



Course content of the Green Line Project in the third semester at AgroParisTech, ULiège and Aalto

Course title: Green Line Project - 3rd stage

Key words	Biotechnology, bioeconomy, innovation, biomolecules, biorefining, life cycle analysis, white biotechnologies, fractioning, extraction, functional properties, biological activity, chemical intermediates
Aims	<ul style="list-style-type: none"> • Deepen scientific knowledge in biochemistry, biophysics, microbiology, process engineering applied to the valorisation of biomass resources in bioindustries • Propose sustainable innovative solutions integrating technological, economic, social and environmental dimensions • Define an experimental project for the elaboration of a model product / prototype developed in a given green line project • Propose scale-up strategies
Content	<p>The valorisation of renewable resources, i.e. biomass in the large sense, is on the base of the bioeconomy. Biomass constitutes a source of molecules, macromolecules and supramolecular assemblies which can be used in numerous applications of virtually every industrial domain, such as food and cosmetics industry, chemicals, materials and textile industries, pharmaceuticals and biomedicine. For that, strategies of deconstruction of complex biological tissues need to be employed, using mechanical, chemical, enzymatic (biotechnological) methods. To give some examples, such methods can be employed to fabricate natural antioxidants, pigments, thickening agents, surfactants, lubricants, solvents, materials, composites. White biotechnology or green chemistry can be employed to re-assemble and/or transform, convert, produce biobased building blocks to substances or assemblies of designed function, such as polymers, fragrances, pharmaceuticals, chemicals.</p> <p>The green line projects concern real case applications in this domain, such as the development of deconstruction strategies of a given plant for the fabrication of functional polysaccharides, the design of a biorefinery of microalgae, the valorisation of agricultural by-products in the cosmetics industry, to name but a few.</p> <p>During the third semester of the green line project, the most promising project strategies will be evaluated by the project group and an in-depth scientific/technical study will be carried out on one of them. A model product/concept will be elaborated.</p> <p>The module consists in:</p> <ul style="list-style-type: none"> • Tutored evaluation of technical/scientific solutions and development of an experimental strategy to model products/processes • Experimental work at the laboratory scale

	<ul style="list-style-type: none"> Personal work and team meetings on the technical-economic evaluation of the model product/process and environmental evaluation
ECTS	5
Skills	<p>Knowledge and understanding For a passing grade the student must:</p> <ul style="list-style-type: none"> Have expert knowledge of the scientific and technological features concerning the green line project Know the methods of environmental and socio-economical evaluation of industrial products/processes Evaluate performance and be able to position the relevance of a given technological solution in the actual industrial context <p>Competences and skills For a passing grade the student must:</p> <ul style="list-style-type: none"> Establish protocols of technological and scientific intelligence Exploit scientific and technological literature data in the interest of a community/industry Combine different disciplinary results in a holistic approach <p>Judgement and approach For a passing grade the student must:</p> <ul style="list-style-type: none"> Propose and argument scientific/technological strategies Draw conclusions, evaluate alternatives, give critical feedback
Module Coordinator(s)	Sandra Domenek (AgroParisTech), Sandrine Bouquillon (URCA), Aurore Richel (ULiège), Kontturi Eero (Aalto), Yevgen Karpichev (TalTech)
Teaching staff	To be defined – depending on the project themes and locations.
Language of instruction	English
Nb hours of lectures	0
Nb hours of practical work	120
Nb hours of tutorials	24
Nb hours of personal work	96
Nb hours of other	
Length of the internship in weeks	
Bibliography recommended	
Prerequisites	
Teaching period (when)	September - February
Place of teaching (where)	
Assessment	Final green line project report by groups assessed by a panel of teachers and external participants (associated partners)