Sustainability in Teaching -course

Session 2 / Zoom

30.9.2022
12-15

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Session outline and objectives

Session outline

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

Break

2. Introduction to 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

Group work/discussions in breakout rooms

BR Chair duties

- Handing out the floor, keeping track of time
- Securing respectful and balanced dialogue
- Taking notes (if applicable), reporting to the whole group

Reading materials sharing in MyCourses

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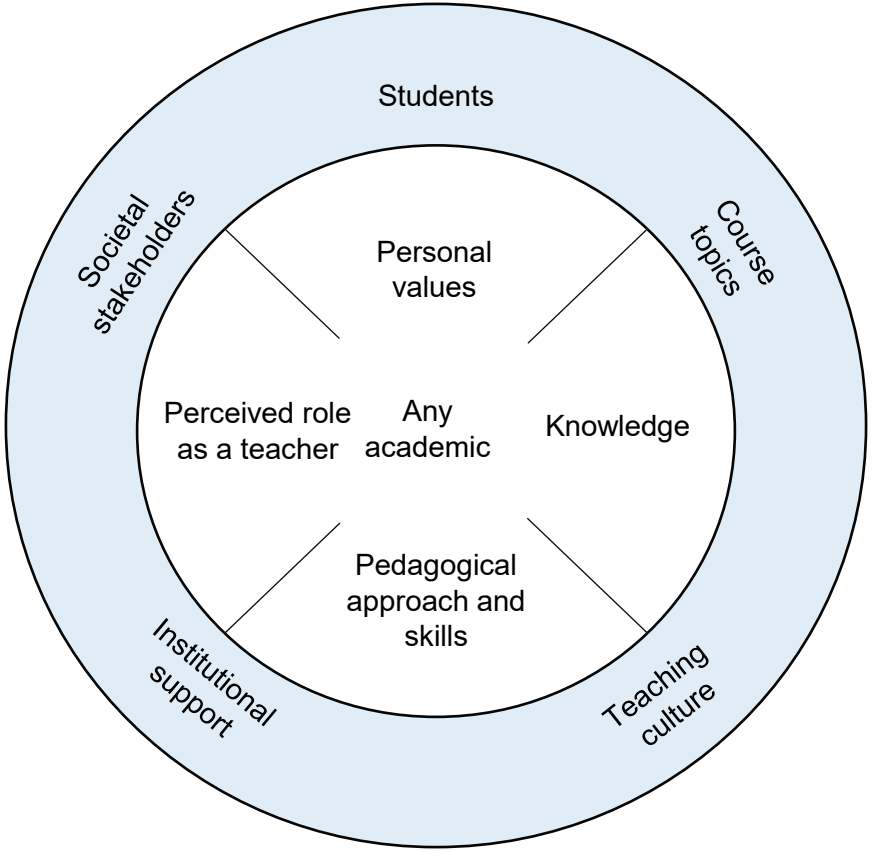
Annie Spratt / Unsplash

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



Applied from Thomas 2016

Homework recap I: Influences

Limitations/obstacles:

- One-sided view or lack of discussion about sustainability within field
- Inflexible courses, limited space for change
- If sustainability is bigger and more systematic, what other topics should drop out?
- Balancing teachers' time constraints
- Diverse student knowledge baseline

Motivation:

+ Accepting new teaching challenges, learning new things

+ Encouragement to pedagogical education, utilize opportunities

+ personal values

+ willingness and enthusiasm of students to learn

+ Societal partners' input

Institutional support

How to facilitate learning of students with different values?

"Should I be the teacher to teach this? Or is it someone else? Or is it everyone?"

