Project Assignment: Lecture Presentation
Topic Draft: 10/8/20, in class
Proposal Due: 10/15/20, 12:45 p.m.
Presentations: November, in class

Prepare and present a lecture on a specific <u>application of nanoparticles in biomedicine</u> that is of interest to you, but not directly related to any research project you may be presently investigating or have investigated in the past. A list of potential topics is at the bottom of the page.

The presentation should cover the following:
• <u>clinical significance,</u> relevant history, and technical background of the application
• <u>functional performance requirements</u> of the nanoparticles for the application
• <u>properties</u> of the nanoparticles that enable the desired functions
• <u>structure</u> of the nanoparticles that enable the desired properties
• engineering <u>structure-property relationships</u> for optimal performance
• (optional) <u>processing</u> methods for preparing nanoparticles with the desired structure
• the <u>state of translation</u> (clinical use, clinical trials, preclinical research) and <u>barriers to further progress</u> in clinical translation

The presentation should last 15 minutes, not including time for questions. Note that a 15 minute presentation will typically include approximately 15 prepared slides assuming you present 1 slide per minute. You will also provide the class with one journal article related to your presentation one week ahead of your presentation.

The presentation will require that you <u>review and cite relevant scientific literature</u> (books, journal articles, patents, etc.) on the subject matter. We will assume that you already know how to search scientific literature using *Google Scholar*, *Pubmed*, and other search engines unless you speak with the instructor or TA. The presentation will also require that you <u>organize and evaluate information</u> that is available in the scientific literature.

The proposal should include 1-2 pages of typed text outlining your plans for your chosen topic. The proposal will not be graded but will provide an early opportunity to receive helpful feedback from the instructor.

Suggested topics (You are also welcome to propose topics not in this list!):

<u>Biosensing and Bioseparation</u>	<u>Diagnostic Imaging Probes</u>	<u>Therapeutics</u>
colorimetric (e.g., ELISA-like)	electron microscopy	antimicrobial
electrochemical/redox	magnetic resonance imaging (MRI)	drug/gene delivery vehicle
fluorescence	multimodal imaging	- disease or pathogen specific
fluorescence enhancement/quenching	nuclear imaging (PET/SPECT)	- mechanism or form specific
magnetic separation/tweezers	optical fluorescence	- delivery mechanism
magnetic activated receptor signaling	luminescence (e.g., two-photon)	filler or reinforcement in
reporters	optical scattering	scaffolds/implants
surface plasmon resonance (SPR)	- dark field microscopy	microwave assisted therapy
surface-enhanced Raman	- optical coherence tomography (OCT)	neurostimulation
scattering (SERS)	- SERS imaging	photothermal therapy
	photoacoustic imaging	photodynamic therapy
	photothermal imaging	radiofrequency (RF) therapy
	ultrasound	radiosensitization
	X-ray/computed tomography	