Umweltproblemlösen (UPL) I, II, III
(as delivered in HS2024 and FS2025)

701-0007-00L (UPL I); 701-0008-00L (UPL II); 701-0009-00L (UPL III)

Project-Based Education in Action

SELECTED TRANSFERABLE COMPETENCIES

Concepts and Theories **Cooperation and Teamwork** **Project Management** **Creative Thinking**

Lecturer responsible for the class:
Marlene Mader, Christian Pohl, Carole Rapo, Ariane Wenger

Teaching team FS2024:
12 tutors: 2nd and 3rd year bachelor students who previously took the course

Department:
D-USYS

Credits:
10 ECTS for both UPL I and II, with an additional 3 ECTS for the elective UPL III module

Class size and study programme:
1st year Environmental Studies bachelor students (~120 students)

Real-world or Practice Context

Driving question:
How can first year students studying BSc Environmental Sciences be trained in the basic skills of analysing real-life problems, developing ways of resolving them together with stakeholders and evaluating those solutions?

Practice context:
Students work with selected sustainability topics from a region of Switzerland. Topics are selected together with an advisory board, consisting of local representatives from administration, business, academia and civil society as well as course representatives (lecturers, tutors and students). UPL classes have worked, amongst others, with stakeholders from Uri, Upper Engadin, Jurapark Aargau, Zurich or the community of Luzern. In HS2024/FS2025, the case study is on sustainable development in the district of Einsiedeln and the municipalities of Alpthal, Rothenthurm, Oberiberg and Unteriberg.

The course defines several sub-topics which groups of students work on during UPL I. In HS2024/FS2025, the sub-topics are: water bodies and water-related natural hazards, energy, tourism, agriculture and forestry, and biodiversity.

Learning Objectives

After completing this course, students will be able to:

- Case analysis: Carry out research on a given topic and present the results in a structured report which (a) shows the state of knowledge and (b) the need for knowledge and action (UPL I).

- Formulating problems and developing solutions: To identify insights, understand needs of local stakeholder, integrate this knowledge of diverse perspectives in a qualitative systems model, to identify problems and to suggest possible solutions from a specific stakeholder's, sustainability and systemic perspective (UPL II).

- Working in groups: Name the different roles within a group, explain the role(s) they are suited for, self-organise in groups, identify problems of collaboration and constructively address the problems (UPL I and II).

- Implementation (elective): To put the measures they developed to address sustainability problems into practice (UPL III).

PBLabs

Process and Student Agency

Length/format of module:
- The course covers 2 semesters, in a double module that is compulsory for all students (UPL I & II), plus an elective 3rd module (UPL III).
- Students work in groups of 5-7 (~24 groups in total). In the first semester, students work on a sub-topic and become 'expert' in that sub-topic.
- First semester: UPL I runs for 14 weeks and strongly focuses not just on the case study and sub-topic but also in university skills like research, writing, working with literature and AI, and learning to work in groups.
- Semester break: 1 week 'Synthesis week'. Students are re-grouped (with 1 student from each sub-topic in the groups) and learn about a combination of design and systems thinking – the 'UPL Methodology'. This week connects the expertise gained in UPL I and allows the groups to think about specific problems and solutions for UPL II.
- Second semester: UPL II runs for 14 weeks. Students

