Biology 350   The Biology of Cancer   Fall 2020

Mondays and Thursdays 1:10pm - 2:25pm in Blackboard Collaborate Ultra

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Textbook (optional):   The Biology of Cancer (Weinberg, 2013)

Topics:

What is cancer?

Dysregulated proliferation in cancer

Dysregulation of cell death mechanisms in cancer

Cell Cycle dysregulation in cancer

Common methods in cancer biology

Cancer cell signaling

Cancer metastasis

Epithelial to mensenchymal transition in cancer

Circulating tumor cells

Non-coding RNAs in cancer

Epigenetics and cancer

Cancer genomics

Multistage carcinogenesis: colon cancer

Viruses and cancer: hepatocellular carcinoma

Hormones and cancer: prostate cancer

Immune mechanisms and cancer

Targeted cancer therapy

Biology of cancer chemoresistance

Grading will be as follows:

First exam	20%
Second exam	20%
Third exam	20%
Fourth exam	20%
Fifth exam	20%

Approximate Schedule:

Aug 27 Thur   What is cancer? (lecture 1)
Aug 31 Mon   Dysregulated proliferation in cancer (lecture 2)
Sep 3 Thur   Methods in cancer biology: assessment of cancer cell proliferation   (lecture 3)
Sep 7   Mon   No class – Labor Day
Sep 10 Thur Dysregulation of cell death mechanisms in cancer (lecture 4)
Sep 14 Mon   Cancer cell signaling (lecture 5)
Sep 17 Thur   Cell Cycle dysregulation in cancer (lecture 6)
Sep 21 Mon   Exam 1   (Also read Exp Cell Res 2016;348(2):190-200)
Sep 24 Thur   Cancer metastasis (lecture 7)
Sep 28 Mon   No class
Oct 1 Thur   Epithelial to mensenchymal transition in cancer (lecture 8)
Oct 5 Mon   Circulating tumor cells (lecture 9)
Oct 8 Thur   Exam 2   (Also read Cells 2020;9(7):1594 and Cells 2019;8(6):618)
Oct 12 Mon   No class – Columbus Day
Oct 15 Thur   Methods in cancer biology: assessment of cancer gene expression (lecture 10)
Oct 19 Mon   Long non-coding RNAs in cancer (lecture 11)
Oct 22 Thur   miRNAs in cancer (lecture 12)
Oct 26 Mon   Epigenetics and cancer (lecture 13)
Oct 29 Thur   Multistage carcinogenesis: colon cancer (lecture 14)
Nov 2 Mon   Methods in cancer biology: assessment of cancer protein expression (lecture 15)
Nov 5 Thur   Exam 3 (Also read Genes 2019;10(12):964 and G3 2020;10(7):2257-2264 and Exp Cell Res 2016;348(2):190-200)
Nov 9 Mon   Hormones and cancer: prostate cancer (lecture 16)
Nov 12 Thur Animal Models of tumorigenesis: prostate cancer and hepatocellular carcinoma (lecture 17)
Nov 16 Mon Immune mechanisms and cancer (lecture 18)
Nov 19 Thur Cancer genomics (lecture 19)
Nov 23 Mon   Exam 4   (Also read G3 2020;10(7):2257-2264 and Genes 2019;10(12):964)
Nov 26 Thur   No class – Thanksgiving recess
Nov 30 Mon Molecular diagnostics in cancer (lecture 20)
Dec 3 Thur   Molecular targeted therapy of cancer (lecture 21)
Dec 7 Mon   Biology of cancer chemoresistance (lecture 22)
Dec 10 Thur Viruses and cancer: hepatocellular carcinoma (lecture 23)
Dec 14 Mon   Exam 5 (Also read Hepatobiliary Pancreat Dis Int 2020;19(2):175-180 and PLoS One 2019;14(12): e0226620 and Genes 2019;10(12): 964)

Learning outcomes: Students will learn that although the etiology of cancer is multifactorial, there is a strong genetic component. They will also be introduced to the molecular biological mechanisms underlying many cellular processes dysregulated in cancer. Students will be introduced to many important methods in cancer biology, including those that lead to the generation of large data sets. And students will be introduced to the approach to accessing and probing publicly available large data sets relevant to cancer biology, and to the basics of cancer molecular diagnostics and therapy.

Required readings: A textbook on The Biology of Cancer (Weinberg, 2013) is recommended to assist in the understanding of lecture material. Additional textbooks that are helpful include: Non-coding RNAs and Cancer (Muller Fabbri), Next Generation Sequencing in Cancer Research Volume 1: Decoding the Cancer Genome (Wei Wu and Hani Choudhry). Helpful peer-reviewed journal articles will also be provided for the use of students.

Method of evaluation: Five exams are given that are based entirely on lecture material that generally involve a short answer format where students are given the opportunity to demonstrate that they understand the basic concepts covered in the lectures.

Plagiarism policy: All writing should be original. Appropriate attribution to any published work used should be done.