Course VL 2233130 Information & Overview Water – Energy – Environment Nexus in a Circular Economy: Research Proposal Preparation

Faculty of Chemical and Process Engineering
Institute for Advanced Membrane Technology (IAMT)

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SS2024, Masters, Elective course (offered first time in 2024), open to all relevant faculties (e.g. Civil Engineering, Electrical Engineering, Mechanical Engineering, Economics Engineering, Water Masters, Chemistry, etc)

Location: Campus South, Building Geb. 30.44, Rm 308, on Thursdays 14.00 – 17.15 pm

The course is held in English and the proposal/oral & poster presentation are to be prepared in English. Participants must attend all presentations and attendance is expected in lectures & tutorials applying an innovative concept of project and student based learning. The resulting proposal is the property of the student and can be utilized for scholarship applications in continuing studies if desired.

Effort: 5 LP which requires typically an effort of 150 hours, of which 56 h (4 SWS) are contact time during lectures and tutorial time, 54 h group and self study and 40 h preparation of assessments and participation at the group presentations (one full day).

Assessment: Research proposal of 10 pages and an oral presentation of 10 minutes (individual work). The grade will be a composite of the proposal (**submission in week 13 before class**) and oral presentation (**all day workshop with researcher participation**).

Course Contents: In a time of limiting resources, climate change and ever increasing demand for resources the concept of a circular economy is inevitable to create a more sustainable utilization of our key resources, water, energy and 'environment'. Concepts of zero liquid discharge, water reuse, carbon net zero, resource recovery and environmental pollution reduction are all part of this concept where where waste is returned to use. The water – energy – environment nexus is the particular focus of ths course. Global water issues, water and wastewater treatment, desalination, water reuse, micropollutants, decentralized systems, water & sanitation in international development, renewable energies, environmental pollution, climate change, resource recovery – and many more topics will inspire future research.

Learning Goals: The goal of this course is to get an overview of current challenges in the circular economy focused on the water – energy – environment nexus. Based on individual student interest a topic will be identified and a research plan developed encompassing a thorough background research to establish the state-of-the-art, identification of a specific research problem and research questions suitable to solve this problem. Concepts of novelty and excellence will be explored in an international context. Following the individual topic choice, the research proposal will be developed individually in a tutor group (divided into water, energy, environment) while lectures on required skills will accompany this process. As an outlook beyond this course, criteria to consider when looking for research careers such as applying for funding/scholarships, considering choices in research environment and supervision, performance indicators in research and university rankings will be introduced to enable informed decisions. The proposal will be communicated in writing, as a brief presentation and as a poster, which equips students brilliantly not only for a masters thesis but also a future research publication or a PhD.

Course Organization and Student Information: The course is a project and student based learning course with a small number of introductory lectures that introduce research topic areas and keywords with the

aim to stimulate student interest for topic selection. Supporting lectures are designed to facilitate the proposal writing tasks. In tutorials the students are supervised in small groups to perform their proposal work assisted by a tutor. The proposal topic is chosen by the student and will be discussed for suitability in week 6, while the topics are finalized in week 8 – and for planning purposes exam registration is now required.

Course Schedule

Week	Date	Lecture	Tutorial	Comments
1	18.4.24	Circular economy: Introductory lecture and research challenges	Tutor Introduction	
2	25.4.24	What is a research proposal?: Aims, Structure, Workplan, Novelty, Excellence	Research Database Introduction	
3	2.5.24	Water research topics in a circular economy *(Andrea I. Schäfer)*	Introduction to Endnote	
4	9.5.24	Holiday: Christi Himmelfahrt		
5	16.5.24	Energy research topics in a circular economy *(Bryce Richards)*	Referencing	
	23.5.24	Lecture free week		
6	30.5.24	Holiday: Fronleichnam		
7	6.6.24	Environmental research topics in a circular economy *(Jochen Kolb)*	DFG Kodex: Research Integrity	Discussion of individual proposal topics (suitability check)
8	13.6.24	Defining Research Problem and Research Questions	Supervised individual work	Course exam registration with research proposal topic and tutor selection
9	20.6.24	Designing creative schematics and animations	Supervised individual work	
10	27.6.24	Realistic planning: working out realistic timeframes and tasks	Supervised individual work	
11	4.7.24	Budgeting and relevant funding opportunities	Supervised individual work	
12	11.7.24	Preparing effective oral and poster presentations	Supervised individual work	
13	18.7.24	Research environments, supervision, international collaboration and university rankings	Supervised individual work	
14	25.7.24	Presentations (all day workshop) with invitation of research colleagues		Venue: KIT Campus North, building TBC, room TBC