Master Nanosciences et nanotechnologies
Nanomagnetism and spintronics

Responsable

Voicu octavian DOLOCAN
voicu.dolocan@univ-amu.fr

Descriptions

Code : S58PH3NDQ3

Nature :

Domaines : Sciences et Technologies

Informations

Composante : Faculté des Sciences

Nombre de crédits :

LANGUE(S) D'ENSEIGNEMENT

Anglais

CONTENU

The course is divided in two parts:

First part:

Introduction to the magnetic properties of materials, basics of magnetism at the atomic scale, ferromagnetism models and application to nanomaterials.

Second part:

Spin-dependent transport, magnetism in low dimensional systems (ultrathin films) and interlayer coupling in heterostructures, spin transfer and spin transport in nanostructures and their applications (magnetoresistive sensors (GMR), STT-MRAM, spin transfer nano-oscillators), techniques for the creation and detection of spin current (spin pumping, inverse spin Hall effect).

Topics :

Nanomagnetism: dia- and paramagnetism, antiferromagnetism, ferromagnetism (mean-field theory, Heisenberg model), magnetic anisotropy, magnetic domains (Kittel's theory), hysteresis, nanoparticles (monodomain) and ferromagnetic nanowires, magnetic recording, magnetic resonance, magnetic measurements.

Spintronics: magnetism in ultrathin films and heterostructures (anisotropy, non-colinear magnetic configurations, DMI, interlayer exchange coupling, exchange bias), giant magnetoresistance, tunnel magnetoresistance (applications), injection, spin accumulation and relaxation in metals, spin Hall effect, spin transfer torque).

PRÉ-REQUIS OBLIGATOIRES

Band theory, free electron gas

Electronic transport

Semiconductors

VOLUME HORAIRE

- Volume total: 54 heures
- Cours magistraux: 24 heures
- Travaux dirigés: 30 heures

CODES APOGÉE

- SNNCU19J [ELP]

M3C

Aucune donnée M3C trouvée

POUR PLUS D'INFORMATIONS

Aller sur le site de l'offre de formation...

Dernière modification le 29/06/2023