Exam 2 Review
Medical Physics -- PHYS 3330

The exam is on Friday, March 2, 2012, during the usual class time. It is a closed book exam, but you may use one (1) 3” × 5” card that you prepare before the exam. The topics below are a list of topics that we have covered in class. The exam will be limited to these topics, but may not cover all of them.

Biological effects of radiation
Surviving fraction curves
What is plotted?
Meaning of axes
Mathematical description of curves
Target concept
Probability of injury = p
Factors that affect p
Understand and use equation: \( P_x = \frac{p^x e^{-p}}{x!} = \frac{(kD)^x e^{-kD}}{x!} \)
Variation of survival curves with multiple targets
Multi-hit theory
Direct and indirect effects
Radiolysis of water
What is it?
What effects does it cause?
Effects of radiation on biological molecules
Modifiers of radiation effects (what are the modifications that are caused?)
Radiation type; effects of different LET
Oxygen concentration
Hyperthermia
Cell type and sensitivity (Law of Bergonie & Tribondeau)

Radiation detection
Gas-filled detectors
How is the signal produced? I.e., how do they work?
Types of detectors and their uses
Ionization chambers
Proportional counters
Geiger-Müller counter
Scintillation detectors
How is a gamma-ray interaction changed to a detector signal?
Gamma-ray spectrum for a scintillation detector
Solid-state detectors
How do they work?
Types of SS detectors and what do they detect?
Gamma ray spectrum for a HPGe detector
Neutron detectors
Types and how they work