Learning Objectives – Introductory Material
BE-410, Spring '06, Dr. C. S. Tritt

Introduction to Biomaterials

Be able to give a reasonable definition of what biomaterials are.

Be able to define failure in the context of biomaterials.

Be able to name 4 of the 6 typical functions of biomaterials described in lecture.

Be able to name 4 of the 6 general categories of materials used in biomedical applications as described in lecture.

Be able to name 3 subjects integral to the study of biomaterials.

Be able to list 3 of the 4 factors that influence the success of a particular application of a biomaterial described in lecture.

Be able to discuss at least one ethical issue related to biomaterial science and technology.

Surface Characterization and Imaging

Be able to name and describe in some detail 2 methods or devices used to characterize (but not image) surfaces.

Be able to name and describe in some detail 2 methods or devices used to image the microscopic (I guess this would be a hint) structure of surfaces.

Be able to explain why it is so important that a scale bar be placed on any microscopic image of a biomaterial.

Be able discussion an issue regarding enhancement and selection of biomaterial images.

Structure of Solids

Be able to name and describe the 5 types of atomic bonding discussed in lecture.

Be able to name and describe three types of crystal point defects (this may not be in your book).

Be able to name and describe two types of crystal line defects (this may not be in your book).

Be able to explain how crystal defects can influence the mechanical properties of materials (this may not be in your book).

Mechanical Properties

Be able to define mechanical stress, σ.

Be able to define mechanical strain, ε.

Be able to sketch and label the stress-strain behavior of a typical material.

Be able to describe how the stress-strain behavior of materials is measured.

Be able to define mechanical failure in the context of biomaterials.

Be able to explain what is meant by the term toughness in the context of materials science.

Be able to describe what mechanical behavior makes a material viscoelastic.

Be able to use a stress-time diagram to illustrate stress relaxation.

Be able to use a strain-time diagram to illustrate creep.

Be able to describe the Maxwell and Voigt mechanical models (these may not be discussed by name in your book).

Be able to explain what fatigue is in the context of material science.

Be able to define hardness in the context of materials science.

Other Properties

Be able to use the linear coefficient of expansion, α, to calculate thermal stresses and strains (this may not be in your book, but should have been covered in ME-207).

Be able to explain what is meant by the term piezoelectric effect.

Be able to state to what Beer's law relates.

Be able to name and describe the material property most directly related to ultrasound refection.