BIOL-UA 530 Cancer Biology

Instructors:
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Course Description:
This course covers the fundamental mechanisms of cancer emergence and evolution. Cancer is a devastating disease with huge medical and economical implications. Since the US declared the “War on Cancer” in 1971, the government has spent billions of dollars in research while patients all around the world spend similar sums in medical bills. These investments have led to significant discoveries and therapeutic improvements, but a definitive cure for cancer remains elusive. The course will cover some of the most important advances in cancer research, with a special emphasis on why basic research is critical to address the challenges posed by this disease. Students will gain a solid foundation on the fundamental molecular and cellular mechanisms behind tumor initiation, progression, and spreading. Students will also learn how tumors evolve and how this evolutionary process is largely responsible for the difficulties in eradicating cancer. The course finishes with discussion of how basic research has enabled novel therapeutic approaches that are bringing us a step closer to cure cancer.

Pre-requisites:
Molecular and Cell Biology I (BIOL-UA 21)
Molecular and Cell Biology II (BIOL-UA 22)

Textbook and Required Materials:
The Biology of Cancer. Robert Weinberg. Suggested as a complement to the papers for reading assignments.

Grading:
Discussant report 10%
Discussion leadership 10%
Participation in discussion 10%
Midterm 30%
Final exam 40%

Topics:
What is Cancer?
DNA damage and Mutagenesis
DNA repair
Oncogenes and tumor suppressor genes
Apoptosis and growth factor independence
Cell Immortality
Tumor metabolism and Oncometabolities
Cancer as a multicellular ecosystem
Spatial heterogeneity within tumors
Temporal evolution and natural selection in cancer
Chemotherapy
Immunotherapy and personalized medicine