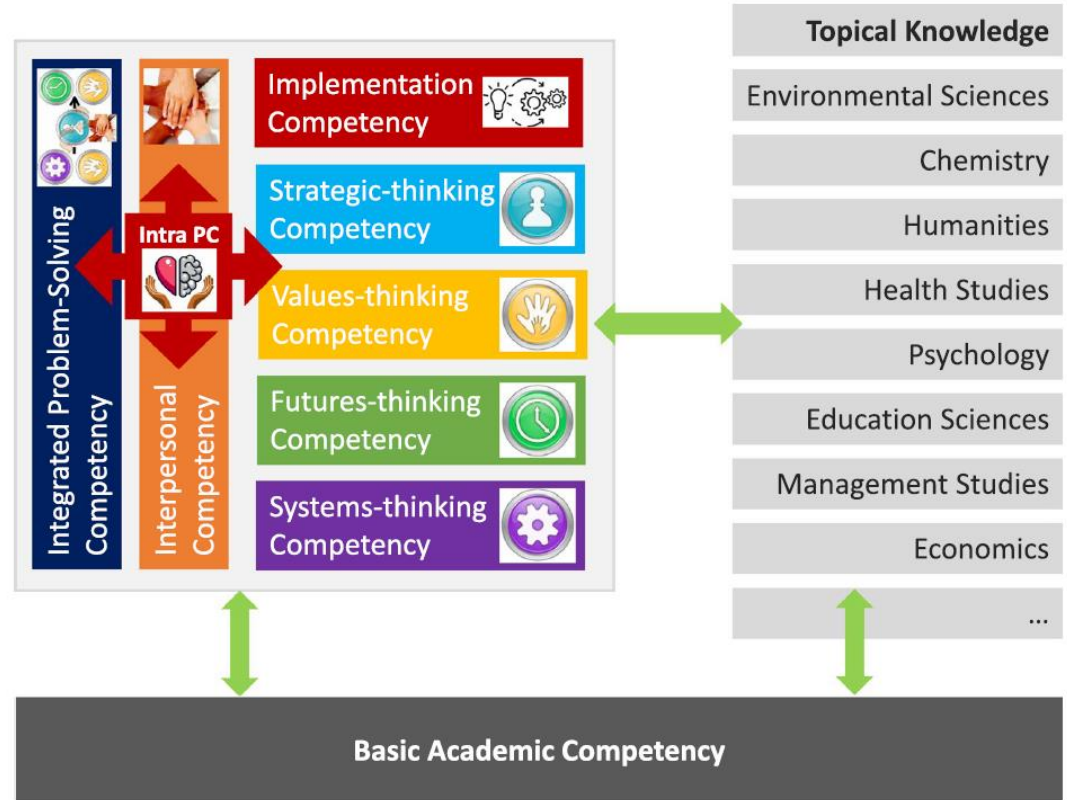
Topical knowledge

Substance and task specific knowledge and skills

Sustainability key competencies

Interdependent: each contribute to the integrated problem-solving process

Brundiens et al. (2021)



A fictional example of a graduate working for a global reinsurer in its 'Department of Sustainability, Emerging and Political Risk Management'.
Brundiens et al. (2021)

Your thoughts on the competencies

Think for 2 min :

**In your opinion, what is most essential for
the students to learn during their studies
regarding sustainability?**



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Flinga-instructions: <https://edu.flinga.fi/s/EEWHJYH>

Your reflections

General guidelines:

Breakout room: 15 min

- Group discussion (random groups, 3-4 persons in a group)
- Documentation of group discussion in Flinga Task 1
- Group chair: Shortest last name (# of letters)
- (For framework slides, see MyCourses)

Topic of discussion:

- Share: *What is most essential for the students to learn during their studies regarding sustainability?*
- Discuss: How do you find the key competency framework, e.g.:
 - How relevant the competencies are in relation to learning sustainability?
 - Possible differences in the relevance of the different competencies – some more important than others?
- Write down the main points of your discussion and prepare to share them with others.

