BIOMATERIALS

Spring Semester 2025 - 2026

3nd Assignment

Submission Date:
Wednesday, May 20, 2026

1. Tissue Response to Implants

Describe:

- The wound healing process.
- The body's response to implants.
- Factors affecting biocompatibility (e.g., toxicity, thrombogenicity).

2. A drug diffuses through a polymeric implant under a concentration gradient. We know:

- Diffusion coefficient: 2×10^{-9} m^2/s
- Concentration difference: 500 mol/m³
- Thickness: 0.002 m

a) Calculate the **diffusion flux**
b) Explain how changes in thickness and material structure affect drug release.

3. A metallic implant is subjected to a stress of 120 MPa. The elastic modulus of the material is 60 GPa.

a) Calculate the resulting **strain**
b) Compare this behavior with that of bone
c) Explain how differences in stiffness may lead to **stress shielding**