

NUPH 550: Introduction to Positron Emission Tomography (PET)

2 Credit Hours - Spring Semester

Course Outline

Week

- 1 - Principles of Radionuclide Imaging/Tracer Principle/Specific Activity
- Gamma Imaging and Single Photon Emission Computed Tomography (64-70; 74-77; 242-284)
- 2 - Principles of Positron Emission Tomography (PET): Image Acquisition (77-79; 116-122)
- PET Camera: Coincidence Counting and Selection of Detectors (pp. 285-296; 305-306)
- **Let's Play PET: Nuclear Physics and Tomography** module (<http://www.crump.ucla.edu/lpp>)
- 3 - Attenuation of Gamma Photons; Transmission Scanning & Attenuation Correction (14-16, 297-299)
- Positron-Emitting Nuclides (p.286)
- 4 - Principles of Cyclotron Operation/Radionuclide Production (157-160)
- **Let's Play PET- Radioisotope Production** module
- 5 - Principles of Perfusion Imaging (*Review from NUPH 530*)
- Synthesis & Applications of ^{15}O -Radiopharmaceuticals (p. 72)
- 6 - *Quiz 1 (30 minutes, 50 points)*
- Synthesis & Applications of ^{15}O -, ^{13}N -, and ^{11}C -Radiopharmaceuticals (pp. 172-173)
- 7 - Synthesis & Applications of ^{11}C -Radiopharmaceuticals, continued
- Synthesis & Applications of ^{18}F -Radiopharmaceuticals (pp. 173-174)
- 8 - Synthesis & Applications of ^{18}F -fluorodeoxyglucose (pp. 173-174)
- Applications of ^{18}F -fluorodeoxyglucose & Other ^{18}F -Radiopharmaceuticals
- 9 - Synthesis of ^{18}F -FDG: Automation and Quality Control (pp. 175-177; 180-182)
- GC and HPLC as tools for purification and quality assurance
- **Let's Play PET: Synthesis of Radiolabeled Compounds** module
- 10 - **Let's Play PET: Clinical PET – Cardiology** (pp. 405-411; 436-439)
- **Let's Play PET: Clinical PET - Cardiology Clinical Case Studies**
- 11 - Accepted Clinical Applications of PET
- 12 - *Quiz 2 (30 minutes, 50 points)*
- **Let's Play PET:: Clinical PET - Neurology and Neurology Case Studies** (pp. 328-344; 347-8)
- **Let's Play PET:: Clinical PET - Oncology and Oncology Case Studies** (pp. 309-327)
- 13 - Quantitation of Physiological Parameters with PET: Tracer Kinetic Modeling
- **Let's Play PET: Principles of Tracer Modeling** module; Complete *Clinical Case Studies*
- 14 - Generator-Produced Radionuclides (^{82}Rb , ^{68}Ga , ^{62}Cu).(pp. 160-164)
- Regulatory Issues in PET (180-182)
- 15 - cGMP Standards for Clinical PET Radiopharmaceuticals
- TBA *Tour of PET Facility at the Indiana University School of Medicine (OPTIONAL ATTENDANCE)*
- 16- **Final Exam** (100 points)

(Reading assignments from: *Nuclear Medicine and PET, 5'th Edition*
P.E. Christian, D.R. Bernier, J.K. Langan, editors, Mosby, St. Louis, 2004.)