develop ideas from the Synthesis Week or newly identified insights into a sustainability project. The aim of UPL II and the UPL Methodology is to have solutions that are developed together with stakeholders and are thus politically, technically, legally, socially and economically feasible, and implementation ready.
- Around 1-3 groups annually enroll in the elective UPL III (3rd semester), and really put their idea into practice.
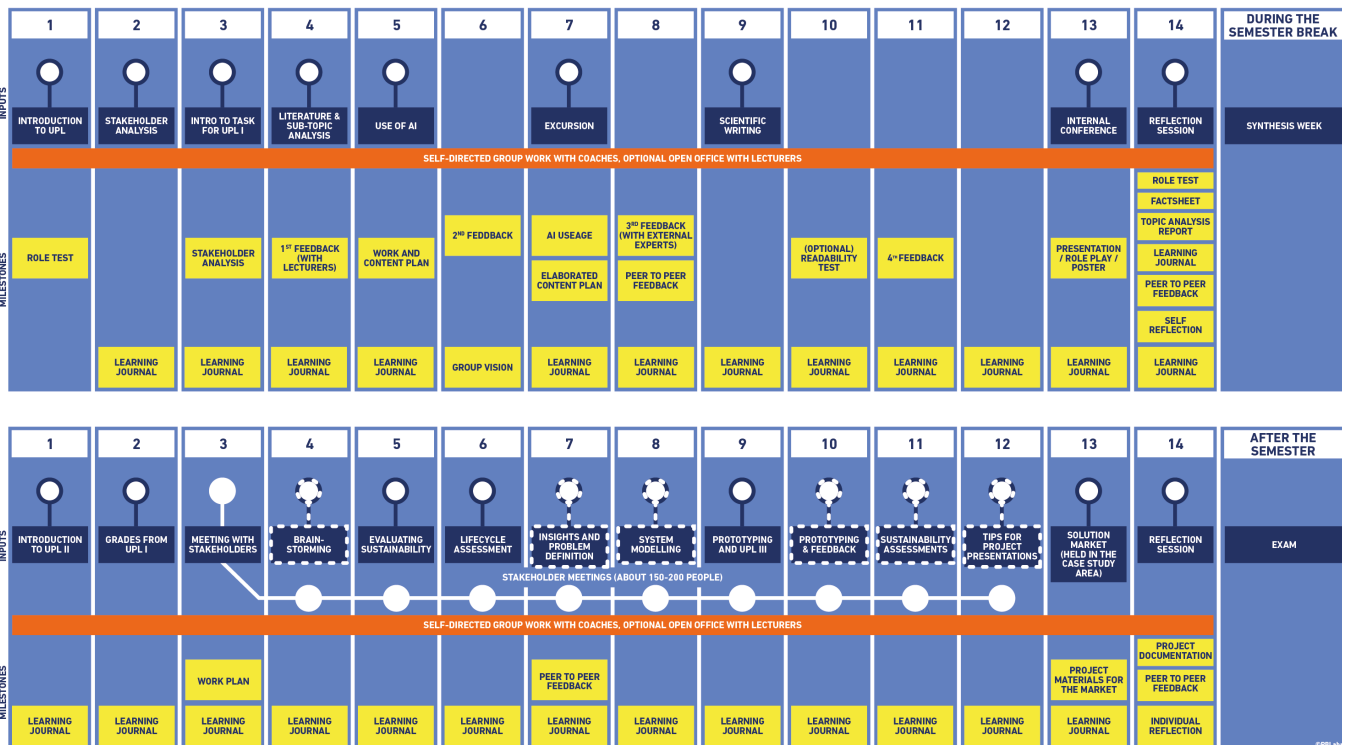
Student agency in the project:
Students have quite a lot of freedom in shaping their UPL learning journey:
- Which problem they are working on in UPL II, with which stakeholders (in total, the class contacts around 200 different stakeholders) and which solutions to develop.
- How to plan the timeline and process for each module
- Whether to present a role play, poster or presentation at the end of UPL I
- Whether to use AI or not in their work

