

Module title	1.7 Circular use of materials
Workload (ECTS)	3 ECTS
Module coordinator	Prof. Dr. Frédéric Pichelin
Contributing lecturers	<ul style="list-style-type: none"> • Prof. Dr. Nicolas Bueche • Prof. Dr. Simon Kleiner • Aymeric David Niederhauser
Entry requirements	<p>Builds on:</p> <ul style="list-style-type: none"> • 0.2 Bridging technology • 1.1 Technological cycle • 1.2 Biological cycle
Description	<p>Due to their complexity or toxicity, many products and building materials are not easy to recycle, reuse or eliminate. This course will focus on the development of innovative materials (consumables and building materials) with the aim to substitute existing products, providing high quality and a lower or negligible environmental impact. The innovation will consist in using/or and combining renewable raw materials and/or recycled materials. Students will be guided through product development, from the ideation up to prototyping and testing (if relevant/possible). Circular design and the impact assessment will be at the core of the process. The production processes and their environmental impact (energy use and possible pollution) will be critically analysed.</p>
Learning outcomes and competences	<p>Competence</p> <p>Students will develop following methodological competencies</p> <ul style="list-style-type: none"> • Apply the Ideation and design thinking methodologies • Select and combine materials • Predict and assess of material properties • Analysis processes (environmental and energetical approach) <p>Outcome:</p> <p>Students</p> <ul style="list-style-type: none"> • Will be able to develop and propose innovative material solutions for a circular economy. • Be able to be critical and question themselves about the environmental impact of existing technologies and materials. • can make use of the design thinking process for product innovation for the circular economy. • will be able to present and defend their idea.
Assessment of learning outcomes	<ul style="list-style-type: none"> • Presentation of a group work • individual involvement and participation in class



Didactic approach	<ul style="list-style-type: none">• Contact teaching• Group work• pitching• learning videos• guest lecture
Project-based learning	The students will work in small groups on a specific case: a selected recycled material will be proposed, and the students will have the freedom to define the final product they would like to develop. Students will be guided through the development of their product through a lecturer.
Links to other modules	<ul style="list-style-type: none">• 4.4 Impact assessment• 4.5 Circular design
Bibliography	Bueche N., Evaluation des performances et des impacts des enrobes bitumineux tièdes, thèse EPFL N° 5169. Lausanne. Novembre 2011. Bueche N. et Dumont A.-G... Paquet de recherche PLANET : RS-5 : Modèle global d'évaluation. Projet de recherche VSS 2010/545. Décembre 2016.
Language	English
Location	TBD