

**Bisc 410 Spring 2021****Class Schedule and Instructions**

<b>JANUARY</b>	M 18 MLK day	<b>No Class</b>	
	W 20		Arnheim lecture -1
	M 25		2
	W 27		3
<b>FEBRUARY</b>	M 1		4
	W 3		5
	M 8		6
	W 10		7
	M 15		8
	W 17		9
	W 22	<b>No Class</b>	
	M 24		Kuhn lecture -10
<b>MARCH</b>	M 1		11
	W 3		12
	M 8		13
	W 10		14
	M 15		15
	W 17		16
	M 22		17
	W 24		18
	M 29		19
	W 31		20
<b>APRIL</b>	M 5		21
	W 7		22
	M 12		23
	W 14		24
	M 19		25
	W 21		26
	M 26	<b>Term Paper Due</b>	27
	W 28		28

**BIOLOGICAL SCIENCES 410 SPRING, 2021**  
**APPLICATIONS OF MOLECULAR BIOLOGY TO MEDICINE**  
ZOOM, 12:00-1:50 pm

This course will review recent advances and trends that are changing the manner in which human diseases are understood, diagnosed and treated.

**PART ONE**

N. Arnheim: RRI Hall 319C, (213) 740-7675, [arnheim@usc.edu](mailto:arnheim@usc.edu)

During the first quarter of the semester students (divided into groups) will present a seminar on a paper from the original literature (not review articles!) that the group has chosen. Each group will have one or more practice sessions with Dr. Arnheim before presenting to the class. Each member of the class will review each group's presentation and hand her/his comments to the instructor. The instructor will then compile all the comments and provide them to the presenting group after removing the names of the students who made the comments (see class instructions below). The goal of this part of the semester is for the student to learn how to read a paper from the original scientific literature. The student will learn to present a scientific paper to a **general** scientific audience so as to convey the motivation to carry out the experiments, the logic of the experimental design, details of the experimental results and the validity of the conclusions.

Possible topics for presentation:

Human genetics; chromosome mechanics; genomics; fragile sites in chromosomes  
Neurodegenerative human diseases; triplet repeat polymorphisms in human disease  
Gene regulation; relative abundance of RNA transcripts  
Regulation of alternative splicing of pre-mRNA  
Epigenetic gene regulation (e.g., imprinting of DNA by methylation; modification of histones)  
Signal transduction/receptor signaling  
Protein structure and function; proteomics; protein arrays  
Protein-DNA interactions  
Nuclear proteins resulting from mutations and protein modifications  
Inflammation; Apoptosis  
Cancer: cancer stem cells; metastasis mechanisms; anti-cancer therapies; oncolytic virus strategies, genetic instabilities in cancer cells; tumor antigens  
Oxidative damage to macromolecules during aging  
Stem cells: differentiation and use in medical therapies and regenerative medicine  
Immunology  
Virology, Prions

Biofilms: microbial infections on membranes and other surfaces  
Drug design (e.g., antibacterial/antiviral drug strategies), protein drugs  
Gene therapy

Possible journals to examine:

Nature  
Science  
Cell  
Nature Genetics  
Nature Medicine  
Nature Structural Biology  
Nature Biotechnology  
New England Journal of Medicine  
Lancet  
Proceedings of the National Academy of Sciences, USA  
Current Opinions In (various titles)  
Trends In (various titles)  
Others will be discussed in class.

**CLASS INSTRUCTIONS FOR ARNHEIM'S PART OF BISC 410 SPRING 2015**

**Getting a paper approved for presentation**

Each group must have Dr. Arnheim's **approval by January 27<sup>nd</sup>**. Since some suggested papers may not be approved, the process of getting approval should begin as soon as possible. PAPERS SHOULD HAVE BEEN PUBLISHED NO LONGER THAN 5 YEARS AGO. PAPERS SHOULD BE EXPERIMENTAL AND NOT DESCRIPTIVE. NO REVIEW ARTICLES WILL BE ACCEPTED. Approval can be obtained by sending pdf files to Dr. Arnheim (arnheim@usc.edu). **You must include your group number in the email subject line.** Send several possible pdf files for your talk at the same time to speed up the approval process. The sooner the paper is approved the sooner your group can organize the talk and set up the appointments to practice the talks with me.

**How many talks will be given**

Each group will give one presentation to the class during this portion of the course. Most classes will have 2-3 groups presenting. When two groups are presenting, each should talk for about 45 minutes. If three groups present in the same class session, the talks should last 35 minutes each.

**Instructions for submitting student reviews**

Before starting their presentation, each group will: (1) write on the board the number of their group and (2) the names of each speaker in the order in which they will present.

Immediately after the talk each student will fill out an evaluation form with constructive comments about each member of each group that presented (except yourself) and hand it to me before the next talk starts. At the next class Dr. Arnheim will then provide each

member of each group the comments concerning their presentation from the whole class **after removing the names of the students who handed in the forms.**

## **PART TWO**

P. Kuhn: USC Michelson MCB 354, +1 (213) 821-3980, pkuhn@usc.edu

During the remaining three quarters of the course, students will focus on cancer as a particular disease setting and how scientific literature relates to impacting patient care in the post outbreak time period. Having learned how to read and present content from the scientific literature in the first part of the course, students will now learn how science is motivated by contemporary problems such as the SARS CoV2 outbreak in standard of care and how scientific discovery can lead to advances of this standard towards better outcomes for patients. An understanding of both opportunities and hurdles along the way are the key learning objectives.

Primary topic for 2021: Cancer research and cancer care in the post-outbreak world. Opportunities and challenges for science and medicine in the next decade.

### **CLASS INSTRUCTIONS FOR KUHN'S PART OF BISC 410 SPRING 2020**

Starting with a set of overview lectures, students will then be tasked to select a specific problem that patients will likely face in the next year(s). Groups of students will then be organized to select a scientific framework that might address that problem. Once the problem statements have been decided on, each group of students will select one problem statement and relevant literature to discuss its relevance towards the solution of the problem. Each group (represented by alternating members) will present and/or submit once per week and these presentations will be used for guided class discussions. The progressive refinement of the presentations will lead to a final presentation for each group. The final presentation should demonstrate the complete process from the articulation of the problem statement through the steps towards a solution in clinical practice. In parallel, each student will develop a term paper that describes a complete solution path of a problem in care for cancer patients. This problem can be the same or different as the group problem statement.

**Paper Draft Due in Dr. Kuhn's inbox on date specified on the schedule above.**  
**Final Paper Submission Due in Dr. Kuhn's inbox on date specified on the schedule above.** Dr. Kuhn's email is pkuhn@usc.edu.