

BIO-392

**Oncology**

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<b>Cursus</b>	<b>Sem.</b>	<b>Type</b>
Life Sciences Engineering	BA6	Opt.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	Written
Workload	120h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Lecture	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**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.

**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

### Resources

#### Bibliography

The biology of cancer, Ed. Garland Science (by R. A. Weinberg).

Hallmarks of Cancer: The next generation. In Cell, 2011 (by D. Hanahan and R. A. Weinberg)

#### Ressources en bibliothèque

- [Hallmarks of Cancer / Hanahan](#)
- [The biology of cancer / Weinberg](#)

#### Moodle Link

- <https://go.epfl.ch/BIO-392>