**S3690: The Biology of Cancer**

*HSSP @ Harvard Fall 2010*

**Description:**

This course will give a brief overview of basic principles in biology by discovering exactly what went wrong in cancer. We will discuss topics such as central dogma, cell cycle, cell signaling, cell aging and more. Since this course is meant to be introductory, we will not be concerned with the details of these processes but rather to understand the fundamental principles that govern them through media and interactive activities.

Each class will be divided into 2 sections: the first section will cover the concepts in biology followed by relevant examples of the concept. This section will be conducted mostly through lectures and videos. The second section will cover how the biological principle applies to one of the six hallmarks of cancer and a class discussion of how this is relevant to cancer treatment and research. Your active participation is expected for both components of the course.

**Instructor:**

Zhi Dong ‘12

Molecular Cellular Biology

[Dong5@fas.harvard.edu](mailto:Dong5@fas.harvard.edu)

623 - 570 -5856

**Course time and location**

Sat 10:00am--12:00pm

Lyman 330

**Homework**

There will be a short reading and/or exercise given after each class. These are meant to familiarize you with the terminology and concepts we have covered and will cover in future lectures. Although you will not be tested on these materials, you should complete them before each lecture in order to take full advantage of this course.

**Final Project**

You will work in a group to create a short video based on one of the concepts we have covered in class or your own research on a related topic and present it to class on the last day. We will see plenty of examples during the course, and more details will be given as the course progresses.

**Class Schedule (Tentative)**

Lecture 1

Framing the Problem: The challenges of treating and managing cancer in today’s healthcare system and the current achievements in cancer research

Course overview, format and introduction; fundamental building blocks of the cell

Lecture 2

The central dogma, introduction to molecular genetics and the six hallmarks of cancer

Lecture 3

The cell cycle, regulation of cellular processes, protein degradation, and the first hallmark of cancer: limitless replicative potential

Lecture 4

Principles of cell signaling, importance of phosphorylation, and two more hallmarks of cancer: self-sufficiency in growth signals and insensitivity to anti-growth signals.

Lecture 5

Life story of a cell: differentiation, cell aging, apoptosis and the fourth hallmark of cancer: Evading apoptosis

Lecture 6

Principles of development, organogenesis, morphogenesis and last two hallmarks of cancer: sustained angiogenesis, tissue invasion and metastasis

Lecture 7

Final Project and presentations