Homework recap I - group discussion

General guidelines:

Breakout room: 10 min

- Random groups
- Room chair: last one in alphabetics (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

—

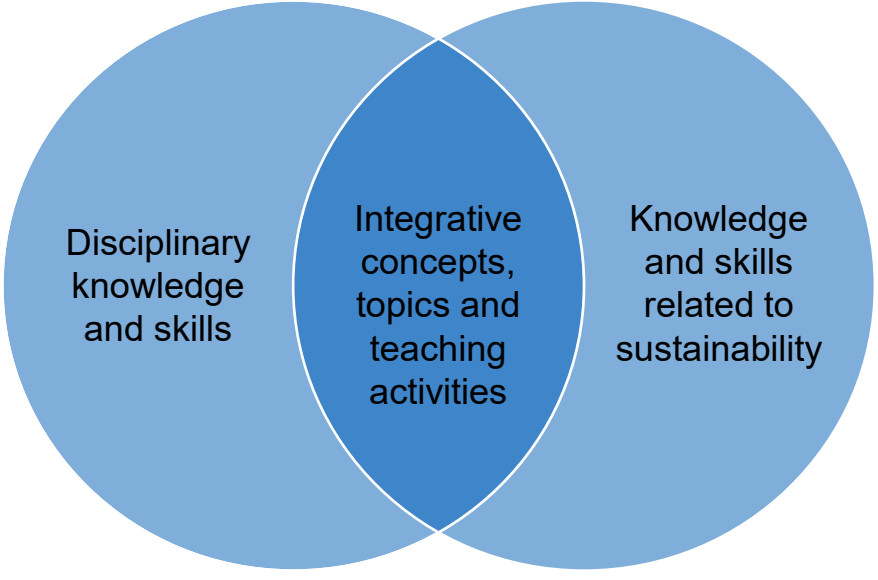
Curriculum perspective

Homework recap II: Finding connections to sustainability

- “I’m still a bit uncertain, but I think I’m beginning to get some clues”
- Great variety: fields that “incorporates almost all kinds of connections to sustainability” and others, where connections less evident.
- Narrowing down *and* thinking of bigger picture connections
- Different view point: decreasing the harmful or developing improvements
- “Focusing on the field and bring out links to sustainability whenever a natural context exists. To include sustainability aspects as examples, background for tasks and in general sprinkled in here and there where it fits.”
- Technological solutions are easily covered in teaching, but systemic level change is political. The challenge is indirect and concerns evidence-based political decision making and communication to the voting public.
- **Action point:** adding a course feedback question: “Would you like to have more sustainability topics covered in this course?” *And what topics?*

Building bridges between disciplinary knowledge and sustainability

- Two ways of bringing sustainability into higher education: sustainability as a cross-cutting theme in curriculum; sustainability focused programmes
- Essential to build meaningful connections between sustainability and the discipline.
- Tension between the framings: 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

Continuum of approaches within sustainability teaching

Solution focused approach

Focuses on field specific sustainability solutions or pragmatic applications.

Analysis of the impacts of providing services or products. (e.g. life cycle analysis, SDG based analysis)

Systemic change approach

Focuses on transition management.

Applies transdisciplinary approach

These approaches should interact, and graduates need competencies in all approaches.

Applied from Mulder (2017)

Two levels of integration

Curriculum development

What are the desired sustainability related graduate competencies?

How can the course contribute to programme level learning outcomes?

How do the courses support achievement of desired graduate competencies?

Course development

What are the meaningful connections to sustainability in my course?

Key questions when integrating sustainability into curriculum

1. What's the future we envision?

- How does the future look like?
- What futures are desirable?

2. Why does our programme exist?

- What is our role in society?
- What expectations do our stakeholders have towards us?
- What expectations do we have for ourselves?

3. What competencies and capabilities do our graduates need?

- What knowledge, skills and mindsets we want to foster?

4. What should our curriculum look like?

- What do we have already?
- What is missing from sustainability relevant knowing, doing and being?
- What improvements could each of us make?

5. How to implement the change?

- What can we implement now?
- What requires longer time?

