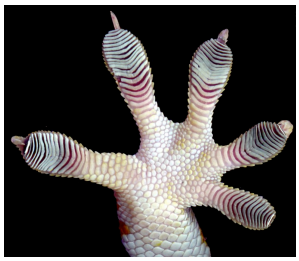
SCIENCES SORBONNE UNIVERSITÉ

MASTER
Physique fondamentale et applications

SMNO nanomat master

M2 – SMNO-nanomat – PIMs

Title	Physics of macroscopic interfaces (PIMs)	
	Apogée code: MU5PYM10 **Number of credits:** 6 **Teaching hours:** 36h courses, 14h tutored project	

Lecturers	Sylvie COHEN-ADDAD (coordinator) INSP - Office 22-23 – 303 sylvie.cohen-addad@insp.upmc.fr	Tristan BAUMBERGER INSP - Office 22-23 - 307 tristan.baumberger@insp.jussieu.fr	Laurence TALINI SIMMS-ESPCI laurence.talini@espci.fr

Objective	A wide variety of phenomena involve macroscopic interfaces: CONTACT, ADHESION, FRACTURE, FRICTION, LUBRICATION, CAPILLARITY, WETTING. Their relevance spans wide domains of both engineering and natural life. It encompasses hard (metals, concrete, glasses) and soft (rubber, gels, foams) structural materials as well as liquids. Their study requires specific tools of continuum (solid and fluid) mechanics and thermodynamics. Emphasis will be put on the use of scaling laws arguments.
Content	1. General tools of elasticity, visco-elasticity and plasticity, with special emphasis on the microscopic origins of these behaviours for broad classes of crystalline or amorphous materials. 2. Liquid/solid interfaces where capillarity and wetting occur. Complex wetting situations with textured, chemically reactive or bio-inspired surfaces. Dynamics of wetting (coating, sliding, spreading, impregnation, bouncing, drying) 3. Solid/solid interfaces: adhesive contact between elastic solids, analogy between adhesion and fracture mechanics, instabilities, relevant length scales. A keynote lecture will be given by an industrial expert.
Prerequisites/Notice	This soft matter course is suitable for students with a major either in physics or in chemistry. Suggested complementary course: SURF “surfaces, interfaces and nanostructures” (microscopic approach)
Examination	Final written exam Evaluated homework, e.g. case study based on a research article