

BIO-244

**Physics of the cell**

Persat Alexandre

<b>Cursus</b>	<b>Sem.</b>	<b>Type</b>
Life Sciences Engineering	BA6	Opt.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	Written
Workload	120h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Lecture	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**Summary**

Living organisms evolve in a physical world: their cells respond to mechanics, electricity and light. In this course, we will describe the behavior and function of cells using physical principles.

**Content**

Molecular motors  
 Ion channels  
 Electricity in cells  
 Multicellularity and biological patterns  
 Biofilms  
 Numbers and estimates in biology  
 Life at low Reynolds number  
 Biopolymers  
 Cytoskeleton  
 Membrane mechanics

**Keywords**

Biological Physics  
 Quantitative Biology  
 Back of the envelope calculations  
 Biomechanics  
 Mechanobiology  
 Cells

**Learning Prerequisites****Required courses**

Introductory Biology  
 Introductory Physics

**Learning Outcomes**

By the end of the course, the student must be able to:

- Quantify forces in biological systems
- Identify mechanically sensitive elements in a cell
- Integrate their engineer knowledge in biology

**Assessment methods**

Written exam

### **Supervision**

Office hours	Yes
Assistants	Yes
Forum	Yes

### **Resources**

#### **Bibliography**

Physical Biology of the Cell (Rob Phillips, Jane Kondev, Julie Theriot)  
Ressources en bibliothèque

- Physical Biology of the Cell / Phillips

#### **Notes/Handbook**

The instructors will provide class notes

#### **Moodle Link**

- <https://go.epfl.ch/BIO-244>