UMWELTPROBLEMLÖSEN (UPL)
(AS DELIVERED IN HS2024/FS2025)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	DURING THE SEMESTER BREAK
INPUTS	INTRODUCTION TO UPL	STAKEHOLDER ANALYSIS	INTRO TO TASK FOR UPL I	LITERATURE & SUB-TOPIC ANALYSIS	USE OF AI		EXCURSION		SCIENTIFIC WRITING				INTERNAL CONFERENCE	REFLECTION SESSION	SYNTHESIS WEEK
	SELF-DIRECTED GROUP WORK WITH COACHES, OPTIONAL OPEN OFFICE WITH LECTURERS														
MILESTONES	ROLE TEST	STAKEHOLDER ANALYSIS	1ST FEEDBACK (WITH LECTURERS)	WORK AND CONTENT PLAN		2ND FEEDBACK	AI USEAGE / ELABORATED CONTENT PLAN	3RD FEEDBACK (WITH EXTERNAL EXPERTS) / PEER TO PEER FEEDBACK		(OPTIONAL) READABILITY TEST	4TH FEEDBACK		PRESENTATION / ROLE PLAY / POSTER	ROLE TEST / FACTSHEET / TOPIC ANALYSIS REPORT / LEARNING JOURNAL / PEER TO PEER FEEDBACK / SELF REFLECTION	
		LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	GROUP VISION	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	AFTER THE SEMESTER
INPUTS	INTRODUCTION TO UPL II	GRADES FROM UPL I	MEETING WITH STAKEHOLDERS	BRAIN-STORMING	EVALUATING SUSTAINABILITY	LIFECYCLE ASSESSMENT	INSIGHTS AND PROBLEM DEFINITION	SYSTEM MODELLING	PROTOTYPING AND UPL III	PROTOTYPING & FEEDBACK	SUSTAINABILITY ASSESSMENTS	TIPS FOR PROJECT PRESENTATIONS	SOLUTION MARKET (HELD IN THE CASE STUDY AREA)	REFLECTION SESSION	EXAM
	STAKEHOLDER MEETINGS (ABOUT 150-200 PEOPLE)														
	SELF-DIRECTED GROUP WORK WITH COACHES, OPTIONAL OPEN OFFICE WITH LECTURERS														
MILESTONES			WORK PLAN				PEER TO PEER FEEDBACK						PROJECT MATERIALS FOR THE MARKET	PROJECT DOCUMENTATION / PEER TO PEER FEEDBACK	
	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	LEARNING JOURNAL	INDIVIDUAL REFLECTION	

OPTIONAL WORKSHOPS

©PBLab

Guidance and Coaching

Although participation in UPL I and II is very self-driven by students, there are numerous check-points and inputs to provide a structured learning environment:

- Three meetings with lecturers during UPL I and 4 during UPL II
- One meeting with topic expert in UPL I
- One organised meeting with stakeholders in UPL II
- Weekly coaching by tutors (2nd and 3rd year BSc

students) in UPL I and II
- Optional open office slots with lecturing team throughout UPL II
- Optional workshops with tutors on diverse topics such as prototyping, brainstorming, etc., throughout UPL II

Review and Assessment

- UPL uses quite an elaborate grading scheme for the grading, to give appropriate weight to different elements of the course work, and to ensure consistency within the team doing the grading.
- UPL's overall grade is divided into thirds:
- 1/3 Group work in UPL I based on the sub-topic analysis (a report) and collaboration in the group
- 1/3 Group work in UPL II based on the sustainability project (a presentation at a public "market of measures" and a documentation) and their work process
- 1/3 individual oral presentation on the case study, sustainability project, methods, and overall understanding (the exam)
- The grades for UPL I and II are informed by a peer-to peer review done in the middle and at the end of the semester. Strongly above-average and below-average assessments can lead to adjustments in the group grade.

Reflection and Evaluation

- Learning journal – weekly maintained as a group, with a focus on group collaboration in UPL I and in UPL II on the process – successes, challenges, solutions found to those challenges, and how the group is feeling in general. Instead of a written entry, every 3rd week students create a short video.

Anything else that makes this project special?

This is the latest in a long line of transdisciplinary teaching at D-USYS dating back to the 1980s. The course has been described and published in the journal GAIA, which gives a more detailed theoretical background to the transdisciplinary approach:

Pohl, C., Pearce, B, Mader, M., Senn, L., Krütli, P (2020). Integrating systems and design thinking in transdisciplinary case studies. GAIA – Ecological Perspectives for Science and Society, 29 (4): 258-266. https://doi.org/10.14512/gaia.29.4.11