

# UE Microscale mechanics and fluidics II: Fluidics



Niveau d'étude  
Bac +4



ECTS  
3 crédits



Composante  
UFR PhITEM  
(physique,  
ingénierie, terre,  
environnement,  
mécanique)



Période de  
l'année  
Automne (sept.  
à dec./janv.)

- > **Langue(s) d'enseignement:** Anglais
- > **Ouvert aux étudiants en échange:** Oui
- > **Code d'export Apogée:** PAX9NAAE

## Présentation

### Description

*Goal:* Microfluidics studies the transport of liquids at the scale of some micrometer to the hundred of micrometer, such as the flow of red blood cells in a blood vessel, the transport of polymer chains in a porous medium, or the locomotion of micro-organisms. Nanofluidics studies the flow of liquids at the colloidal scale, that is at distance of the nanometer to the micrometer from a surface. This course introduces the concepts of low Reynolds number flows and surface-driven flows and describes the main properties of flows and transport at the sub-millimeter scale.

### Objectifs

*Content:*

- Simple deformations, definition of viscosity
- Lubrication flows ; applications
- Stokes equations ; general properties of low Reynolds number flows
- Diffusion and mixing ; hydrodynamic dispersion ; Peclet number
- Capillary flows ; moving contact lines
- Surface driven flows and coupled transport: Marangoni flows ; electro-osmosis ; Helmholtz-Shmolukovski velocity

*Exercise session:*

Viscous flow around a sphere ; Oseen tensor ; notions on locomotion at low Re

*Bibliography:*

Guyon, Hulin, Petit "Physical Hydrodynamics"  
de Gennes, Brochard, Quéré "Bubbles, drops, pearls and waves"  
Tabeling "Introduction to microfluidics"

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## Heures d'enseignement

UE Microfluidics - CMTD	Cours magistral - Travaux dirigés	14h
UE Microfluidics - TP	TP	10h

**Période :** Semestre 7

## Infos pratiques

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### Campus

> Grenoble - Domaine universitaire