

Physics 432, Medical Physics Syllabus Fall 2013

Location: ELL 161, 1:00 - 2:30 pm, Mon, Thurs

Date		Instr	Lec	Assign Due	Topic	
Sept	5	AJ	1		Review	Atomic structure, characteristic X-rays,
Sept	9	AJ	2		Radioactivity	Atomic mass, nuclear decay, radioactivity, half life, Attenuation coefficients., uses in medical physics
Sept	12	AJ	3		X-ray and γ interactions	Photoelectric effect, Compton effect, Pair production, Interaction coefficients, uses in medical physics
Sept	16	AJ	4		charged particle interactions.	Electron and proton stopping power, Bremsstrahlung production, uses of charged particles
Sept	19	AJ	5	A1 due	Dosimetry	Exposure and dose, charged particle equilibrium, cavity theory, dose measurement, ionization chambers, TLD, diodes, film etc.
Sept	23	AJ	6		Radiation generators, Biological effects of ionizing radiation	Linear accelerators, isotope production, LET, RBE, dose limits
Sept	26	MI	7		Interaction of Light with Matter I	Absorption and Emission of Photons and light scattering
Sept	30	MI	8		Interaction of Light with Matter II	Rayleigh scattering, Brillouin Scattering, Raman Scattering, Fluorescence and Phosphorescence
Oct	3	MI	9	A2 due	Use of spectroscopy in biomedical research I	Fluorescence spectroscopy, microscopy and imaging of cells and tissue Magnetic Resonance Spectroscopy (NMR, ESR), UV-vis Spectroscopy in biomedical research
Oct	7	MI	10		Use of spectroscopy in biomedical research II	Vibrational Spectroscopy (Infrared, Raman, Terahertz) in biomedical research
Oct	10	MI	11		New Approaches in Biomedical Spectroscopy and Imaging	Fiber-Optic-Linked Raman and Resonance Raman Spectroscopy, Surface-Enhanced Raman Sensing, chemical imaging, Application of spectroscopy in Nanotechnology
Oct	17	MI/AJ	12		Mid-Term	

Oct	21	WB	13	A3 due	Tour of VIC (4-5PM)	
Oct	24	DW	14		Computed Tomography (CT)	System configuration and evolution, x-ray source, scintillation detectors, image reconstruction
Oct	28	DW	15		Nuclear Medicine 1	Isotope production: I-131, Tc-99, FdG; principles of measurement
Oct	31	DW	16		Nuclear Medicine 2	Radionuclide imaging using Gamma camera, SPECT, PET: isotopes, detectors, sampling, random and true coincidences
Nov	4	DW	17	A4 due	Ultrasound	Principles and operation
Nov	7	WB	18		Radiography 1	Image formation, image quality, film/screens
Nov	14	WB	19		Radiography 2	Mammography, angiography, digital imaging
Nov	18	WB	20		Magnetic Resonance Imaging (MRI)	NMR phenomenon, biological tissue discrimination, mapping of MR signals in 3D
Nov	21		21	A5 due	Current Research Topics	
Nov	25		22		Student Presentations	
Nov	28		23		Student Presentations	
Dec	2		24			