



CAS ETH in
REGENERATIVE MATERIALS
earth . bio-based . reused

C ONTEXT

Construction industry consumes a tremendous amount of resources and is responsible for half of the greenhouse gas emissions and waste released from our societies. In the last decades, diverse solutions have been provided in order to align building technologies with current sustainability standards. However, despite these efforts, **being less bad is simply not good enough** and a shift towards a regenerative approach, which provides more positive benefits is then urgently needed.

Alternative solutions out of earth, bio-based and reused materials are emerging all over the world and are triggering regenerative output, thanks to their capacity to contribute to the restoration and improvement of the surrounding natural and social environment. However, they are not widespread in the construction sector due to lack of information on the side of decision makers and lack of competence on the side of practitioners.

This new CAS gives the professionals the opportunity to acquire these skills.



Centre of discovery of the biodiversity, Beautour, La Roche-sur-Yon, France

Architecte: Guinée*Potin

Photo credit: Sergio Garzia

OBJECTIVES

This education program aims to give practitioners tools and methods to use earth, bio-based and reused materials with efficiency and creativity in order to contribute to the necessary ecological and social transition in the construction sector. We propose a **Certificate of advanced studies (CAS)** for the management of projects to strengthen construction knowledge with these “low-carbon” building materials. With this program we ambition to:

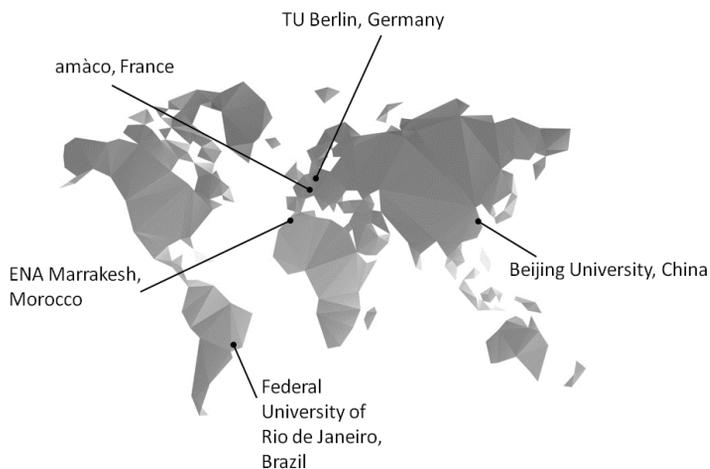
- Participate to the necessary **ecological and social transition** in the construction sector.
- Train specialists to **conduct complex projects using earth, bio-based and reused materials** with realistic and affordable solutions.
- Highlight exemplary architectural projects developing **circular economy** and the use of **«low carbon» materials**.
- Offer a **practical experience** on real projects (new construction, thermal renovation, historic restoration...).
- Create a **network of professionals** working on regenerative construction

TARGET AUDIENCE

Project managers, members of city technical services, building contractors, NGOs, architects, engineers...

10-15 participants from Switzerland and abroad. 12 credits, 5 weeks distributed over 1 semester (theoretical blocks and practical modules + individual project exercise)

INTERNATIONAL PARTNERS AND TEACHING BOARD



ETH teaching board

Roger Boltshauser
Sophie Claude
Guillaume Habert
Andrea Frangi

External teaching board

Antonin Fabbri, ENTPE (France)
Laetitia Fontaine, amàco (France)
Dominique Gauzin-Müller, UNESCO-earth chair (Germany)
Anna Heringer (Germany)
Renaud Haerlingen, ROTOR (Belgium)
Mu Jun, Beijing university (China)
Martin Rauch, Lehm Ton Erde (Austria)
Eike Roswag, TU Berlin (Germany)
Abdelghani Tayyibi, ENA Marrakesh (Morocco)
Romildo Toledo Filho, UFRJ (Brazil)
Christof Ziegert, ZRS Berlin (Germany)

CAS coordination

Chair of sustainable construction, ETH Zurich
Prof. Guillaume Habert
Dr. Sophie Claude

