

UE Adhesion, friction, nanomechanics

+5

Level Baccalaureate

ECTS 3 credits

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Component **UFR PhITEM** (physique, ingénierie, terre, environnement, mécanique)

Semester Automne

- > Teaching language(s): English
- > Open to exchange students: Yes
- > Code d'export Apogée: PAX9NFAF

Presentation

Description

Goal: Nanomechanics is an important part of applied nanotechnology, This course will provide a working knowledge of nano-mechanics and nano-tribology emphasizing the role of surfaces, interfaces, defects, roughness, and quantum effects. Nano-mechanical measurements techniques and applications in micro-electronic technologies and nano-manufactoring will be developped.

I. Overview and preliminaries.

Surface interactions ; Van der Waals long range forces ; Derjaguin approximation, measuring surfaces forces SFA AFM.

II. Mechanics of solid contacts.

Single contact: Herz contact ; mechanics of adhesive contacts. Statistics of contacts: Greenwood-Williamson model ; elasto-plastic contact

III. Friction an Iubrication

Amonton's law and Coulomb friction; Tabor 's model of friction. Static and dynamic friction; stick-slip; Rice and Ruina law's of friction. Lubrication regimes, Reynolds equation, squeeze film lubrication. Exercice class.

IV. Applications in micro-electronics

MEMS & NEMS applications

Direct bonding, wetting ; bonding wave dynamics





Mechanics of fracture ; smartcut process

Course parts

UE Adhesion, friction, nanomechanics - CMTD

Period : Semester 9

Lectures (CM) & Teaching Unit (UE)

22,5h

Useful info

Campus

> Grenoble - University campus

