



# Metallurgy and electronics properties



Niveau d'étude  
BAC +4



ECTS  
5 crédits



Composante  
Faculté des  
Sciences

## En bref

- **Date de début des cours:** 1 sept. 2021
- **Langue(s) d'enseignement:** Anglais
- **Méthode d'enseignement:** En présence
- **Organisation de l'enseignement:** Formation initiale
- **Ouvert aux étudiants en échange:** Non

## Volumes horaires\* :

CM : 30 h

TD : 15 h

## Objectifs

Getting familiar with electronic and structural properties of different functional materials and characterization techniques

## Présentation

### Description

This teaching unit is devoted to give an introduction to the electronic properties in the solid state of bulk and/or nano-materials, magnetic properties in transition metal oxides, etc.... This unit is given by different, alternating external teachers to UM and the topics may vary with respect to the respective area of expertise of the teaching staff.

Students should get familiarized not only with the electronic properties and ordering of materials, but also with respect to ionic and mixed electronic ionic conductors, materials for spintronics. Another aspect concerns here their specific characterizations using neutron/synchrotron diffraction as well as complementary macroscopic characterization methods for magnetism, permeability, etc

## Pré-requis nécessaires

Basic knowledge of fundamental concepts in Chemistry, Physics, and Solid State Science (Bachelor degree program)

## Contrôle des connaissances

CC

## Syllabus

### Correlated oxides:

Properties, structures, synthesis

Spin, charge and orbital degrees of freedom.

Metal-insulator transitions,

Spin polarised conductors



## Magnetic oxides and magnetic exchange mechanisms :

Superexchange, Double Exchange

Colossal magnetoresistance

Charge order

Crystal field theory

Superconductivity in comparison to previous types : Chemical and structural requirements for superconductivity in cuprates, applications

### Electrocatalysis

### Photocatalysis

### Solid State NMR:

Anisotropic Interactions:

magnetic shielding

dipole-dipole coupling

nuclear electric quadrupole coupling

Manipulation of Interactions:

high-resolution NMR in crystalline Systems

dipolar spectroscopy

cross-polarization

NMR Studies of Glasses

NMR Studies of Insensitive Nuclei

NMR Studies of Supramolecular Systems

NMR Studies of Rare-Earth Compounds

Secrétariat Master Chimie

<https://master-chimie.edu.umontpellier.fr/>

## Infos pratiques

### Contacts

Responsable pédagogique

Werner PAULUS

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### Lieu(x)

➤ Montpellier - Triolet

## Informations complémentaires

### Contact(s) administratif(s) :