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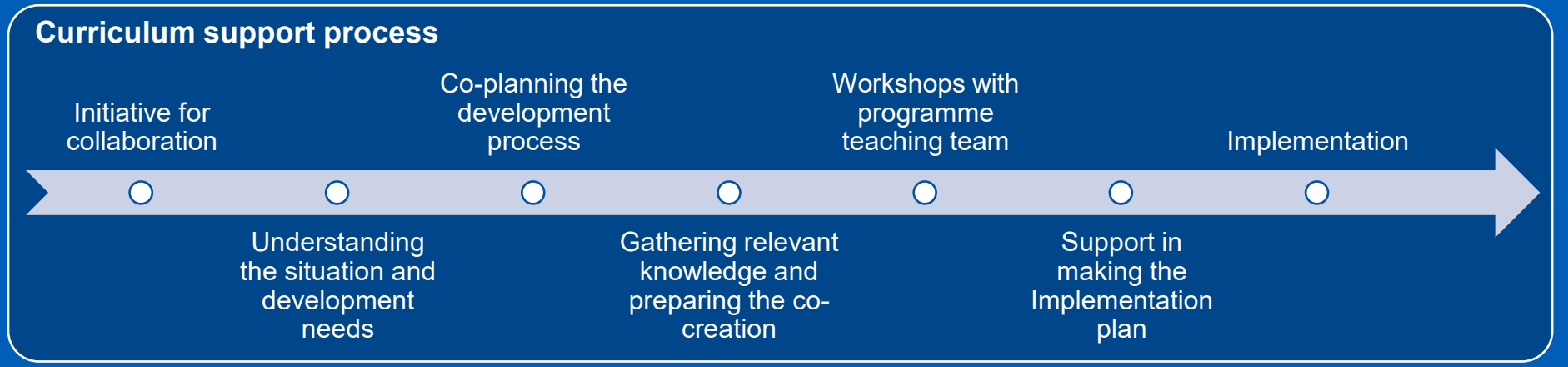
Support for curriculum development available



Aalto co-educator team:
Elina Kähkönen, project lead
Noora Jaakkola, specialist in curriculum development

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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.

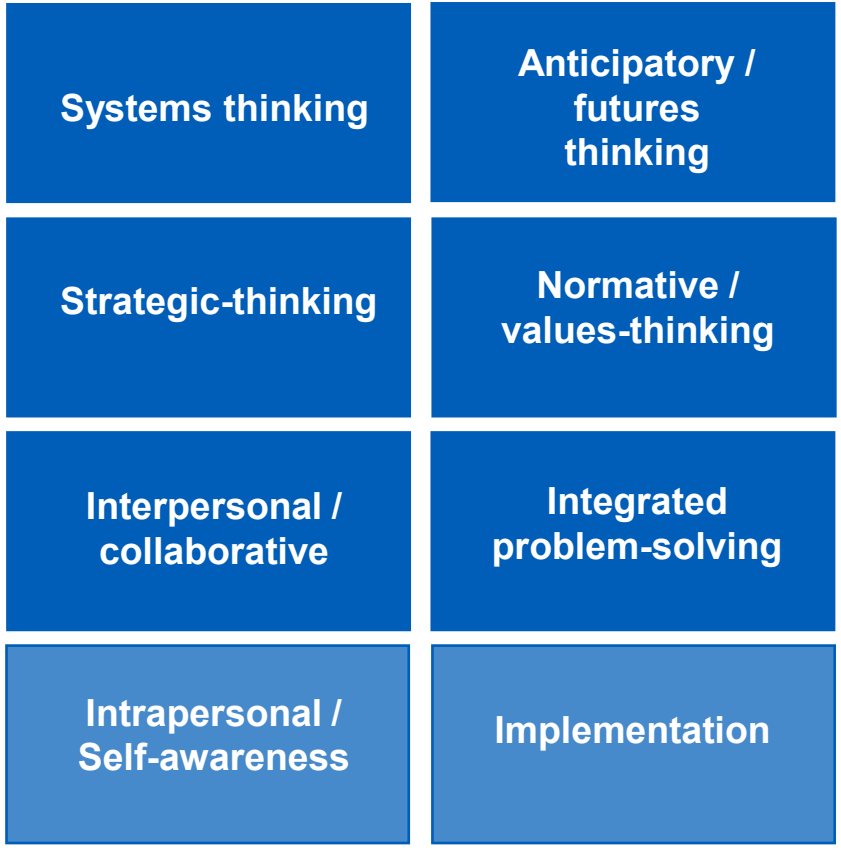
Transformative competencies for 2030 of the OECD (2019) and sustainability competencies are connected to both interpretations.

