**Introduction to oncology**

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**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

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**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**

- The biology of cancer / Weinberg
- Hallmarks of Cancer / Hanahan