

## **Microhydrodynamics (MEC664)**

The course presents the fundamental properties of Stokes flow, when inertia plays a negligible role with respect to viscous dissipation. This class of flows can be found in many applications including biology (swimming bacteria), biomedical (blood flows), environmental flows (motion of glaciers on centennial scales) and industry (glass or cheese manufacturing). The goal of this class is to present the specific methods developed to study this type of flows.

During the class, fundamental concepts and recent research developments in that domain will be presented through formal lectures and presentation/discussion of recent research papers by the students.

Covered topics include:

- Fundamental equations and theorems.
- Singular representations.
- Confined flows.
- Thin films.
- Motion of particles in Stokes flow (individual and collective)
- Swimming in low Reynolds number flows
- Suspensions

Prerequisite: Incompressible fluid mechanics (viscous and inertial)

### **Bibliography:**

- "Microhydrodynamics, Brownian Motion and Complex fluids", by M. Graham, 2019, Cambridge University Press
- "A physical introduction to suspension dynamics", by J. F. Morris & E. Guazzelli, 2012, Cambridge University Press
- "Advanced Transport Phenomena", by L. G. Leal, 2007, Cambridge University Press

**Timing:** The Course is offered in the second semester (Dec-Feb) of the M2 year.

**Credits:** 3 ECTS

**Hours:** 32 hours.