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 hematopoietic, 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 exercises

Assessment methods
Written exam

Resources
Stem cell biology and technology
Ressources en bibliothèque