



Faculty of Health, Science and Technology
Environmental and Energy Systems

Syllabus

Cleaning technology continuation course

Course Code:	EMAD21
Course Title:	Cleaning technology continuation course <i>Reningsteknik fördjupning</i>
Credits:	7.5
Degree Level:	Master's level
Progressive Specialisation:	Second cycle, has only first-cycle course/s as entry requirements (A1N)

Major Field of Study:
MEI (Environmental and Energy Systems)

Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2020-03-11, and is valid from the Autumn semester 2020 at Karlstad University.

Prerequisites

Registered on 180 ECTS credits within the Master programme in Energy and Environmental Engineering, with the courses Cleaning Technologies (15 ECTS credits), Environmental Chemistry (7.5 ECTS credits), Energy and Environmental Systems Analysis (30 ECTS credits), and Calculus in Several Variables (7.5 ECTS credits) completed, plus upper secondary level Swedish 3 or B or Swedish as a second language 3 or B, and English 6 or A, or equivalent

Learning Outcomes

Upon completion of the course, students should be able to:

- develop dynamic calculation models for cleaning technology systems,
- evaluate the credibility of dynamic calculation models,
- use models to optimise cleaning technology processes,

- plan practical evaluation and optimisation experiments in a resource-effective and time-effective manner,
- describe the execution of experiments in a repeatable scientific manner,
- demonstrate statistical accuracy in experimental results, and
- develop advanced models of a complex system to optimise the use of resources in terms of energy and material flows in a social system.

Content

The course comprises three parts, all of which include practical components.

1) Modelling of cleaning technology systems, specialisation in a selected cleaning technology system. Modelling of dynamic biological cleaning processes that are dependent on external variables such as for example changes in temperature or flow. Students build a model of an existing cleaning technology process, verify the model, and use the model to optimise several synergetic processes. They also propose changes meant to optimise processes.

2) Systematic trial planning. Plan and carry out laboratory tasks for which a large number of parameters can be varied. Describe the implementation and results of experimental trials.

3) Industrial symbiosis. In this project, students study industrial symbiosis where some kind of sewage plant is a central part. Modelling of nutrition, energy, and other material flows in a geographical area. Analyse and optimise the use of resources, in terms of energy and material flows.

Reading List

See separate document.

Examination

Assessment is based on written hand-in assignments that are also presented orally.

If students have a decision from Karlstad University entitling them to special pedagogical support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

Grades

One of the grades Distinction (VG), Pass (G), or Fail (U) is awarded in the examination of the course. For students in Engineering programmes, one of the grades 5 (Pass with Distinction), 4 (Pass with Some Distinction), 3 (Pass), or U (Fail) is awarded in the examination of the course.

Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional information

The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.