*Competence and competency have differing meanings see e.g. Mäkinen & Annala (2010) and Schaffar (2021)

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 (**Brundiers et al., 2021).

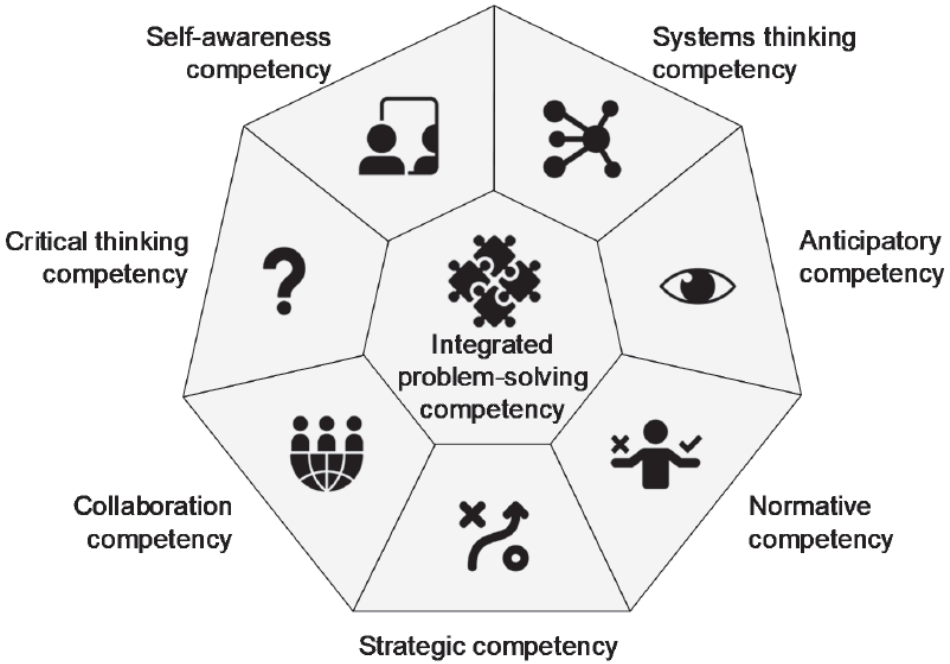


UNESCO key competencies for sustainability

Awareness of one's own emotions, desires, thoughts, behaviors, and personality
- Self reflection
- Feelings, desires

Critical use and evaluation of information

Collaborate in each step of the problem-solving process
- Inter-/transdisciplinary collaboration
- Leadership, empathy



Analyse complex problem in current state and its history
- Structures, subsystems,
- Feedback loops, cause-effect

Craft future sustainability visions, create non-intervention scenarios
- Possible/desirable futures
- Path dependencies
- Scenarios

Map, specify, apply, reconcile and negotiate sustainability values
- Justice, fairness,
- Risk, trade-offs, ethical

Develop sustainability transition strategies
- Intentions, action
- Success factors, obstacles

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(Wiek et al 2011; UNESCO 2017; Rosén et al 2019, Brundiers et al 2021)

