

## **Course Syllabus**

University of Nevada, Las Vegas  
Department of Health Physics  
Nuclear Medicine Program

Course	Nuc 480 Positron Emission Tomography
Credit Hours	3
Instructor	Dr. Art Meyers
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### COURSE DESCRIPTION

This course is designed to provide students an overall understanding of the basic principles of PET and PET/CT Imaging.

Aspects of PET and PET/CT imaging that will be discussed include; Instrumentation, physics, Pet production, glucose metabolism, Quality Control, reimbursement and radiation safety concerns. Pet and Pet/CT testing procedures and diagnostic assessment in the areas of Oncology, Neurology and Cardiology will be examined. The diagnostic value and advantages of Pet and Pet/CT will be presented, along with an exploration into future trends.

### Course Objectives

1. Understand the basic physics behind Pet and Pet/CT
2. Understand the basic theory of Pet and Pet/CT
3. Examine different types of Instrumentation used in Pet
4. Understand the advantages of Pet and Pet/CT compared to SPECT imaging and other diagnostic modalities
5. Gain an appreciation for and an overall understand of the concerns for radiation safety when using Pet radiopharmaceutical
6. Understand the various diagnostic tests using Pet and Pet/Ct including Oncology, Neurology and Cardiology
7. Know and understand the various radiopharmaceuticals used in Pet
8. Understand the methodology and need for various QC instrumentation in Pet and Pet/CT
9. Understand the use and biodistribution of glucose and understand the use of Na-F18, and concerns of Brown fat
10. Understand the basic principles of radiography and CT and MSCT
11. Understand the principle of Pet production related to negative ion cyclotrons
12. Examine the current and future concerns for reimbursement in Pet and Pet/CT

13. Examine and appreciate the possibilities and implications of  
Pet and Pet/CT on the field of Nuclear Medicine.

Grading

Midterm Examination	40%
Final Examination -	40%
Attendance and participation	20%
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	100%

Text Books

No specific text is required but numerous books already required for the nuclear medicine program and other supplement texts listed here will be utilized in the course of instruction

Principles and Practices of PET and PET/CT, Wahl. R  
Lippincott, Williams and Wilkins, second edition 2009  
PET/CT and Molecular Imaging, 5<sup>th</sup> Annual Symposium  
Stanford University  
Practical PET Imaging: Focus on PET and PET/CT  
Educational Symposium  
CT for Nuclear Medicine Professional  
SNM, Learning Center  
Nuclear Medicine Technology Procedures and Quick References  
Shackett, 2<sup>nd</sup> Edition, Lippincott. 2007  
Nuclear Medicine and PET/CT Technology and Techniques  
Christian. P , Mosby 2008  
Clinical Positron Emission Tomography, Schulthess. G  
Lippincott, 2004

## Tentative Weekly Schedule

- Week 1 - Course Introduction including an overview of Course Objectives, Pet Physics discussion of the annihilation reaction, Glucose Metabolism and its function and use in PET imaging and Introduction to basic Instrumentation concerns
- Week 2- The use of NaF-18 bone imaging as a superior agent to current Tc-99mMDP imaging, and pitfalls of recent research regarding FDG Uptake in Brown fat
- Week 3- Instrumentation in Pet including an analysis of various camera types, crystal comparisons, and basic components of dedicated PET systems
- Week 4- PET instrumentation and basic quality control used in PET including purpose and uses of blank scans, normalization, absolute activity calibrations, attenuation correction and field uniformity
- Week 5 –PET Cyclotron Production, including basic schematic and understanding of negative ion production
- Week 6 – Pet Oncology including a detailed analysis of the basic procedure and discussion of types of cancers that are commonly imaged in PET and PET/CT
- Week 7 – Pet Cardiology, discussion of viability imaging, various pharmaceutical options and basic procedure used for imaging
- Week 8 - Midterm
- Week 9 - Pet Neurology including imaging protocols and radiopharmaceuticals used for various neurological disorder and mental illnesses assessed in Pet and PET/CT
- Week 10- Pet/CT Reimbursement, understand the historic development and coding system, and implication of reimbursement, Review for Examination
- Week 11- Aspects of CT imaging as related to PET/CT, basic instrumentation of CT system, comparison of Ct and PET, discussion of complementary aspects, complete fusion imaging systems, registration of images
- Week 12 – Concept of Multislice CT (MSCT) and Instrumentation of PET/CT
- Week 13 - Pet/CT Continuation including aspects of quality control such as water phantoms, tube warm-up, air calibration and water phantom checks of slice thickness accuracy and positioning

Week 14 – Pet/CT and future outlook for fusion imaging  
including SPECT/CT, Molecular tagging and optical  
imaging

Week 15 – Review and complete all other topics on PET/CT

Week 16 - Final Examination

## **UNIVERSITY POLICIES:**

**Academic Misconduct** – Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's function as an educational institution.

An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the Student Academic Misconduct Policy (approved December 9, 2005) located at: <http://studentconduct.unlv.edu/misconduct/policy.html>.

**Copyright** – The University requires all members of the University Community to familiarize themselves with and to follow copyright and fair use requirements. You are individually and solely responsible for violations of copyright and fair use laws. The university will neither protect nor defend you nor assume any responsibility for employee or student violations of fair use laws.

Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found at: <http://www.unlv.edu/provost/copyright>.

**Disability Resource Center (DRC)** – The UNLV Disability Resource Center (SSC-A 143, <http://drc.unlv.edu/>, 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available to you. If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to the instructor during office hours so that you may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach the instructor before or after class to discuss your accommodation needs.

**Religious Holidays Policy** – Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor no later than the end of the first two weeks of classes, **September 22, 2015** of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

**Incomplete Grades** - The grade of I – Incomplete – can be granted when a student has satisfactorily completed three-fourths of course work for that semester/session but for reason(s) beyond the student’s control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade. Please note – Students cannot enroll in other nursing courses if they have an incomplete (I) in a course that is designated as a prerequisite to that course. (Per School of Nursing Policy C-12).

**Tutoring** – The Academic Success Center (ASC) provides tutoring and academic assistance for all UNLV students taking UNLV courses. Students are encouraged to stop by the ASC to learn more about subjects offered, tutoring times and other academic resources. The ASC is located across from the Student Services Complex (SSC). Students may learn more about tutoring services by calling 702- 895-3177 or visiting the tutoring web site at: <http://academicsuccess.unlv.edu/tutoring/>.

**UNLV Writing Center** – One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student’s Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: <http://writingcenter.unlv.edu/>

**Rebelmail** – By policy, faculty and staff should e-mail students’ Rebelmail accounts only. Rebelmail is UNLV’s official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students’ e-mail prefixes are listed on class rosters. The suffix is always [@unlv.nevada.edu](mailto:@unlv.nevada.edu). Emailing within WebCampus is acceptable.

**Library Resources** –Students may consult with a librarian ([www.library.unlv.edu/consultation](http://www.library.unlv.edu/consultation)) about research needs. For this class, the subject librarian is Xan Goodman. UNLV Libraries provides resources to support students’ access to information. Discovery, access, and use of information are vital skills for academic work and for successful post-college life. Access library resources and ask questions at [www.library.unlv.edu/](http://www.library.unlv.edu/)