

<b>JANUARY</b>	M 7		ARNHEIM-1
	W 9		2
	M 14		3
	W 16		4
	M 21 MLK DAY	<b>NO CLASS</b>	
	W 23		5
	M 28		6
	W 30		7
<b>FEBRUARY</b>	M 4		KUHN-8
	W 6		9
	M 11		10
	W 13		11
	M 18 Presiden. day	<b>NO CLASS</b>	
	W 20		12
	M 25		13
	W 27		14
<b>MARCH</b>	M 5		15
	W 7		16
	M 11 Spr Brk	<b>NO CLASS</b>	
	W 13 Spr Brk	<b>NO CLASS</b>	
	M 18		17
	W 20		18
	M 25	<b>Paper draft due</b>	19
	W 27		20
<b>APRIL</b>	M 1		21
	W 3		22
	M 8		23
	W10		24
	M 15	<b>Term paper due</b>	25
	W 17		26
	M 22		27
	W 24		28

**BIOLOGICAL SCIENCES 410 SPRING, 2019**  
**APPLICATIONS OF MOLECULAR BIOLOGY TO MEDICINE**  
RRI 301, 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 a practice session with Dr. Arnheim before presenting to the class. Each member of the class will review each group's presentation and send 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). 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

PLOS Journals

Proceedings of the National Academy of Sciences, USA

Professional Society Journals ( Journal of Biological Chemistry and Molecular Biology etc.)

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 at least **ONE** week before the presentation is to be given. Since some suggested papers may not be approved, the process of getting approval should begin at least two weeks before the presentation is given. 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 subject line.** Send several possible pdf files for your talk at the same time to speed up the approval process.

**How many talks will be given**

Each group will give one presentation during this portion of the course and will give practice talks to Dr. Arnheim before presenting to the class. Most classes will have two presentations and occasionally perhaps three. When two groups are presenting, each group should talk for about 45 minutes. On rare occasions when 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.

Each student will write constructive comments about each member of each group that present on a given day (except your own group). These comments will be sent by email to a chosen member of your group. This group member will then compile all the comments and send them to Dr. Arnheim. The subject line of the email to him must give, in the following order, **1) the last name and group # of the person sending the email, 2) the group being reviewed and 3) the date of the talk being reviewed.** For example, "Subject: Jones, group # 2-critique of group #5-Jan 28, 2015". The body of the email will contain comments on each of the speakers from each group member. At a later time Dr.

Arnheim will provide each group that talked with the comments from the whole class concerning their presentation **after he removes the names of the students who made the comments.**

To clarify, each student should send one email to the designated member of their group for each group that presents a talk (that means a total of 2 or 3 emails) after each class, and this email should contain comments about each member of the presenting group. The designated group member must send the compiled comments (one email for each presenting group) to Dr. Arnheim within one week from the date of the presentation. Any email that does not have ALL the required information in the subject line will be returned. Unless the email is received on time and with the correct subject line, the student will not receive credit for completing this particular assignment.

In thinking about what comments to make, you should consider:

- 1) The organization of the speaker's portion of the presentation.
- 2) The presentation mechanics such as the pace at which the speaker delivers the information, the voice volume and enunciation and the quality of eye contact with the audience.
- 3) The quality of the slides: can everything be easily seen? Are they too busy? etc.
- 4) The general confidence shown by the speaker.
- 5) Your confidence in the speaker's knowledge of the material.

## **PART TWO**

P. Kuhn: TRF 114, +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. 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 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 2019: XPRIZE in Early Cancer Detection – opportunities and challenges derived from the current state of knowledge.

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

Starting with a set of overview lectures, students will then be tasked to select a specific problem that patients are facing in the clinic today. 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.

Each group will go through a discovery phase of understanding the problem setting by working backwards from a current standard of care setting. For example one group could pick an overall setting of early detection in lung cancer and start by understanding how the current diagnostic approach was developed followed by what an improvement will have to accomplish and how current literature relates to that. Each group will use a phased approach to the final roadmap to impacting the care of a specific subgroup of patients.

A term paper (maximum of 6 pages) is required in order to earn a letter grade in this course. In writing the paper, very recent literature should be consulted and referenced. More information on writing the paper will be given in class.

**Paper Draft Due: 03/25/18**

**Final Paper Submission Due: 04/15/18**, the finished paper should be submitted no later than April 15<sup>th</sup> to Dr. Kuhn at [pkuhn@usc.edu](mailto:pkuhn@usc.edu).