

Microstructural design and characterization of inorganic materials

Titulaire

Stephane GODET (Coordonnateur)

Mnémonique du cours

CHIM-H412

Crédits ECTS

6 crédits

Langue(s) d'enseignement

Anglais

Période du cours

Premier quadrimestre

Campus

Solbosch et Plaine

- 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

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

Références, bibliographie et lectures recommandées

Phase transformation in metals and alloys, by Porter and Easterling

Support(s) de cours

Université virtuelle

Autres renseignements

Lieu(x) d'enseignement

Plaine et Solbosch

Contact(s)

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Méthode(s) d'évaluation

Autre

Méthode(s) d'évaluation (complément)

Oral exam during which the students will have to explain a few slides to show their understanding of the concepts and explain their choice of methods to solve a practical problem of characterization.

Mini-project evaluation : personal work and written report

Construction de la note (en ce compris, la pondération des notes partielles)

Oral exam: 60%

mini-project: 40% (20% individual mark for the quadrimester work, 20 % group mark for the written report)

Langue(s) d'évaluation principale(s)

Anglais

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

