Milestone 3 (Team) – Cover Page

Team Number:

26

Please list full names and MacID's of all *present* Team Members.

Full Name:	MacID:
Eloise Nguyen	Nguyt126
Sohail Persaud	persas29
Rory Sucharov-Gluck	sucharor
Hassan Bokhari	bokharh

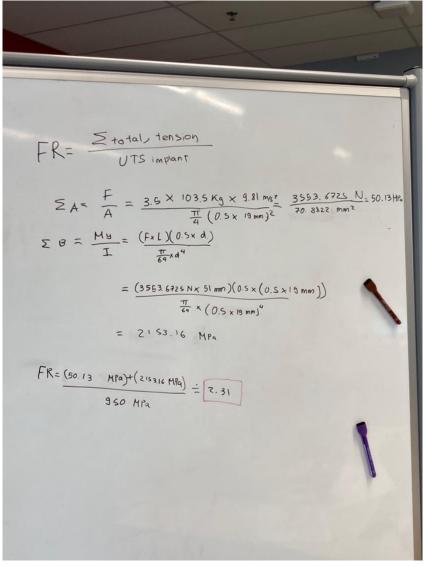
Any student that is *not* present for Design Studio will not be given credit for completion of the worksheet and may be subject to a 10% deduction to their DP-2 grade.

MILESTONE 3 (STAGE 2) – PRELIMINARY DESIGN ANALYSIS **FRACTURE RISK**

Team Number: 26

Calculate the fracture risk of the implant stem assuming a combined loading scenario. Don't forget to:

- → Compare tensile stress on the lateral side of the implant to the ultimate tensile strength of your assigned material
- → Show all of your work neatly and in detail (do not skip steps), include the correct number of significant digits, and correct units



MILESTONE 3 (STAGE 2) – PRELIMINARY DESIGN ANALYSIS FATIGUE LIFE

Team Number:

26

Calculate the fatigue life of your assigned material.

→ Show all of your work neatly and in detail (do not skip steps), include the correct number of significant digits, and correct units

Stress Amplitude = $\frac{2max - 2min}{2}$ $\frac{429.72MPa - (-429.72MPa)}{2} = 429.72MPa}{2}$ Looking at S-N anne, Fatigue life = 10^{5.25} Cycles Fmax = (103.5)(9.81)(30) = 30 460.03 N E max = Fmax = 30.460.03N 70.8822mm² = 429.72 MPa Fmin = - (103.5)(9.81)(30) = - 30 460.05 N Z Hin= -30 460.05 N 70.8822 mm = -429.72 MB

MILESTONE 3 (STAGE 2) – PRELIMINARY DESIGN ANALYSIS BONE STRESS REDUCTION

Team Number:



Calculate the magnitude of bone stress reduction after implant reconstruction. Don't forget:

- \rightarrow Calculations should not consider a combined loading scenario, like in Part 1 of this Milestone
- → Show all of your work neatly and in detail (do not skip steps), include the correct number of significant digits, and correct units

 $Treduc = Tcomp \cdot \left(\frac{2 \cdot Ebone}{Ebone + Eimplant}\right)^{\frac{1}{2}}$ F. (Z. Ebone Ebone + Eimplant) 2 from Previous question) $\frac{30,460.05N}{678.58mm^2} \left(\frac{2 \cdot 17GPa}{17GPa + 114GPa}\right)^{\frac{1}{2}}$ $=\frac{\pi}{4}\left(35^{2}\text{ mm}-19^{2}\text{ mm}\right)$ Oreduc = 22.9 MPa = 67 8.58 mm²