

BIO-478

**Pharmacology and pharmacokinetics**

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Cursus	Sem.	Type
Biotechnology minor	E	Opt.
Life Sciences Engineering	MA2, MA4	Opt.

Language of teaching	English
Credits	2
Session	Summer
Semester	Spring
Exam	Written
Workload	60h
Weeks	14
<b>Hours</b>	<b>2 weekly</b>
Courses	2 weekly
<b>Number of positions</b>	

**Summary**

This course introduces the student to the fundamentals of pharmacology, pharmacokinetics and drug-receptor interactions. It discusses also pharmacogenetics and chronopharmacology, to exemplify the challenges of personalized medicine.

**Content**

- Introduction to Pharmacology and general topics of pharmacology
- Pharmacokinetics: principal models and parameters, Drug Absorption, Distribution, Metabolism and Excretion (ADME)
- Chronopharmacology: effect of circadian rhythm on drug action.
- Pharmacogenetics: candidate genes for variable drug response.
- Pharmacodynamics: Drug-target interaction, quantitative description of ligand binding, relationship between ligand binding and functional effect, antagonism; exercises
- Classes of drug targets: functional and structural aspects, strategies of drug targeting; examples
- General topics of pharmacotherapy

**Keywords**

Pharmacokinetics  
 Pharmacodynamics  
 Absorption  
 Distribution  
 Drug metabolism  
 drug elimination  
 Drug  
 Pharmacogenetics  
 Chronopharmacology

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

General human physiology

**Recommended courses**

Cellular and molecular physiology  
 Biochemistry

Maths

### Important concepts to start the course

Bachelor in Life Sciences and Technology or equivalent, i.e. physiology, cell and molecular biology, maths

### Learning Outcomes

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

- Describe mechanisms of Drug Absorption, Distribution, Metabolism and Excretion (ADME)
- Describe principal models and parameters of pharmacokinetics
- Explain the role of genetic polymorphisms in variable drug response
- Describe the effect of circadian rhythms on drug action
- Describe the basic principles of pharmacodynamics
- Compute and represent graphically the concentration dependence of agonist and agonist effects and of ligand binding, and the kinetics of drug action
- Describe the principles of drug action on the main classes of drug targets and illustrate it with examples
- Describe the principles of gene therapy and protein therapeutics and illustrate it with examples

### Teaching methods

Ex Cathedra and exercises

### Assessment methods

written exam

### Supervision

Office hours	Yes
Assistants	No
Forum	No

### Resources

#### Bibliography

Handouts will be placed on the moodle site of the course.

Most of the topics are covered in the following reference textbooks:

- "Rang and Dale's pharmacology " by James Ritter et al., Elsevier/Churchill Livingstone, 9th edition, 2018
- "Principles of Pharmacology" by DE Golan et al., Lippincott Williams & Wilkins, 4th edition, 2016.
- "Rowland and Tozer's Clinical Pharmacokinetics and Pharmacodynamics: Concepts and Applications" by Hartmut Derendorf, Stephan Schmidt, 5th edition, 2019.

### Ressources en bibliothèque

- Ritter. Rang and Dale's pharmacology
- Golan. Principles of Pharmacology
- Derendorf. Rowland and Tozer's Clinical Pharmacokinetics and Pharmacodynamics: Concepts and Applications

### Moodle Link

- <https://go.epfl.ch/BIO-478>