PEDAGOGICAL APPROACH



Samples prepared by the students of Prof. Mu Jun, Terra Award exhibition, Hong Kong

An active learning placing the student at the centre of the training is settled here with **participative methods, experimental lectures, hands-on exercises, inspiring visits and project-based learning.**

The CAS-course explains how to achieve a project with non conventional materials in the Western world as well as in emerging and developing countries. It covers **ecological aspects** (environmental footprint, carbon storage...), **regulations** (thermal, hygrothermal, fire resistance, seismic safety...), **evaluation of the costs, social aspects** (communication, empowerment of the population, training of craftsmen...). Taught skills enable to manage new construction projects but also energy retrofit and heritage conservation projects.

Diverse modules dealing with practical issues are offered:

- The «**Inspiration modules**» propose public **input lectures from well-known specialists** (e.g. *Wang Shu, Anna Heringer, Simón Veléz...*) to raise public awareness. The **visit of inspiring buildings and construction sites** (e.g. *those realised by Martin Rauch...*) will allow discussion with stakeholders involved in their realisation.
- The «**Practical modules**» gather real-life experiences that can prepare the students to apply their knowledge. They include **hands-on workshops** to understand the materials, technical experiments to test the different ways of building with earth, bio-based and reused materials as well as **group projects** to work on realistic calls for tenders.

Training is structured along five main modules split in five weeks: four weeks with contact hours and an individual project exercise.

Certificate of Advanced Studies in Regenerative Materials (12 ECTS)

Module 1 : Discovering Regenerative Materials

13.01 - 17.01.20

- Discovery (composition, implementation, LCA analysis, aesthetic)
- Inspiration from vernacular and contemporary architecture : think local - adopt a territory approach
- Social and ecological transition through Regenerative Materials
- Innovative project setting up to overcome legislative barriers

Week 1

Module 2 : Earth construction

17.02 - 21.02.20

- Construction techniques
- Focus on the structural behaviour and durability
- Cost and planning, existing standards
- Innovative processes: Prefabrication and production line

Week 2

Module 3 : Bio-based construction

16.03 - 20.03.20

- Construction techniques
- Focus on the thermal and hygrothermal behaviour
- Cost and planning, existing standards
- Recent development with lightweight materials

Week 3

Module 4 : Re-valuing the building stock

20.04 - 24.04.20

- Methodology for energy retrofit of existing buildings (historic to 80's)
- Refurbishment technique with Regenerative Materials
- Advantages of RM as finishing (air quality, acoustic, moisture regulation)
- Deconstruction: from dismantling to reuse
- Re-think modern building conception for future reuse

Week 4

Module 5 : Individual project exercise

11.05 - 15.05.20

- Analysis of the local resources, the regional know-how and the social challenges of the project to tend towards a regenerative architecture
- Definition of a pre-program with cost and planning
- Formulation of a strategy to overcome blockages

Week 5



Hotel in Boaxi (China), architect: Anna Heringer

CONTACT

CAS ETH in Regenerative Materials

Chair of sustainable construction,
ETH Zurich
Prof. Guillaume Habert
Dr. Sophie Claude

sclaude@ethz.ch

For more information:

<https://sc.ibi.ethz.ch/en/education/cas-regenerative-materials.html>



Duration

Starting in January 2020

12 credits, 5 weeks distributed over 1 semester (theoretical and practical modules + individual project exercise)

Language of instruction

Courses are typically held in English. Visits and discussion with practitioners will be translated in English but given sometimes in French, German or Italian.

Tuition fees

CAS: 7'000 CHF

It does not include living expenses.

Infrastructure

Students are enrolled at ETH Zurich and are entitled to the use of all academic facilities, including student computer rooms, excellent libraries with electronic access to journals, discounted meals in student cafeterias, as well as access to sport and leisure facilities.

Application

Applicants are asked to apply online and send a motivation letter, a CV and 2 reference letters directly to sclaude@ethz.ch

Application deadline: November 20th, 2019.