BIO-447

Stem cell biology and technology

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

Language of teaching	English
Credits	3
Session	Winter
Semester	Fall
Exam	Written
Workload	90h
Weeks	14
Hours	**3 weekly**
Courses	2 weekly
Exercises	1 weekly
Number of positions	

Summary

This course introduces the fundamentals of stem cell biology, with a particular focus on the role of stem cells during development, tissue homeostasis/regeneration and disease.

Content

Embryonic stem cells, adult stem cells including hemaotopoietic, skin, intestine, neuronal and cancer stem cells.
Concepts of nuclear reprogramming, cloning, and molecular basis of self-renewal.
Stem cells and therapy, emerging concept in stem cell bioengineering.

Learning Outcomes

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

- Define key molecular and cellular principles of pluripotent stem cell biology (i.e. embryonic stem cells and induced pluripotent stem cells).
- Develop a molecular understanding of nuclear reprogramming and cloning.
- Compare between different types of stem cells, their function and characterization.
- Define key molecular and cellular principles of the biology of several adult stem cell types including hematopoietic, skin, intestine and neural stem cells as well as cancer stem cells.
- Develop a firm conceptual understanding of key stem cell fate choices including self-renewal and differentiation/commitment as well as stem cell plasticity.
- Develop a molecular understanding of extrinsic (niche) regulation of stem cell fate.
- List key components of stem cell niches and their role in regulating stem cell fate.
- Recall selected bioengineering tools for use in stem cell biology as well as translational aspects of stem cell biology.

Transversal skills

- Demonstrate the capacity for critical thinking
- Access and evaluate appropriate sources of information.

Teaching methods

Lectures and exercices

Assessment methods

Written exam

Resources

Ressources en bibliothèque

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