BIEN 235 2019S Study Guide for Exam 1

**What are my exams like?** My exams usually have questions that are similar to the homework and quizzes, plus some questions about diagrams from the class PowerPoints. There will be several very short answer or fill-in-the-blank statements that are sometimes associated with drawings or figures, some problems that involve using table and/or a plot, several multiple-choice problems, and true-false statements. There are no long essay questions, so none of your statements should be longer than a few words or sentences. The first exam will not have calculations; so, you will not need a calculator. (You will do calculations on the Final exam.)

**What will the exam cover?**

IMMUNE SYSTEM & WOUND HEALING & CELLS AND PROTEINS: Know the main difference between the two subsystems of the immune system (innate and adaptive), some of the cells and types of molecules in each, what they do and when they do it, types transport across the plasma membrane of cells, extravasation, difference between the two types of cell death, timeline of the immune cell response and wound healing (see plot), Biomaterials-Tissue interaction and device-associated complications (graphic with yellow highlighting), acute vs. chronic inflammation, steps of the wound healing process,

BMEB SAFETY RULES (& LAB TOUR: Name two types of PPE, the rules on the use of gloves, every chemical has a Safety Data Sheet, name the place to meet after exiting the building for a fire alarm, where the fire alarms are always located, the phone number of the campus police, describe the differences in the primary use and the air flow patterns of a biosafety cabinet (cell culture hood) versus a fume hood.

Protein Interactions with Biomaterials and Surface Modifications, Surface Characterization, & POLMER SYTHESIS AND CONTACT ANGLE LABS: Protein properties and adsorption, amino acid side chains affect protein structure, four levels of protein structure, name some common biopolymers, rate of protein adsorption & Vroman effect & denatured & rearranged proteins, nature of permanent layer on surface, application of coatings meant to prevent protein adsorption and/or functional surface, types of functionalization of biomolecules, stimulus responsive polymers, devices for surface analysis, destructive or nondestructive, use/concerns for contact angle measurement, tacticity, crystallinity, and crosslinking and other types of structural characteristics, biological polymers (different types covered in class), viscoelastic properties and what causes these (on a molecular/chain level).

MECHANICAL PROPERTIES: Effects on tensile properties of polymers, viscoelastic properties, tensile v. shear stress measurements, endurance measurements, using information on tables of material properties (You will not perform calculations for Exam 1.)

Orthopedic implants and reactions: Bone is an anisotropic composite biological material: know the cell types, at least one major biopolymer in bone, and one of the main minerals and what these contribute to dynamic properties of bone, hip anatomy (ilium, acetabulum, femoral head, etc.), two major causes of hip implant failure (not including breakage and squeaking), three major components of a total hip implant, some types of materials used in these implants.

ALSO: Any items that I wrote on the board in class, and topics that were on assignments 1 – 2 and quizzes 1 & 2 may appear on the exam.

**How should I study?** Study the notes you took in class and during lab activities, PowerPoints presented in class, your homework problems (Assignments 1 & 2), and quizzes (1 & 2).

The PowerPoint presentations in class will be helpful. Remember, I said that some of slides were for your own information or for projects. These slides are marked optional or “do not memorize;” you do not need to study these sections for the exam. Also, sections on slides are marked with a note stating that “you don't need to memorize this.” Also, when tables contain more than ~5 items, I generally pick a few for you to know; these are denoted by yellow highlighting. Generally speaking, you do not need to study the course textbook unless there is something from the homework that you wish to review.

**What should I bring?** Bring a pencil and an eraser. You will need to place all other personal items on the floor.