<https://edu.flinga.fi/s/EEWHJYH>

Break



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Curriculum mapping exercise from WAT master's programme

Period	Course (á 5 ect)	Define the concept of sustainability and describe the key global scientific and political frameworks relating to it [knowledge]	Explain the fundamentals of the current state of the world, including fact knowledge and orders of magnitude relevant to the field [knowledge]	Identify and analyse cause-consequence relations and feedback loops relevant to water sector and apply short- and long-term strategic planning based on those analyses [skill]	Apply relevant engineering approaches and methods to define and solve water-related sustainability challenges [skill]	Promote a functioning and sustainable society with flexible and creative mindset [identity]	Recognise, reflect and critically analyse own mental models and behavior in relation to other people and the natural environment [identity]
I	Water and environmental engineering 15cr	X	X	x	x	x	X
II	Groundwater hydrology		X	x	x		
III	Hydrological modelling	X		x	x	X	
IV	Environmental hydraulics		x	x	x	X	x (X)
IV	Surface water resources		x (X)	x	x		
II	Sustainable built environment		X			X	x (X)
II	Sustainability in environmental engineering	X	x		x	x	
III	Water and governance	X	x		x		x
III	Sustainable global technologies (SGT) studio 10 cr	X		X		X	X
V	Water and people in a changing world	X	x	x	x		X
II	Urban water systems	X	X	x	x		X
III	Physical and chemical treatment of water and waste		X	x	x (X)	x	X
IV	Biological treatment of water and waste		X		x	X	
IV	Design and management of water and wastewater networks		x (X)	x (X)	x	X	X
V	Modelling and control of water and wastewater treatment processes				x	X	
	Study tracks:	COMMON COURSE	WATER RESOURCES	WATER AND DEVELOPMENT	WATER AND WASTEWATER		
	Labels:	x: covered trough substance		X: covered specifically related to sustainability			
		X: content could/should be added to reach the virtual course ILOs					

Applying competencies for sustainability to different disciplinary settings

- **Competencies for sustainability are designed originally for sustainability graduates**
- **The application of the competencies in different disciplinary settings is less addressed**
- **When applying the competencies, important to consider how they are relevant in your disciplinary context**

Competency: Systems-thinking

Suggested Intended learning outcome for systems thinking (Wiek et al. 2016)

- Graduates, who are competent in systems thinking, are **able to analyse sustainability problems cutting across different domains** (or sectors) **and scales** (i.e. from local to global), thereby applying systems concepts including systems ontologies, cause-effect structures, cascading effects, inertia, feedback loops, structuration, etc.

Application in WAT master's programme-level ILOs

- Identify the societal context relevant to the water and environment and comprehend the different scales and key drivers applicable to water and environmental engineering



Systems thinking in learning outcomes and teaching

WAT-E1100 Water and Environmental Engineering 15 ECTS (common course)

Systems thinking, such as: Global and local cause-effect, structures, sub-systems, cascading effects

Learning outcome / topical knowledge

Identify the broader societal context relevant to water and environmental engineering, including the key governance and entrepreneurial aspects

Understand the principles of the hydrological cycle and water resources management, including the role of hydraulic structures

Understand the key principles of good environmental and water quality

Implementation / topical skills

Water as a cross-cutting element in e.g. food security and health issues + who is involved in managing these

Modeling climate scenarios

Essay based on articles + lab work with “mystery” water samples



Designated groups

Group 1: Sofia, Dina, Astrid

Group 2: Henriikka, Petra, Nina

Group 3: Tom B., Tom R., Hakan, Lena

Group 4: Neha, Tiia, Weiwei, Gerhard

Group 5: Donya, Anahita, Mika, Dandan

Group 6: Karin, Christine, Susa



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Seth Schwiert / Unsplash

Your reflections

General guidelines:

Individually 5 min

Breakout room: 15 min

- Field specific groups
- Documentation in Flinga 2
- Group chair: Longest last name (# of letters)

<https://edu.flinga.fi/s/EEWHJYH>

Topic of discussion:

