

BIO-487

**Scientific project design in translational neurosciences**

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Cursus	Sem.	Type
Bioengineering	MA1, MA3	Opt.
Sciences du vivant	MA1, MA3	Opt.

Language of teaching	English
Credits	5
Withdrawal Session	Unauthorized Winter
Semester	Fall
Exam	During the semester
Workload	150h
Weeks	14
<b>Hours</b>	<b>5 weekly</b>
Courses	2 weekly
Exercises	3 weekly
<b>Number of positions</b>	<b>12</b>

**It is not allowed to withdraw from this subject after the registration deadline.**

**Remark**

only one registration per student to a scientific thinking course

**Summary**

The goal of this course is to instruct the student how fundamental scientific knowledge, acquired through the study of fundamental disciplines, including biochemistry, genetics, pharmacology, physiology, genomics, cell and molecular biology can be applied for drug discovery and development.

**Content**

We will illustrate how basic scientific knowledge translates into medical advances and serves as the stepping stone to identify and validate new disease targets, to develop drugs, and to improve diagnosis, prevention, and treatment of diseases of the nervous system. We will show these principles by examples, which will focus on conditions of the nervous system, such as neurodegenerative disorders, cognitive enhancement, taste perception but also calorie detection and reward representation in the brain.

Content:

- General principles of drug development [target identification, target validation, screening, hit to lead optimization, process research (optimization of the chemical synthesis for the pilot plant and factory), efficacy, toxicity / safety, preclinical & clinical development]
- Development and use of animal models in biomedical research
- Pathophysiology and therapeutic strategies for disorders of energy balance [fasting-feeding cycles, nutrition, Perception Physiology, hormonal control of energy homeostasis, obesity, anorexia, prevention and treatments]
- Pathophysiology and therapeutic strategies for treating neurodegenerative disease, including Alzheimer's and Parkinson's disease [development and insights from genetic and toxin-based animal models, genetic basis of disease, disease pathways and processes, neuropathology, clinical diagnosis, surgical and drug treatments, neuroimaging, biomarker discovery, target validation]
- Neuroepigenetics
- The business environment [markets, patients/consumers, competitors]
- Project management [sponsors, stake-holders and their expectations, checkpoints, milestones, execution]
- Commercialization [business plan, regulatory, product launch, Intellectual property]
- Case studies

## Learning Prerequisites

### Required courses

Bachelor in Life Science

## Learning Outcomes

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

- Develop expertise in a specific area of research
- Assess / Evaluate therapeutic strategies for treating neurodegenerative disease
- Formulate General principles of drug development
- Demonstrate written and oral communication skills

## Transversal skills

- Write a literature review which assesses the state of the art.
- Make an oral presentation.
- Plan and carry out activities in a way which makes optimal use of available time and other resources.

## Teaching methods

After ex-cathedra introduction sessions, the teaching proceeds with weekly sessions of office hours and group work in close collaboration with the teachers.

## Assessment methods

- Written project
- Oral defense of the project during the semester

## Resources

### Bibliography

- Corey E.J., Czakó B, Kurti L "Molecules and Medicines" (2007)
- Kenakin T.P. "A pharmacology primer, theory, applications and methods" (2006)

En bibliothèque / in libraries :

(cliquez sur le lien pour consulter les informations du réseau de bibliothèque suisse / click on the link to consult information of the Swiss network of libraries)

A pharmacology primer : theory, applications, and methods / Terry Kenakin, 2009

([http://opac.nebis.ch/F?local\\_base=nebis&con\\_lng=FRE&func=find-b&find\\_code=020&request=978-0-12-374585-9](http://opac.nebis.ch/F?local_base=nebis&con_lng=FRE&func=find-b&find_code=020&request=978-0-12-374585-9))

Molecules and medicine / E.J. Corey, B. Czakó and L. Körti, 2007

([http://opac.nebis.ch/F?local\\_base=nebis&con\\_lng=FRE&func=find-b&find\\_code=020&request=978-0-470-22749-7](http://opac.nebis.ch/F?local_base=nebis&con_lng=FRE&func=find-b&find_code=020&request=978-0-470-22749-7))

### Ressources en bibliothèque

- [Molecules and Medicines / Corey](#)
- [A pharmacology primer, theory, applications and methods/ Kenakin](#)

## Prerequisite for

Master in LST