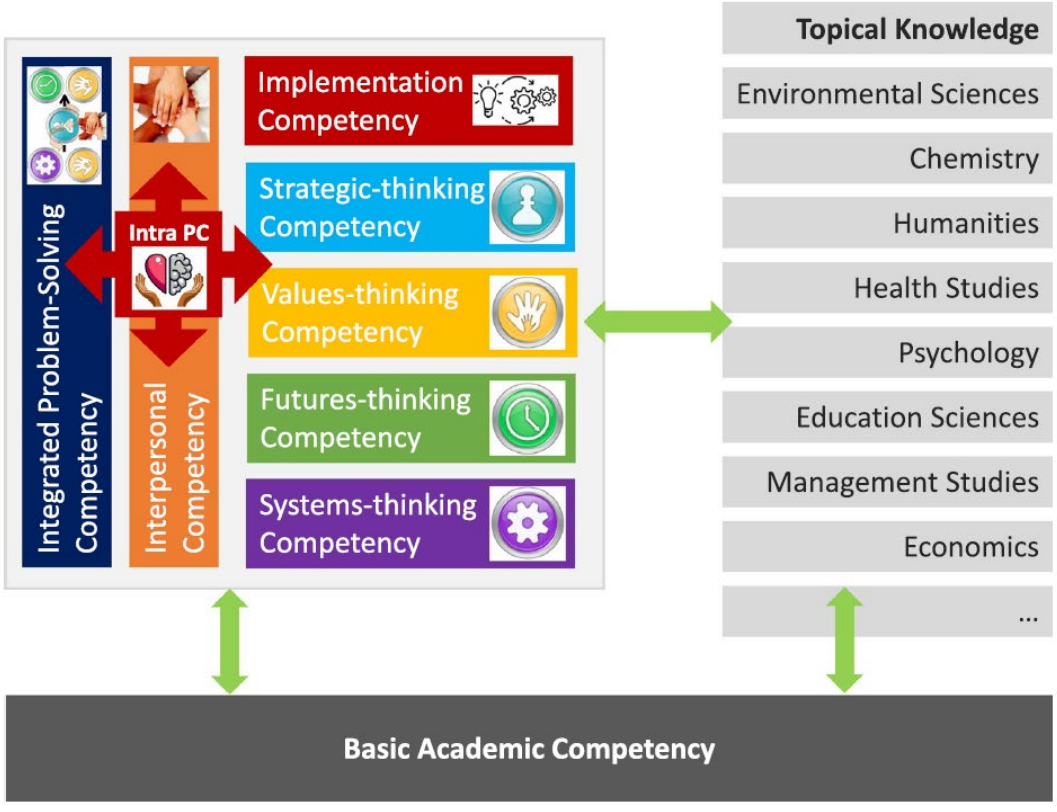
Key competencies, topical knowledge and academic skills

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

Brundiers et al. (2021)



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

Your thoughts on the competencies

Think for 2 min :

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

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Your reflections

General guidelines:

Breakout room: 14 min

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

Topic of discussion:

- Share: What is most essential for students to learn during their studies regarding sustainability?
- What do you think about the competency framework?

- *Write down main points of your discussion and prepare to share them with others.*

- https://edu.flinga.fi/s/E48633J

Break

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Curriculum mapping exercise from WAT master's programme

Period	Course (á 5 ects)	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			

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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 <u>in your disciplinary context</u>**

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	Implementation / topical skills
Identify the broader societal context relevant to water and environmental engineering, including the key governance and entrepreneurial aspects	Water as a cross-cutting element in e.g. food security and health issues + who is involved in managing these
Understand the principles of the hydrological cycle and water resources management, including the role of hydraulic structures	Modeling climate scenarios
Understand the key principles of good environmental and water quality	Essay based on articles + lab work with “mystery” water samples

Designated group (note changes)

