

JANUARY	M 10		Arnheim lecture -1
	W 12		2
	M 17	MLK day	3
	W 19		4
	M 24		5
	W 26		6
	M 31		7
FEBRUARY	W 2		8
	M 7		9
	W 9		Kuhn lecture -10
	M 14		11
	W 16		12
	M 21	President's Day	13
	W 23		14
	M 28		15
MARCH	W 2		16
	M 7		17
	W 9		18
	M 14	Spring Recess	19
	W 16	Spring Recess	20
	M 21		21
	W 23		22
	M 28		23
	W 30		24
APRIL	M 4	Draft papers due	25
	W 6		26
	M 11		27
	W 13		28
	M 18		29
	W20		30
	M 25	Final Paper due	31
	W 27		32

BIOLOGICAL SCIENCES 410 SPRING, 2022
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, 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 all group presentations. 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 2022

Getting a paper approved for presentation

Each group must have Dr. Arnheim's **approval by January 26nd**. 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, practice it and set up the appointments to practice your talk 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 (or rarely 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 they start their presentation write down the group's number. Their names will be obvious on Zoom. During the talk take notes about each speaker's presentation. Each student in the Zoom audience will write constructive comments **about each member of each group** that present on a given day (except your own group). You should consider making notes about:

- 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.

Email all your comments about each speaker in each presenting group to one designated member of your group within **24** hours from the end of class. For each group that presented that day the designated member will send **one** email specific to that group to Dr. Arnheim (arnheim@usc.edu) with all the comments. The subject line of the email should 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.** For example, "Subject: Jones, group # 2-critique of group #5-Feb 10, 2021". The body of the email will contain all the comments from each group 2 member on each of the group 5 speakers.

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

PART TWO

P. Kuhn: USC Michelson MCB 220M, +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 pandemic era. 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 COVID-19 pandemic and its consequences for cancer care including screening for cancer and home healthcare delivery for cancer patients. An understanding of both opportunities and hurdles along the way are the key learning objectives.

Primary topic for 2022: Cancer research and cancer care in the post-pandemic world. Opportunities and challenges for science and medicine in the next decade.

CLASS INSTRUCTIONS FOR KUHN'S PART OF BISC 410 SPRING 2022

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 team will develop a term paper consistent with the presentation and organized in chapters written by individual members.

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.