CHATTANOOGA STATE COMMUNITY COLLEGE
DIVISION OF NURSING AND ALLIED HEALTH
COURSE SYLLABUS
PET 200 Positron Emission Tomography

Class Hours:       Online       Credit Hours:  3
Laboratory Hours:  0
Instructors: Dusty York M.A. Ed., ARRT(N), CNMT, PET and
Office hours are Monday through Friday from 1:00-4:00pm. Please call ahead to ensure that we
will be in the office as clinic visits and meetings may conflict with this schedule.

Contact Information:
Dusty York Phone Number (423)697-3335       Leesa Ross Phone Number
(423)697-3331
E-mail: Dusty.York@chattanoogastate.edu      E-mail: Leesa.Ross@chattanoogastate.edu
Fax:     (423)697-3324

Catalog Course Description:
This course is designed to provide students with a cognitive foundation in positron emission
tomography (PET). The relationships between physiology, pathophysiology, radiochemistry,
radiobiology, instrumentation, and patient care techniques in order to perform PET imaging
procedures in neurology, cardiology, and oncology are discussed. Radiation protection and
physics, with focus on the positron, is discussed in detail.

Entry Level Standards:
Student must meet minimum entrance requirements of ARRT(N) or CNMT, and/or ARRT(RT)

Prerequisite:
Completion of a Radiologic Technology program or Nuclear Medicine program AND certification
in one of these areas.

Corequisite(s):
None

Textbook(s) and Other Reference Materials Required for the Course:
1. Online Materials as posted.
2. NUCLEAR MEDICINE and PET/CT TECHNOLOGY AND TECHNIQUES, 6th Edition. Paul E.

Supplemental Text(s) (These text are not required but may provide additional information of use
to the student)
1. ESSENTIALS OF NUCLEAR MEDICINE PHYSICS; Rachel A. Powsner and Edward R.
2. CLINICAL ATLAS OF PET: WITH IMAGING CORRELATION, Michael S. Kipper and Marie
3. PRACTICAL MATHEMATICS IN NUCLEAR MEDICINE TECHNOLOGY. Patricia Wells.
   Society of Nuclear Medicine, 1999.
4. POSITRON EMISSION TOMOGRAPHY: BASIC SCIENCE, Dale L. Bailey, David W.
I. STUDENT LEARNING OUTCOMES:
The required competencies and student outcomes/instructional objectives in this course are utilized to meet the NMT Program overall mission to provide education and training experiences appropriate for the development of competent professional technologists in the use of radionuclids for diagnostic and therapeutic procedures. For more information on this, please see the NMT Program Student Handbook.

Institutional Student Learning Outcomes:
The knowledge, skills, and attitudes that a community college graduate is expected to have developed include:

ISLO1. Communication: Includes speaking, writing and graphic presentation skills
ISLO2. Critical Thinking: Purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual, considerations upon which that judgment is based.
ISLO3. Information and Technology Skills: Includes use of computers, online learning, information seeking, use of new technologies
ISLO4. Global/Cultural Awareness: Includes awareness of how societal and cultural differences affect an individual’s life, focusing on diversity and collaboration
ISLO5. Competency in a specialty: The specialty-specific competencies that each graduate of the program is expected to achieve

Program Student Learning Outcomes Assessed in this Course: At the completion of the positron emission tomography course, the student will be prepared to perform the following.

PSLO1: Acquire the didactic base in positron emission tomography in order to make critical thinking decisions as a PET technologists.

CSLO1: Demonstrate knowledge of the physics and instrumentation of PET.
CSLO2: Demonstrate a thorough understanding of PET Radiopharmacology and Radiochemistry.
CSLO3: Demonstrate a thorough understanding of radiation protection procedures and policies according to the NRC.
CSLO4: Demonstrate a general understanding of computerized tomography (CT) and its role in PET imaging.
CSLO5: Demonstrate a thorough understanding of quality control in a PET department.
CSLO6: Demonstrate a general knowledge of oncology, cardiac, and neurology applications, indications, and procedures in PET.
CSLO7: Demonstrate knowledge of data analysis and artifact identification in PET imaging.
CSLO8: Demonstrate knowledge of federal regulations and reimbursement as they pertain to PET imaging.

