Bachelor-Arbeiten BSc Bauing - FS 2024

Leiter der Bachelor-Arbeit:	**Prof. Dr. Guillaume Habert**

Institut:	Institut für Bau und Infrastrukturmanagement
Fachbereich:	Nachhaltiges Bauen
Anzahl Themen:	4

Themen direkt auf der Website der Professur/des Instituts veröffent-licht	Link: https://sc.ibi.ethz.ch/studium/studienarbeiten/bachelorarbeiten.html

Titel der Bachelor-Arbeit:	**Big data in LCA: analysing the data from Environmental Product Declarations (EPDs) for construction products**
Betreuer der Bachelorarbeit:	**Dr. Fernanda Belizario Silva**
Beschreibung:	Environmental Product Declarations (EPDs) communicate environmental indicators of products based on Life Cycle Assessment (LCA). Thousands of EPDs are already published for construction products all over the world. Although EPDs contain impact results for several impact categories, only the Global Warming Potential (GWP) is usually analysed. This leads to the so-called "carbon blindness", leaving other important environmental aspects unaddressed, such as freshwater use. This work aims to investigate the variability in the impact and resource use values for ready-mixed concrete production based on published EPDs to identify possible correlations and eventual inconsistencies. The work requires processing a lot of data, usually published in PDF format, which demands computational techniques to extract and organise the data and statistical skills to process them. The resulting database will allow us to derive ranges for the environmental impacts of ready-mixed concrete, which can be used to calculate the environmental footprints of buildings. The script can also be applied to analyse EPDs of other types of construction products.
Empfohlene Lehrveranstaltungen:	
Platzbeschränkung	Nein: ☐ Ja: ☒ Anzahl Plätze: 3
Gruppenarbeit	Nein: ☒ Ja: ☐ Gruppengrösse:
Besonderes:	Computational and statistical skills required.

Titel der Bachelor-Arbeit:	**Perspectives for Carbon Capture, Utilisation and Storage (CCUS) application in the construction value chain**
Betreuer der Bachelorarbeit:	**Dr. Fernanda Belizario Silva**
Beschreibung:	Carbon capture, utilisation and storage (CCUS) is one of the possible strategies to reach net-zero carbon emissions by 2050 and mitigate climate change. It is an emerging topic with many possible technological routes, each one with a carbon-saving potential but also with potential environmental, economic, and social impacts. Furthermore, there is always a question about who gets the benefit: is it the company that captures the CO2 or the one that uses it? This work aims to map the state-of-the-art of CCUS technologies related to the construction sector, describing how each technology works, how much CO2 it can capture/ store/ use (based on Life Cycle Assessment), and its main environmental, economic, and social aspects. This map should consider CCUS technologies with various Technology Readiness Levels (TRLs).
Empfohlene Lehrveranstaltungen:	
Platzbeschränkung	Nein: ☐ Ja: ☒ Anzahl Plätze: 1
Gruppenarbeit	Nein: ☒ Ja: ☐ Gruppengrösse:
Besonderes:	

Titel der Bachelor-Arbeit:	**Biostabilization for earthen materials development**
Betreuer der Bachelorarbeit:	**Dr. Brumaud Coralie - brumaud@ibi.baug.ethz.ch** **Dr. Magda Posani - posani@ibi.baug.ethz.ch** **Dr. Yi Du - du@ibi.baug.ethz.ch** **Julie Assuncao - assuncao@ibi.baug.ethz.ch**
Beschreibung:	Earth is a building resource with many advantages. It is available everywhere, it has the best recycling potential, and its transformation into building material releases low CO2 emission. Despite numerous advantages, this building material presents many weaknesses that limit its use in some conditions. To overcome these difficulties, a mineral (hydraulic) stabilizer such as lime or cement is commonly added to enhance the performances of earth-based materials (strength, durability). However, this method is under debate regarding its environmental impact and recycling potential. Eco-friendly alternative solutions need to be addressed. The aim of this work will be to investigate the use of bio stabilizer in comparison with mineral ones by testing different mix design strategies (mineral VS bio stabilizer) for different applications (poured earth, 3D printing, bricks) and targeted performances (strength, workability, recyclability, CO2 impact, etc).
Empfohlene Lehrveranstaltungen:	
Platzbeschränkung	Nein: ☐ Ja: ☒ Anzahl Plätze: 3
Gruppenarbeit	Nein: ☐ Ja: ☒ Gruppengrösse:
Besonderes:	Interest in doing experimental work in the lab. Exchange with the supervisors will be in English

Titel der Bachelor-Arbeit:	**Comprehend the shrink behaviors of poured and 3D-printed earth materials**
Betreuer der Bachelorarbeit:	**Dr. Yi Du - du@ibi.baug.ethz.ch** **Julie Assuncao - assuncao@ibi.baug.ethz.ch**
Beschreibung:	Earth materials are receiving growing interest nowadays due to their low carbon and infinite recyclability characteristics. However, much progress still has to be made for these materials to become widely accepted and utilized. Unpredictable shrinkage behaviors during the drying process are one of these obstacles, particularly for techniques involving higher water content. Water evaporation induces the clay paste to shrink perpendicularly to the surface of surrounding aggregates, and when the early strength of earth sample is insufficient against the tensile stress, cracks will generate. Therefore, it is imperative to comprehend the mechanisms underlying the shrinking of earth materials along with the water drying, to implement appropriate preventive measures. Main tasks: Identifying the shrinkage types of earth materials along with the drying process and highlighting the key parameters controlling the shrinking and cracking behaviors.
Empfohlene Lehrveranstaltungen:	
Platzbeschränkung	Nein: ☐ Ja: ☒ Anzahl Plätze: 1
Gruppenarbeit	Nein: ☒ Ja: ☐ Gruppengrösse:
Besonderes:	Interest in Sustainable Materials. Exchange with supervisors will be in English.