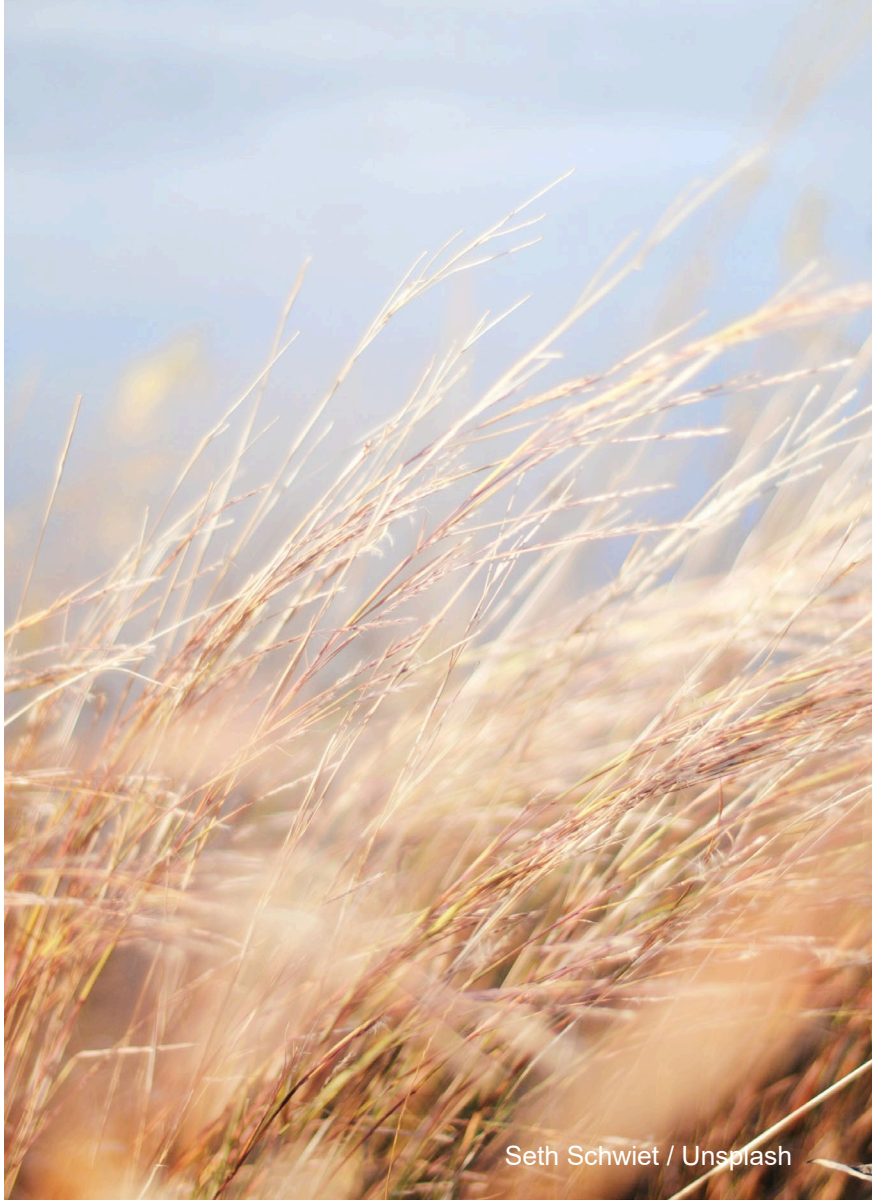
Group 1: Tamara, Victor, Janet, Marja

Group 2: Jouni, Sam, Henrikki, Janika

Group 3: Karolina, Irina, Henrik, Oguz

Group 4: Eeva B., Susan, Julia

Group 5: Ville, Eeva-L. R., Jacky, Eero



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/E48633J

Topic of discussion:

Applying the competencies for sustainability into field specific context

Think individually:

- 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.

Discuss in group:

- What competencies did you see as most relevant?
- How could you use key competencies for sustainability in your teaching?

- https://edu.flinga.fi/s/E48633J

Timeline of the course (changes possible)

Reading task for respective week	Mon	Tue	Wed	Thu	Fri
					9.9. Session 0: Course practicalities
Sustainability.now-material	**12.9.**	**13.9.**	**14.9.** Pre-assignment (questionnaire) Introduction	**15.9.**	**16.9. Session 1:** Introduction to sust. & Sust. in field specific context
Wiek et al 2011	**19.9.**	**20.9.**	**21.9.**	**22.9.**	**23.9.**
	26.9.	**27.9.** Homework from session 1	**28.9.**	**29.9.**	**30.9. Session 2:** Integration of sustainability in higher education, Competencies
SDG-articles, two options, read at least one Video	**3.10.-7.10.** Discussion with colleague (book time slot in time)				
	10.10.	**11.10.** Homework from session 2	**12.10.**	**13.10.**	**14.10. Session 3:** SDG framework

COURSE SESSION, at 12-15

READING TASKS (due before contact sessions)

Homework assignment DLs

OTHER ASSIGNMENT

Timeline of the course (changes possible)

Reading task for respective week	Mon	Tue	Wed	Thu	Fri
Tejedor et al Video	17.-21.10. Discussion with student (book time slot in time)				
	24.10.	**25.10.** Homework from session 3	**26.10.**	**27.10.**	**28.10. Session 4:** Teaching methods
Reading task (tbc)	**31.10.**	**1.11.**	**2.11.**	**3.11.**	**4.11.**
	7.11.	**8.11.** SULITEST Homework from session 4	**9.11.**	**10.11.**	**11.11. Session 5:** Teaching and assessment methods Values in teaching
Reading task (tbc)	**14.11.**	**15.11.**	**16.11.**	**17.11.**	**18.11.**
	21.11.	**22.11.** Homework from session 5	**23.11.**	**24.11.**	**25.11. Session 6:** Dealing with emotions and anxiety Closing
	Deadline of final reflection: 9.12.				

