Aim: The course aims to provide a comprehensive overview of the molecular oncology.

Course Description: The course is divided into four parts: basic theory of cancer biology (Lectures 1-6), molecular mechanisms of cancer development and progression (Lectures 7-13), molecular mechanisms of tumor suppressors (Lectures 14-20) and hot topics of cancer research (Lectures 21-24). This course is designed for both graduate and undergraduate students* and provides them with a basic understanding of the molecular and cellular mechanisms of cancer initiation, development and progression. In the part describing molecular mechanisms of tumor suppression, the fundamental principles of cancer diagnosis, prevention, and therapeutic interventions are also discussed.


Sustainable Development: the course is related to sustainable development goal 3 as part of health-related global issues and the trends in public health.

Levels: Undeclared, Doctorate, Masters, Exchange - Erasmus Mundus DR, MA, UG, Special Student, Scientific Preparatory, Undergraduate, Exchange - Socrates Erasmus DR, MA, UG

Course Attributes: Lang. of Instruction: English, 3.000 Credit hours, 10 ECTS, Course Offered by FENS

Prerequisites: A basic level understanding of biology, molecular and cell biology, chemistry, biochemistry and statistics is a highly prerequisite.

Attendance and participation: Required in at least 80% of the lectures

Evaluation criteria: T1- 15%, T2-15%, Midterm-30%, Final – 40%

LEARNING OUTCOME: - Knowledge on how Cancer is formed, develops, progresses, cured

Any of the following books can be used as supportive materials:


Oxford Textbook of Cancer Biology (Oxford Textbooks in Oncology) Illustrated Edition by Francesco Pezzella (Editor), Mahvash Tavassoli (Editor), David Kerr (Editor)

The Biology of Cancer, 2nd Edition and up by Robert A. Weinberg (Author)

**Tentative topics by weeks**

**Week 1**


**Week 2**

Cancer metabolism. Glycolysis vs. OXPHOS. Molecular pathways contributing to metabolic reprogramming.

**Week 3**

Week 4


Week 5

Molecular mechanisms of cancer development and progression: oncogenes, tumor viruses. Original research papers to discuss.

Week 6

Molecular mechanisms of cancer development and progression: growth factors and carcinogenesis. Discussion of original papers.

Week 7

Molecular mechanisms of cancer development and progression: G-proteins and oncogenic activation and transformation. RAS signaling pathway. Discussion of original papers.

Week 8 or midterms

Practical lessons. The audience is divided into two groups - a support group and a critics group. We discuss 4 articles in leading journals (two in leading medical journals and two in scientific journals). Then the groups switch places. The goal is to develop critical thinking. Bonuses are for clever questions, for insightful insights, for clever whodunits, and for a non-trivial approach to interpreting results.

Week 9

Week 10


Week 11

Molecular mechanisms of cancer development and progression: angiogenesis, metastasis. Tumor microenvironment, metastatic niches. EMT vs. MET. Role of Wnt pathway. Discussion of original papers.

Week 12


Week 13

Molecular mechanisms of tumor suppressors: radio- and chemotherapy, immunotherapy and CAR-technology. Discussion of original papers.

Week 14

Molecular mechanisms of tumor suppressors: novel molecular targets for anticancer therapy. Discussion of original papers. Conclusion remarks - the current state of cancer research in the world.

Week 15 or final assignments

Practical lessons. Students are asked to divide into four groups and prepare a short presentation suggesting a new or improved approach for anti-cancer therapy. As always, the debates will consist of a critique group and an advocacy group.