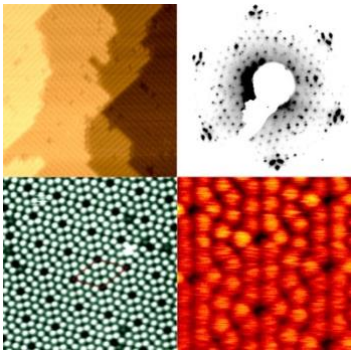
SCIENCES SORBONNE UNIVERSITÉ

MASTER
Physique fondamentale et applications

SMNO nanomat master

M2 – SMNO-nanomat – Surf

Title:	Surfaces, interfaces and nanostructures (Surf)	
	Apogée code: MU5PYM07 **Number of credits:** 6 **Teaching hours:** 36h courses, 14h tutorial or project	

Lecturers:	Greg CABAILH (coordinator) INSP – 22-12 – 507 gregory.cabailh@sorbonne-universite.fr	Geoffroy PREVOT INSP – 22-12 -403	Hervé MONTIGAUD Saint-Gobain Recherche

Objective	The properties of nanostructures or low-dimensional systems are extremely sensitive to surfaces and/or interfaces. The objective is to introduce the theoretical and experimental aspects related to the atomic and electronic structure of surfaces. Surfaces will then be considered as supports for various nanostructured systems. The surface science tools (low energy electron diffraction, grazing X-ray diffraction, tunnel and atomic force microscopy, X-ray and Auger spectroscopy...) will be discussed.
Content	• Structure of crystalline surfaces (crystallography and planar groups, experimental techniques: diffraction (LEED, GIXD) and microscopy (STM, AFM) • Thermodynamics of surfaces (equilibrium form of a liquid drop and a solid, Shuttleworth relation, Wulff construction) • Vibrations at surfaces and in 2D materials • Adsorption on surfaces (thermodynamic aspects, chemisorption, physisorption) • Interactions on surfaces (self-assembly, elastic interaction and self-organization, reactivity and catalysis, growth mechanisms) • Nano-objects: evolution of nanoparticle assemblies (ripening), electronic properties (metallic nanoparticles and plasmon resonance, semiconductor nanoparticles and light emission), deformation (surface tension for fluids and surface stress in solids)
Prerequisites	The student should have taken an introductory course to solid state physics and ideally an introductory course to crystallography.
Examination	The course will be evaluated through a final exam and a project.