MSE-660(a)

Limestone-Calcined Clay - Cement : Characterisation methods

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Cursus	Sem.	Type
Materials Science and Engineering		Opt.

Language of teaching	English
Credits	2
Session	
Exam	Written
Workload	60h
Hours	**28**
Courses	20
TP	8
Number of positions	**40**

Frequency

Every year

Remark

Will not be given this Fall Semester

Summary

Le but est de former doctorants et post doctorants aux méthodes de charactérisation des ciments composés comme la microstructure, la diffraction des rayons X, la calorimétrie, la formulation et la durabilité dans le cadre des actions internationales du project LC3 financé par la DDC.

Content

I) Hydration of cements (4hours)
A) Context why we need SCMs and calcined clays in particular
B) Clay structure, why kaolinite, calcination temperature and methods, reactivity
C) Back to hydration, the products
D) Kinetics and mechanisms
E) Practical work : calorimetry (2h)
F) Practical work : SEM + samples preparation (4h)

II) XRD for cementitious materials (2-3hours)
A) Introduction to XRD for cement
B) Quantitative analysis using Rietveld
C) Practical work : XRD (2h)
I) Mechanical behaviour of cements (2 hours)
A) Creep
B) Shrinkage

III) Characterisation of microstructure (2h)
A) Scanning electron microscopy
B) Mercury Intrusion Porosimetry
C) Proton NMR

IV) Rheology and mix design (2-3h)
A) Basic of rheology
B) Particle size distribution + Specific surface
C) Concrete design

V) Durability (4h)
A) Carbonation
B) Sulfate attack

C) Chloride resistance
D) Alkali silica reaction

Assessment methods

Written

Resources

Moodle Link

- https://moodle.epfl.ch/course/view.php?idnumber=MSE-660(a)