

Biofluid Mechanics and Mass Transport

Subject area: Mechanical Engineering

University: L'X
Level: BA3, MA1, MA2
Teaching mode: online
Instructor(s): Abdul Barakat

Short description

The course focuses mainly on bio-fluids but also includes concepts of mass transport. The fluid mechanical portion deals with biological applications of inertial flows, Stokes flows, boundary flows, and flow in porous media. The mass transport part of the course focuses on diffusion and osmosis as well as convection-diffusion systems with reaction either in the fluid or at boundaries/surfaces.

Full description

These concepts will be used to describe the following applications: 1) non-stationary flow in arteries and veins; 2) flow in the pulmonary bronchi; 3) lubrication of joints and mucus flow; 4) flow in tumors and intracellular space; 5) the exchange of gases in the lungs; and 6) transport of macromolecules within tissues.

<https://synapses.polytechnique.fr/catalogue/2022-2023/ue/743/MEC550-biofluid-mechanics-and-mass-transport>

Learning outcomes

The course has the following two objectives: 1) to introduce biomedical and biological applications of fluid mechanics and mass transport and 2) to teach research methods through research projects in which students develop new models that describe particular phenomena in biology or biomedical science.

General information

Contact hours per week: 4 hours
Total workload: 60 to 70 (including lecture contact hours) (in student hours for the whole course)
ECTS credits: 5
Language: English

Course start date:	19 September 2022
Course end date:	09 December 2022
Add. info about start date:	The course should start the week of September 19, 2022
Weekly teaching day/time:	Friday 2-6 pm
Time zone:	CET (Denmark, Germany, France, Netherlands, Switzerland, Czech Republic)
Further information:	The course will be taught in person at Ecole Polytechnique and recorded for enrolled students from other EuroTeQ partner institutions.
Prerequisites:	An introductory course in fluid mechanics. There is no biology prerequisite.
Activities and methods:	Lectures, research projects conducted by students
Presence on campus:	

Final examination

Form:	Students are evaluated on the basis of a written exam and/or the research projects (written reports and final oral presentations)
Date:	12 December 2022
Location/format:	
Re-sit possibility:	
Transcript available:	end of the semester and generally 8 weeks after the exam.
Add. info/requirements:	

Registration

To register for this course, follow the registration requirements of your **home university** as specified here: www.euroteq.eu/courses-registration.

Administration

Number of places:	24
Minimum participants:	
Internal course code:	MEC550
Contact:	exchange-international@polytechnique.fr

This course is part of the EuroTeQ Engineering University joint course catalogue 2022/2023. This is a collaborative activity of the partner universities DTU, L'X, TU/e, TalTech, CTU, TUM as well as Technion. Students from these universities can participate in the offered courses. It is the responsibility of the student to check if you fulfil the requirements to participate in a specific course. Students are also advised to check with their home institution how to get recognition of the ECTS credits gained in courses of the EuroTeQ course catalogue. For further information about EuroTeQ Engineering University, visit www.euroteq.eu or get in touch with the above-mentioned point of contact.