PENS-308

Argamassa armada in Salvador de Bahia

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Cursus	Sem.	Type
Projeter ensemble ENAC	BA6	Opt.

Langue d'enseignement	français
Crédits	4
Retrait	Non autorisé
Session	Eté
Semestre	Printemps
Examen	Pendant le semestre
Charge	120h
Semaines	12
Heures	**4 hebdo**
Cours	1 hebdo
Exercices	3 hebdo
Nombre de places	

It is not allowed to withdraw from this subject after the registration deadline.

Résumé

Cette Unité d'enseignement prévoit d'analyser de manière critique le système proposé par Filgueiras Lima, à travers la construction d'éléments en béton à l'échelle 1:1 par les étudiants.

Contenu

This *Unité d'enseignement* (UE) focuses on the building technology developed by the Brazilian architect Filgueiras Lima, based on a specific type of ferrocement construction material (*argamassa armada*). Through an in-depth analysis of the proposed building technology, the UE proposes to recover this local and highly valuable technique. The course addresses manifold issues such as respect for local building culture through the lens of technological innovation and social technologies, and ultimately aims at formulating potential responses to an urgent need for a durable and efficient construction system to be used for informal (and formal) construction.
For the on site production of *argamassa armada* elements, Filgueiras Lima proposed a concept for a mobile mini-plant, which could facilitate and divulgate the production of concrete elements by help of local inhabitants. The building system and the mini-plant concept –so far understudied by scholarly, technological research– contains much potential to respond to the above mentioned manifold needs. First, it applies to and is based on the local climate and available materials. Second, it permits rapid, yet solid construction, eventually implemented by masons and rapidly trained workers alike. Moreover, even the historical heritage area (UNESCO), located in the city's center and currently in despair, may benefit from this technology.
The UE foresees to retrieve and critically analyse the system proposed by Filgueiras Lima, through a close collaboration of a team of researchers from architectural and engineering sciences, based respectively at the Atelier de la Conception de l'Espace (EPFL ENAC IA ALICE), at the Structural Concrete Laboratory (EPFL ENAC IIC IBETON) and the Faculdade de Arquitectura da Universidade Federal da Bahia (FAUFBA) in conjunction with the Scientific Research Program Without Borders brought by the architect and researcher Olivia De Oliveira.
After a first period of analysis, empirical research through 1:1 building tests will be led at the EPFL Labs with UE students from the EPFL during the UE 2018. Students will produce 1:1 scale elements in textile reinforced concrete.
The established knowledge will be shared with the project partners at the University of Bahia, with the aim to build up a mini-plant in Salvador de Bahia as interface between scientific research and local inhabitants and workers of informal settlements.

Mots-clés

Technological innovation, Local and global knowledge transfer, Ferrocement construction, Elements 1:1.

Acquis de formation

A la fin de ce cours l'étudiant doit être capable de:

- Analyser
- Dessiner
- Construire

Méthode d'enseignement

1:1 test, lectures, visits, collaborative discussion
Constructive investigations
A critical review of the strengths and weaknesses of the *argamassa armada* technique, will allow for significant progress in the development of thin construction elements such as folded members or shells. It is the aim to identify efficient construction solutions (ease of formwork, efficiency of the structural lay-out) and to update the *argamassa armada* technique with recent technological inputs, in order to optimize it, for the moment, being frail aspects. Concerning this aspect, a promising research line will be given by the potential use of textile reinforced concrete.
The UE proposes to the students to analyze the students work of the 2016 and 2017 UE and develop it further.
Students will produce 1:1 scale elements in textile reinforced concrete:
Analysis of the elements the students have worked on, in the 2016 UE (five elements, case studies from João Filgueiras Lima in Salvador de Bahia).

1. Analysis of the elements the students have worked on, in the 2016 and 2017 UE (five elements, case studies from João Filgueiras Lima in Salvador de Bahia).
2. Construction of 1:1 formworks
3. Placement of textile reinforcement in the formwork.
4. Casting 1:1 elements under i-beton supervision.
5. Measuring of resistance and ductility in the i-beton lab.
6. Establish a protocol of the technical information and functional layout of the casting process and facility (mini-plant).

These different tracks offer a framework for interdisciplinary work that opens doors to future questions, and providing a richer context to investigations. By working with students from different sections of the ENAC, we give students the opportunity to develop a project and experiment together.

Travail attendu

At the end of the course, the student should be able to:
translate architectural drawings and models into 1:1 constructions
use drawing, model and 1:1 construction to resolve tectonic and structural questions,
identify the specific climatic and site-specific constraints of a given project
work in a group on a collaborative building project.

Transversal competences
receive feedback from a critique and respond in an appropriate manner
give feedback to other group members and responding to group critique.
The interactions generated by the project will test disciplinary boundaries -both personally and intellectually - by working with other sections within the school.
We also allow the UE to build links to the Semaine ENAC “Making structural logic”, where the objective will be for students to design and test an innovative formwork system for a textile reinforced concrete element. The goal will be to bring into functional correlation the flexible behavior of textile reinforcement and the necessary rigidity of the formwork for obtaining a minimal dimensioning of the element.

Méthode d'évaluation

Ongoing evaluation.
Students will be evaluated on the basis of the four following criteria:

1. ability to work between drawing/model and 1:1 construction;
2. capacity to use testing as a means of advancing an architectural idea;
3. collaboration (communication, team work, flexibility within different roles);
4. engagement (participation in exercises, analytical work, initiative*).*

Encadrement

Autres	The professors will be with the students on a continual basis throughout the UE period.

Ressources

Bibliographie

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