Scientific project design in translational neurosciences
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Cursus | Sem. | Type
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Bioingénierie | MA1, MA3 | Opt.
Sciences du vivant | MA1, MA3 | Opt.
Sciences et technologies du vivant | MA1 | Opt.

Language | English
Credits | 5
Withdrawal | Unauthorized
Session | Winter
Semester | Fall
Exam | During the semester
Workload | 150h
Weeks | 14
Hours | 5 weekly
Lecture | 2 weekly
Exercises | 3 weekly

Remarque
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., Czako B, Kurti L "Molecules and Medicines" (2007)
• Kenakin T.P. "A pharmacology primer, theory, applications and methods" (2006)

En bibliothèque / in 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)
Molecules and medicine / E.J. Corey, B. CzakÃ³ and L. KÃŒrti, 2007
(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
• A pharmacology primer, theory, applications and methods/ Kenakin
• Molecules and Medicines / Corey

Prerequisite for
Master in LST