COURSE SESSION, at 12-15 EET

READING TASKS (due before contact sessions)

Home work assignment DLs

OTHER ASSIGNMENT

Next session…

- **Assignment**:
  - Written assignment, instructions and submission in MyCourses
  - DL for the assignment Tue 11.10.2022
- **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 in the assignment.

- **Reading task**: See MyCourses
- **Watch** a short video for inspiration on interconnectedness of the SDGs (link in MyCourses)

Next session Fri 14.10.2022!

Literature

Barth, M. 2013. Many roads lead to sustainability: a process-oriented analysis of change in higher education. International Journal of Sustainability in Higher Education Vol. 14 No. 2, 2013 pp. 160-175

Barth, M. (2015) Implementing sustainability in higher education. Learning in an age of transformation. Routledge studies in sustainable development, Routledge, London

Brundiers, K., Barth, M., Cebrián, G., Cohen, M., Diaz, L., Doucette-Remington, S., Dripps, W., Habron, G., Harre, N., Jarchows, M., Losche, K., Michel, J., Mochizuki, Y., Rieckmann, M., Parnell, R., Walker, P., Zint, M. (2021). Key competencies in sustainability in higher education—toward an agreed-upon reference framework. *Sustainability Science* 16, p. 13–29. https://doi.org/10.1007/s11625-020-00838-2

Mulder, K. (2017). Strategic competences for concrete action towards sustainability: An oxymoron? Engineering education for sustainable future. Renewable and sustainable Energy Reviws 68 (2017) 1106-1111. https://doi.org/10.1016/j.rser.2016.03.038

Mäkinen, M. and Annala, J. (2010). Osaamisperustaisen opetussuunnitelman monet merkitykset korkeakoulutuksessa. Kasvatus & Aika. 4:4, 41–61.

OECD (2019): The OECD Learning Compass 2030. https://www.oecd.org/education/2030-project/teaching-and-learning/learning/

Rosén, Karvinen, Keskinen et al. (2019): Mapping the CDIO syllabus to the UNESCO key competencies for sustainability 2019 in Proceedings of the international CDIO conference ISBN: 978-87-7507-459-4. https://doi.org/10.7146/aul.347

Sandri, O. (2021) Providing a 'point of entry' : Approaches to framing sustainability in curriculum design in Higher Education. *Australian journal of environmental education*. [Online] 37 (1), 56–68.

Schaffar, B. (2021). Competent uses of competence: on the difference between a value-judgment and empirical assessability. Nord. J. Stud. Educ. Policy, 7: 2, 55–64. https://doi.org/10.1080/20020317.2021.1958993

Thomas, I. Challenges for implementation of education for sustainable development in higher education institutions. In: Barth M, Michelsen G, Rieckmann M, Thomas I (eds) 2016 Handbook of higher education for sustainable development. Routledge, London, pp 56-71.

UNESCO (2017): Education for Sustainable Development Goals: learning objectives; 2017 (unesco.de)

Wiek A, Bernstein M, Foley R, Cohen M, Forrest N, Kuzdas C, Kay B, Withycombe Keeler L (2016) Operationalising competencies in higher education for sustainable development. In: Barth M, Michelsen G, Rieckmann M, Thomas I (eds) 2016 Handbook of higher education for sustainable development. Routledge, London, pp 241–260.

Wiek A, Withycombe L, Redman CL (2011) Key competencies in sustainability: a reference framework for academic program development. *Sustainability Science* 6(2):203–218. https://doi.org/10.1007/s11625-011-0132-6