II. Indicators
1. Discuss the history of PET.
2. Describe the general theory of operation of a PET scanner.
3. Define basic terminology associated with PET imaging.
4. Define the parts of the atomic model.
5. Discuss radioactive decay processes and how they relate to PET.
6. Discuss the interaction of radiation with matter.
7. Differentiate and list various types of radiation detectors.
8. Demonstrate understanding of radiopharmaceutical localization and distribution mechanism in target and non-target organs.
9. Identify quality control procedures and parameters to determine radiochemical, radionuclide, and radiopharmaceutical purity, pH, stability, and presence of pyrogens.
10. Demonstrate understanding of the production process for PET radiopharmaceuticals.
11. Identify regulatory compliance issues related to storage, disposal, labeling, record-keeping, clean up, handling, and shipping of radiopharmaceuticals.
12. Define ALARA and how it pertains to radiation safety.
13. Describe the general theory and basic terminology of a CT scanner as well as its role in PET.
14. Evaluate the use of contrast agents with respect to indications, contraindications, dose calculations, administration routes, and allergic reactions.
15. Identify, describe, and compare the various non-imaging quality control procedures and standards.
16. Identify, describe, and compare quality control requirements and standards on a PET scanner and interpret results.
17. Describe quantitative techniques used in PET imaging.
18. Describe the various attenuation correction methods utilized in PET imaging.
19. Identify and analyze PET imaging artifacts.
20. Identify regulatory agencies governing the operation of PET departments.

III. Teaching/Learning Methods:
1. Online Lecture
   Class lectures will center on assigned reading material. A set of lecture notes with salient information will be posted each week. These lecture notes are not all inclusive. Test material may be derived from any of the assigned reading material or from the lecture. The technical procedures from Positron Emission Tomography are to be considered the appropriate technique for test purposes unless another technique is presented in the lecture notes and stated to be the technique of choice.
2. Reading assignments:
   The student must be prepared for class. The reading assignments will be the basis for online discussions; therefore, the student must complete all reading assignments and notes before they are discussed in class.
3. Student projects
   Special projects will be assigned during this course as deemed by the instructor.
4. Pop quizzes
   The quizzes may consist of any number of questions. The quizzes will be over any material which has been assigned regardless of whether or not the topic has been discussed in lecture.
5. Class Participation
   Each student will receive a class participation grade based on the student’s participation, and contribution to online discussions.

IV. Instructional Activities
1. Introductory Homework on History and Theory of PET
2. Instrumentation Homework
3. Radiation Safety Homework
4. Radiopharmacy Homework
5. Computerized Tomography Homework
6. Quality Control Homework
7. Oncology Homework Part 1
8. Oncology Homework Part 2
9. Cardiac PET Homework
10. Neurologic PET Homework
11. Data Analysis Homework
V. Assessments:
- Exam 1: Exam one is a multiple choice exam that covers material from weeks 1-3.
- Exam 2: Exam two is a multiple choice exam that covers material from weeks 4-6
- Exam 3: Exam three is a multiple choice exam that covers material from weeks 7-10
- Final Exam: The Final exam is a cumulative multiple choice exam that covers all material presented in PET 200.

VI. Grading Scale:
Grades will be based on objective tests consisting of registry type multiple choice questions as well as discussion questions. Clinical assignments as well as a project will also contribute to the final grade. A score of 70% will be the minimum for a passing grade. The individual components will be weighted as follows:

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<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Exam 1</td>
<td>20%</td>
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<tr>
<td>Exam 2</td>
<td>20%</td>
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<tr>
<td>Exam 3</td>
<td>20%</td>
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<tr>
<td>Final Exam</td>
<td>30%</td>
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<tr>
<td>TOTAL</td>
<td>100%</td>
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The grading scale is as follows:

- 90-100 A
- 80-89 B
- 70-79 C
- 65-69 D
- Below 65 F
VII. Schedule:

Asynchronous 14-Week Format:
Chattanooga State online classes are designed in a fourteen week format to be accessed anytime of the day or night and from any location connected to the Internet.

