

# UE Microfluidics



Niveau d'étude  
Bac +5



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"

Tabelling "Introduction to microfluidics"

---

## Heures d'enseignement

UE Microfluidics - CM

CM

14h

UE Microfluidics - TP

TP

8h

**Période :** Semestre 9

## Infos pratiques

---

### Campus

> Grenoble - Domaine universitaire