Applying the competencies for sustainability in a field specific context

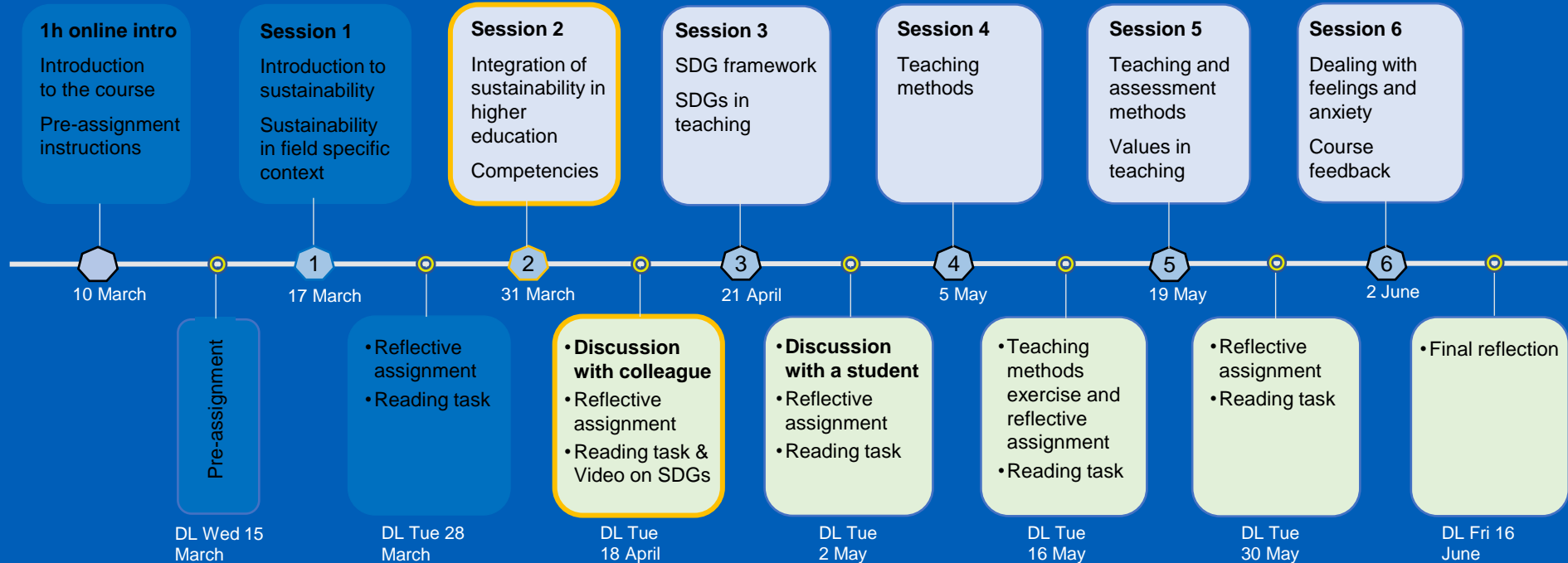
Think individually (5 min):

- which 1-2 competencies are most relevant for your graduates from sustainability perspective? What should students learn in practice?
 - Write down your thoughts in your group-specific Flinga sheet.

Discuss in group (15 min):

- What competencies did you see as most relevant?
- How could you apply the key competencies for sustainability in your teaching (e.g., in ILOs, teaching methods, learning activities..)?

Sessions and assignments



Next session...

- **Assignment 2:**
 - Written reflection, instructions and submission in MyCourses
 - DL for the assignment Tue 18.4.2023 noon
- **Peer discussion:** Book a timeslot for an informal discussion with a department colleague (s.o. preferably not on this course). Topic of discussion:
→ *What are the most relevant and important sustainability competencies in your field?* Share a brief reflection on your discussion as a part of Assignment 2.
- **Reading task:** See MyCourses
- **Watch** a video for inspiration on interconnectedness of the SDGs (link in MyCourses). NOTE: you are supposed to watch only Maija Taka's talk (20 min).

Next session Fri 21.4.2023 online in Zoom!
(Poll on the voluntary get together on 5.5.)

Literature

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Questions, comments



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