Systems perspectives on biomass resources, 7.5 Credits

PhD Course within the Bio4Energy Graduate School

Objectives

The main aim of the course is to provide the student knowledge to be able to put her/his own research into a larger perspective. Specifically, after the course, the student will be able to:

- critically reflect on the rationale of sustainability,
- discuss resource and environmental challenges related to biorefineries and biomass resources,
- understand and suggest different types of environmental, technical and economic tools and methods for evaluation of biomass-based systems and processes.

Contents

The course is centered around three themes:

- sustainability and the role of biomass in a sustainable society,
- taking a systems perspectives approach – identification of the areas to study, scope of the analysis, setting system boundaries, time frames etc.,
- systems analysis tools and methods, including energy systems modelling, environmental systems analysis, process modelling and integration, and techno-economic evaluation.

Realization

Lectures, workshops, group meetings and own work, divided into two blocks:

I. Lectures and workshops, onsite in Luleå (approximately 30 hours)
II. Project work (in small groups, see below), with final seminar onsite in Luleå (approximately 170 hours of work)

In the project work, the students choose one (or several) evaluation tools or methods (such as, LCA, Pinch analysis, economic evaluation, etc.) to apply on a research topic of their choosing.

Each project group is assigned a senior contact person for the project work. However, the students also supervise each other during regular meetings.

Examination

To pass the course, a project work must be presented orally and in a written document in one of the following formats:

a) a draft research proposal, or
b) a journal or conference manuscript, or
c) a thesis chapter, or
d) conventional research report in a relevant topic

The work is preferably carried out in groups of two or three students. It is encouraged that the group compositions (and final report) are interdisciplinary. Individual work

Preliminary schedule block I (Luleå)

Monday 9 November – Theme: Introduction

11.30	Gathering and information
12.00	Lunch
13.00	Course introduction
14.00	Introduction lectures and discussions: - Global energy situation and scenarios - Why systems analysis and systems perspectives?
15.30	Presentations from all participants: - Introduction to your research
17.00	End of classroom day
19.00	Dinner

Tuesday 10 November – Theme: Sustainability and the role of biomass in a sustainable society

8.30	Check-in and reflections
9.00	Introduction to sustainability and the global sustainability development goals (lectures and joint discussions)
11.30	Lunch
12.30	Workshop: applying sustainability perspectives to your own research
17.00	End of day

Wednesday 11 November – Theme: Taking a systems perspectives approach

8.30	Check-in and reflections
9.00	Lectures and discussions: - Forests and climate change mitigation - Ecosystem services - Policy, markets and economy - Conflicting targets and trade-offs
12.00	Lunch
13.00	Lab tour at Bio4Energy related labs at LTU
15.00	Project introduction and short project workshop
17.00	End of day

Thursday 12 November – Theme: Systems analysis methods and tools

8.30	Check-in and reflections
9.00	Lectures and discussions: - Energy systems modelling - Process modelling and process integration - Techno-economic and environmental analysis
12.00	Lunch
13.00	Project work
17.00	Pizza and project discussions
20.00	End of day

Friday 13 November – Theme: Putting your research in a systems context

8.30	Check-in and reflections
9.00	Presentations from all participants: - Put your research in a systems perspective
12.00	Lunch
13.00	End of day

Preliminary schedule block II

November 2026 – March 2027

- Individual project work, with scheduled update meetings.
  Exact time TBD jointly in the group.
- Online lectures on selected topics (ca one per month) in conjunction with supervised project status discussions.

XX March 2027 (exact date TBD)

- Seminar in Luleå, with project presentations

Course fee and accommodation

The course is free for academic participants that are part of Bio4Energy, including accommodation during the week in Luleå.

The fee is SEK 3,000 for academic participants not member of Bio4Energy and SEK 10,000 for participants from industry. Accommodation is not included in the fee.

Meals, i.e., lunches, coffee/tea and two dinners (one pizza evening) are included.

Registration

Registration should be done no later than 30 September 2026 using this registration form: https://forms.office.com/e/2mSmMNJ96F

The number of participants is limited to 20.

Contact

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