Bachelor-Arbeiten BSc Bauing - FS 2024

Leiter der Bachelor-Arbeit:	**Prof. Dr. Robert Flatt**

Institut:	IfB
Fachbereich:	PCBM
Anzahl Themen:	9

Themen direkt auf der Website der Professur/des Instituts veröffent-licht	Link:

Titel der Bachelor-Arbeit:	**Superplasticizers for low carbon cements**
Betreuer der Bachelorarbeit:	**Moghul Sirajuddin**
Beschreibung:	Lime stone calcine clay cement (LC3) is a low carbon cement with one of the highest potentials for large scale adoption in the market. A shortcoming of it however is that the flow retention in presence of PCE superplasticizers is limited. In this project, we will examine a novel combination of admixtures that is showing great promise to resolve this issue of great practical relevance. We will examine the fundamental mechanism explaining this improved performance and optimize the formulation for practical applications. By harnessing the insights gained from our study, we can foster a more sustainable future by reducing the environmental impact of the construction industry while improving its efficiency and performance.
Empfohlene Lehrveranstaltungen:	Werkstoffe lectures and lab
Platzbeschränkung	Nein: ☐ Ja: ☒ Anzahl Plätze: 1
Gruppenarbeit	Nein: ☒ Ja: ☐ Gruppengrösse:
Besonderes:	

Titel der Bachelor-Arbeit:	**Functionally diversified superplasticizers for low carbon cement**
Betreuer der Bachelorarbeit:	**Anastasiya Kurlevskaya**
Beschreibung:	This research proposal aims to investigate the adsorption of Functionally Diversified Polycarboxylate Ethers (FD-PCEs) on the surface of limestone particles, an important component of low carbon cements, and to compare the resulting rheological behavior with that of the regular PCE-limestone systems. It will be based on FD-PCEs designed to deliver improved performance in low carbon concrete. By examining the competitive adsorption of FD-PCEs, this study will offer insights into how to achieve a large market adoption of low carbon cements. The findings bear significant implications for applications in the construction industry, particularly in the context of the growing use of limestone calcined clay cement (LC3). In this project, the sudent will learn about surface chemistry and colloidal interactions in blended cement and become aquainted with relevant characterization methods.
Empfohlene Lehrveranstaltungen:	Werkstoffe lecture and labs
Platzbeschränkung	Nein: ☐ Ja: ☒ Anzahl Plätze: 1
Gruppenarbeit	Nein: ☒ Ja: ☐ Gruppengrösse:
Besonderes:	

Titel der Bachelor-Arbeit:	**Automated Production of Precast Elements: Twin-Pipe Static Mixing System**
Betreuer der Bachelorarbeit:	**Dr. Yaxin Tao, Dr. Arnesh Das, Seyma Gürel**
Beschreibung:	Digital fabrication of concrete has seen remarkable development, especially in production of non-standard concrete elements, and fast production of standard elements. A technology developed at ETH known as Digital Casting allows for rapid production of these elements by intermixing of a set accelerator just before deposition in a formwork. Static mixers are mixers that utilize flow energy for mixing, and are very common in the processing industries, but not in concrete technology. This project will develop the use of a static mixing system in the Digital Casting System in the context of precast concrete element production, examining questions of mixing efficiency, rheology, and production speed.
Empfohlene Lehrveranstaltungen:	Werkstoffe lecture and labs
Platzbeschränkung	Nein: ☐ Ja: ☒ Anzahl Plätze: 3
Gruppenarbeit	Nein: ☐ Ja: ☒ Gruppengrösse: 2 or 3
Besonderes:	

Titel der Bachelor-Arbeit:	**Einfluss von Saccharose und Polycarboxylatethern auf die Hydratation von Zement-Kalkstein-Mischungen**
Betreuer der Bachelorarbeit:	**Roland Käser**
Beschreibung:	Organische Zusatzmittel sind wichtige Bestandteile von Beton, da sie sein Verhalten im frischen Zustand verändern. Saccharose ist ein sehr starker Verzögerer, der die Hydratation verzögert und dadurch eine längere Offenzeit ermöglicht. Polycarboxylatether (PCEs) sind Fliessmittel, die die Fliessspannung erheblich verringern und damit die Verarbeitbarkeit verbessern können. Dies kann auf verschiedene Weisen von Vorteil sein. In diesem Projekt wird der Einfluss von Saccharose sowie einiger PCEs mit unterschiedlichen Eigenschaften auf die Hydratation von einfachen kohlenstoffarmen Zementen, bestehend aus Portlandzement und Kalkstein, untersucht. Dabei soll ermittelt werden, wie sich die Hydratationskinetik aufgrund der Zusatzmittel ändert, und insbesondere wie sich das Abbinden und die verschiedenen Phasen der Hydratation zeitlich verschieben.
Empfohlene Lehrveranstaltungen:	Chemie für Bauingenieure, Werkstoffe
Platzbeschränkung	Nein: ☐ Ja: ☒ Anzahl Plätze: 1
Gruppenarbeit	Nein: ☒ Ja: ☐ Gruppengrösse:
Besonderes:	

