

# Microstructural design and characterization of inorganic materials

## Titulaires

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## Mnémonique du cours

CHIM-H412

## Crédits ECTS

6 crédits

## Langue(s) d'enseignement

Anglais

## Période du cours

Premier quadrimestre

## Campus

Solbosch et Plaine

## Contenu du cours

Structure of crystalline (metals and ceramics) and amorphous (glasses) solids, phase diagrams, diffusion, thermodynamics of interfaces, phase transformations in steels, phenomenological theory of martensitic transformation, titanium and aluminum alloys.

Methods of characterization of solids and liquids based on the interaction with photons, electrons and ions : principles, limitations and applications.

## Objectifs (et/ou acquis d'apprentissages spécifiques)

Understanding the formation of microstructures in inorganic materials based on thermodynamics and kinetics principles.

Understand the principles of the characterization methods and being able to choose and apply one or more methods to solve a given analytical problem.

## Méthodes d'enseignement et activités d'apprentissages

Ex-cathedra class. The concepts are applied in a mini-project realized in group and common to the 'surface treatments' class.

## Contribution au profil d'enseignement

This teaching unit contributes to the following competences:

- › In-depth knowledge and understanding of exact sciences with the specificity of their application to engineering

- › In-depth knowledge and understanding of integrated structural design methods in the framework of a global design strategy
- › Conceive, plan and execute a research project, based on an analysis of its objectives, existing knowledge and the relevant literature, with attention to innovation and valorization in industry and society
- › Correctly report on research or design results in the form of a technical report or in the form of a scientific paper
- › Present and defend results in a scientifically sound way, using contemporary communication tools, for a national as well as for an international professional or lay audience
- › Collaborate in a (multidisciplinary) team
- › A creative, problem-solving, result-driven and evidence-based attitude, aiming at innovation and applicability in industry and society
- › The flexibility and adaptability to work in an international and/or intercultural context
- › An attitude of life-long learning as needed for the future development of his/her career
- › An integrated insight in chemical process and materials' technology

## Références, bibliographie et lectures recommandées

Phase transformation in metals and alloys, by Porter and Easterling

## Autres renseignements

### Lieu(x) d'enseignement

Plaine et Solbosch

### Contact(s)

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## Programmes

### Programmes proposant ce cours à l'école polytechnique de Bruxelles

MA-IRMA | Master : ingénieur civil en chimie et science des matériaux | finalité Spécialisée/bloc 1