

## Molecular Cancer Biology (C002722)

**Course size** *(nominal values; actual values may depend on programme)*

**Credits 3.0**

**Study time 80 h**

### Course offerings and teaching methods in academic year 2024-2025

A (semester 1)

English

Gent

lecture

seminar

### Lecturers in academic year 2024-2025

Berx, Geert

WE14

lecturer-in-charge

Pieters, Tim

GE31

co-lecturer

### Offered in the following programmes in 2024-2025

[Master of Science in Bioinformatics\(main subject Systems Biology\)](#)

**crdts**

**offering**

3

A

[Master of Science in Biochemistry and Biotechnology](#)

3

A

[Exchange programme in Biochemistry and Biotechnology \(master's level\)](#)

3

A

### Teaching languages

English

### Keywords

Cancer, growth control, genetic instability, lymphangiogenesis & angiogenesis, invasion, metastasis, cancer therapy

### Position of the course

The students should understand better which series of molecular changes a normal cell should undergo to become a cancer cell.

This course contributes to the following program competencies: Ma.WE.BB.1.1 - Ma.WE.BB.1.5, Ma.WE.BB.2.1 - Ma.WE.BB.2.6, Ma.WE.BB.3.1 - Ma.WE.BB.3.6, Ma.WE.BB.4.1 - Ma.WE.BB.4.4, Ma.WE.BB.6.1 - Ma.WE.BB.6.5, Ma.WE.BB.7.RES.1 - Ma.WE.BB.7.RES.2

### Contents

The course "Molecular Cancer Biology" builds on the basic knowledge of Molecular and Cell Biology of the animal cell. The changes at the molecular level of different barriers that normal cells have to pass to become cancer cells will be explained in detail. Cancer diagnosis and classification, cancer genetics, genome instability, insensitivity to anti-growth signals, limitless replicative potential; sustained angiogenesis, tissue invasion and metastasis, cancer models. Experimental approaches and new technological advancements in cancer research will be discussed. Understanding the biology and pathogenesis of cancer at the molecular level is a prerequisite to the development of new types of diagnostics and more effective therapeutics.

Summary of content:

Pathology of cancer (incidence, etiology), classical and molecular classification of human cancer

- Pathology of cancer (incidence, etiology), classical and molecular classification of human cancer
- DNA structure and stability: mutations versus DNA repair, the action of carcinogens
- Growth factor signalling and inhibition of growth: oncogenes versus tumorsuppressor genes (tumor virusses, cellular oncogenes, growthfactors and receptors, tumorsuppressors, Rb and celcyclus control, the role of p53).
- The biology of blood and lymphatic vessel formation during tumor progression

(Approved)

- Unlimited replicative potential: cell immortalization and tumorigenesis (telomerase)
- Stem cells, differentiation and cancer
- Malignant cancer progression of cancer: Invasion and Metastasis
- Tumor Immunology
- Rational treatment of cancer on the basis of molecular insights: chemotherapy versus relevant new molecular targets
- Active discussion of technology and models that are used in modern cancer research (bvb mutation analysis, transformation assays, angiogenesis analysis, transgenic in vivo models for cancer analysis, xenograft models, invasion and migration assays)
- Discussion of relevant actual research articles which bring new insights in the development and progression of cancer

#### **Initial competences**

Having followed with success the courses of physiology, cell biology, molecular biology, genetics and immunology, or acquired the competences aimed at in these courses in another way.

#### **Final competences**

- 1 To acquire the knowledge how a cancer cell arises from a normal cell.
- 2 Student understands the different molecular mechanisms of cancer progression.
- 3 Student should be able to recognize different molecular levels in a cancer cell that may allow future therapeutic intervention.

#### **Conditions for credit contract**

Access to this course unit via a credit contract is determined after successful competences assessment

#### **Conditions for exam contract**

This course unit cannot be taken via an exam contract

#### **Teaching methods**

Seminar, Lecture

#### **Extra information on the teaching methods**

Classroom problem solving sessions with discussion sessions on presentation of recent research articles

#### **Study material**

Type: Handouts

Name: Molecular Cancer Biology

Indicative price: Free or paid by faculty

Optional: no

Language : English

Available on Ufora : Yes

#### **References**

The Biology of Cancer (Garland Science): Robert Weinberg

#### **Course content-related study coaching**

Interactive support via Ufora, Personally: after electronic appointment the instructor is available to answer questions on unclear aspects of the course

#### **Assessment moments**

end-of-term assessment

#### **Examination methods in case of periodic assessment during the first examination period**

Written assessment with open-ended questions

#### **Examination methods in case of periodic assessment during the second examination period**

Written assessment with open-ended questions

#### **Examination methods in case of permanent assessment**

#### **Possibilities of retake in case of permanent assessment**

not applicable

#### **Calculation of the examination mark**

Periodic evaluation (100%)