Titel der Bachelor-Arbeit:	**Sharing historical objects: A virtual capture-flag operation**
Betreuer der Bachelorarbeit:	**Yamini Patankar, Wenqian Yang**
Beschreibung:	Goal: Digitze tapestry and display it through XR in ist original location
Empfohlene Lehrveranstaltungen:	The Caesar Tapestries are four large-scale cultural objects of high significance. The Bernese army appropriated them from the Lausanne Cathedral about 500 years ago. They are currently on disply in the Bern Historical Museum. Your mission if you accept it is to create a "digital twin" of the tapestry to bring it back to the Lausanne Cathedral through augmented reality. More generally you will be working on augmented representation of questions of historical preservtion of this monument in relation to interdisciplinary ongoing research.
Platzbeschränkung	Nein: ☐ Ja: ☒ Anzahl Plätze: 1
Gruppenarbeit	Nein: ☒ Ja: ☐ Gruppengrösse:
Besonderes:	

Titel der Bachelor-Arbeit:	**Admixtures for concrete recycling for post-war Ukraine**
Betreuer der Bachelorarbeit:	**Prof. Dr. Viacheslav Troian**
Beschreibung:	The question of how to rapidly, efficiently and durably rebuilt the vast stock of damaged buildings in Ukraine is under consideration. Concrete recycling can a priori play an important role in this context, facilitating in particular compromised supply changed and material availability. There are however many challenges to be overcome to facilitate a wide spread use of concrete recycling in such context. For this, this project will built upon recently developed methods to study the causes for loss of workability in recycled concrete. More specifically, the student(s) characterize the performance of different chemical admixtures propost for comabiting this loss of workability. The project will be supervised by Prof. Dr. Vyacheslav Troyan from the Kiev National Universtiy of Construction and Architecture, who is hosted at ETH under our institution's action of solidarity with Ukraine.
Empfohlene Lehrveranstaltungen:	Werkstoffe lectures and lab
Platzbeschränkung	Nein: ☐ Ja: ☒ Anzahl Plätze: 2
Gruppenarbeit	Nein: ☐ Ja: ☒ Gruppengrösse:
Besonderes:	The project can also be adapted for a single student

Titel der Bachelor-Arbeit:	**Robustness of digital concrete towards variations in accelerating systems**
Betreuer der Bachelorarbeit:	**Matineh Mahmoudi**
Beschreibung:	Digital fabrication of concrete aiming towards automation in construction and increasing its efficiency has been the subject of several studies for more than a decade. However, this technology needs more investigation to increase its application in the market. One of the shortcomings in this subject is that the digital concrete mix is not as robust as the conventional concrete. Therefore, small variations in the mix or surrounding conditions can largely effect the outcomes and even hinder the operation. This study will focus on investigating the robustness of different accelerating systems against probable changes such as temperature and/or dosage variations, using a variety of experimental technics.
Empfohlene Lehrveranstaltungen:	Werkstoffe lectures and lab
Platzbeschränkung	Nein: ☐ Ja: ☒ Anzahl Plätze: 1
Gruppenarbeit	Nein: ☒ Ja: ☐ Gruppengrösse:
Besonderes:	

Titel der Bachelor-Arbeit:	**Artificially aged stones: the bridge between laboratory and practitioners' conservation practice**
Betreuer der Bachelorarbeit:	**Camilla Tennenini**
Beschreibung:	In the world of studying the durability and conservation treatments of building materials (particularly the stones that make up historic buildings), the testing phase of products is a widely debated topic. The frequent use of fresh stone samples, which are substantially dissimilar to the original degraded substrate for which treatment is required, leads practitioners to take the results obtained from laboratory tests with a grain of salt. To date, therefore, it is important to investigate the various techniques of artificially weathering materials and/or printing artificial materials that simulate the altered rock to evaluate their differences and similarities. To this end, different analytical techniques will be involved to identify the best route for characterizing the created materials.
Empfohlene Lehrveranstaltungen:	Werkstoffe lectures and lab
Platzbeschränkung	Nein: ☐ Ja: ☒ Anzahl Plätze: 1
Gruppenarbeit	Nein: ☒ Ja: ☐ Gruppengrösse:
Besonderes:	

Titel der Bachelor-Arbeit:	**Potential of CO2 capture by 3D printed concrete**
Betreuer der Bachelorarbeit:	**Lucas Nascimento de Lima**
Beschreibung:	Digital fabrication with concrete is revolutionating the construction industry by introducing automated techniques in the assemblage of buildings. However, due to the high cement content used, 3D printed concrete tends to be seen as a poor alternative for sustainable construction. Neverthless, there is a great potential in reducing the carbon footprint in printed structures by capturing and storing CO2 by mineral carbonation. This project aims to conduct a benchmarking on the potential of CO2 capture and storage of different mixture designs currently used for printing. The results aquired will have an important practical application and will shed a light on the future of sustainable construction with digital fabrication.
Empfohlene Lehrveranstaltungen:	101-0604-02L: Introduction to Materials 101.6615-00L: Materials in Civil Engineering I
Platzbeschränkung	Nein: ☐ Ja: ☒ Anzahl Plätze: 1
Gruppenarbeit	Nein: ☒ Ja: ☐ Gruppengrösse:
Besonderes:	