Introduction to oncology

Constam Daniel, De Palma Michele

Cursus: Ingénierie des sciences du vivant
Sem.: BA6
Type: Opt.

Language: English
Credits: 4
Session: Summer
Semester: Spring
Exam: Written
Workload: 120h
Weeks: 14
Hours: 4 weekly
Lecture: 2 weekly
Exercises: 2 weekly

Summary
This course provides a comprehensive overview of the biology of cancer, illustrating the mechanisms that cancer cells use to grow and disseminate at the expense of normal tissues and organs. The "hallmarks of cancer" categorization proposed by Hanahan and Weinberg (2001; 2011) provides a referen

Content
Topics of the course:
- The hallmarks of cancer.
- Normal organs and tumours: notions of histopathology.
- The molecular biology of the cancer cells: sustained proliferative signals and evasion of growth suppression.
- Resistance to apoptosis and replicative immortality
- The causes and consequences of cancer: mutations and multi-step tumour progression.
- DNA repair and genetic instability.
- The tumour microenvironment: heterotypic interactions among cancer cells and the tumour-associated stroma.
- Tumour angiogenesis: biology and therapeutic targeting.
- Inflammation and cancer.
- The role of the immune system in cancer evolution.
- The biology of metastasis and metastasis-associated organ microenvironments.
- Cancer biomarkers and classifiers.
- Druggable and non-druggable mutations, darwinian selection, and mechanisms of resistance.
- Cancer therapies: an overview.
- Targeted therapies: mechanisms and applications.
- Immunotherapies.

Keywords
cancer; hallmark of cancer; oncogene; tumor suppressor; tumor microenvironment; tumor immunology; tumor angiogenesis; invasion; metastasis; targeted therapy; resistance mechanism

Learning Prerequisites
- Required courses
  Biology

Important concepts to start the course
The biology of the cell, including: transcription; cell signaling; cell cycle.

Learning Outcomes
By the end of the course, the student must be able to:
• Conduct a study to identify the mechanism(s) of tumorigenesis
• Assess / Evaluate the molecular and cellular mechanisms of tumorigenesis
• Design mechanism-targeted treatments to inhibit tumorigenesis

Transversal skills
• Summarize an article or a technical report.
• Give feedback (critique) in an appropriate fashion.
• Access and evaluate appropriate sources of information.
• Take feedback (critique) and respond in an appropriate manner.

Teaching methods
Lectures, during which the feedback of the students is requested.
Exercises (can vary in style, but are important to reach the learning objectives)

Expected student activities
Attending lectures and exercises.

Assessment methods
Written exam

Supervision
Office hours       Yes
Assistants        Yes

Resources
Bibliography

Ressources en bibliothèque
• Hallmarks of Cancer / Hanahan
• The biology of cancer / Weinberg