<table>
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<tr>
<th>DATE</th>
<th>TOPIC</th>
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| **Week 1 August 27** | 1) Course Orientation  
2) Introduction to PET  
   a) History of PET  
   b) Theory of operation |
| **Week 2 September 4** | 1) Physics and Instrumentation  
   a) Review the Atomic model  
   b) Radioactive Decay  
   c) Interaction of radiation with matter  
   d) Radiation detectors |
| **Week 3 September 10** | 1) Radiopharmacology  
   a) Radionuclide production  
   b) Radiochemistry  
   c) Tracer Kinetics  
   d) Methods of localization |
| **Week 4 September 17** | 1) Radiation Protection in PET  
   a) Occupational and Public Exposures  
   b) Time, Distance, and Shielding  
      i) HVL  
      ii) Inverse Square Law  
   c) Special Considerations  
      i) Pregnancy  
      ii) Pediatric doses |
| **Week 5 September 24** | 1) Computerized Tomography in PET  
   a) An introduction to CT  
   b) Physics and instrumentation  
   c) Attenuation uses  
   d) Contrast |
| **Week 6 October 1** | 1) PET Quality Control  
   a) Non Imaging QC (Dose calibrator)  
      i) Accuracy  
      ii) Linearity  
      iii) Constancy  
      iv) Geometry  
   b) Scanner QC  
      i) Characterization and Correction Calibrations  
      ii) Quality control failures |
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<tr>
<th>Week 7 October 8</th>
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<tr>
<td>1) Oncology Applications</td>
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<tr>
<td>a) Radionuclides</td>
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<tr>
<td>b) Imaging Protocols</td>
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<tr>
<td>c) Clinical Indications</td>
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<tr>
<th>Week 8 October 15</th>
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<tbody>
<tr>
<td>1) Oncology Applications cont.</td>
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<tr>
<td>a) Normal variations</td>
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<tr>
<td>b) Monitoring response to therapy</td>
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<tr>
<td>c) Future Trends</td>
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<tr>
<th>Week 9 October 22</th>
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<tr>
<td>1) Cardiac Applications</td>
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<tr>
<td>a) Cardiac anatomy and physiology</td>
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<tr>
<td>b) Cardiac Radiotracers</td>
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<tr>
<td>i) production</td>
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<tr>
<td>c) PET myocardial perfusion imaging</td>
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<tr>
<td>i) Imaging protocols</td>
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<tr>
<td>ii) Stress protocols (ASNC guidelines)</td>
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<tr>
<th>Week 10 October 29</th>
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<tbody>
<tr>
<td>1) Cardiac Applications cont.</td>
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<tr>
<td>a) Evaluating myocardial metabolism</td>
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<tr>
<td>i) Imaging protocols</td>
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<th>Week 11 November 5</th>
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<tbody>
<tr>
<td>1) Neurology Applications</td>
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<tr>
<td>a) Radiotracers</td>
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<td>b) Imaging Protocols</td>
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<td>c) Tumor evaluation</td>
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<td>d) Evaluating degenerative changes</td>
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<th>Week 12 November 12</th>
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<tr>
<td>1) Data analysis in PET imaging</td>
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<td>b) Quantitative techniques</td>
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<td>c) Reconstruction Algorithms</td>
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<td>d) Attenuation Correction Methods</td>
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<tr>
<th>Week 13 November 19</th>
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<tbody>
<tr>
<td>1) Image Artifacts</td>
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<th>Week 14 November 26</th>
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<tr>
<td>1) Federal Regulations and Reimbursement</td>
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<tr>
<td>a) Medicare approved indications</td>
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<td>b) Review of Federal regulations</td>
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<th>Week 15 December 3</th>
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<tr>
<td>1) Special Topics</td>
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<th>Week 16 December 10</th>
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<td>I. Final Exam</td>
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In addition to the reading assignments listed, the student will also be required to access a series of handouts containing lecture notes, worksheets, diagrams, and published articles, which are
posted online. The student will be responsible for the online material. These materials are not supplemental to the course content, but essential components.

VIII. Instructor Policies:

Plagiarism, cheating, assuming another student’s identity, and other forms of academic dishonesty are prohibited and will result in immediate dismissal from the Program. Students guilty of academic misconduct, either directly or indirectly through participation or assistance, are immediately responsible to the instructor of the class. In addition to other possible disciplinary sanctions which may be imposed through the regular institutional procedures as a result of academic misconduct, the instructor will assign an “F” for the course, thus resulting in dismissal from the program.

If the student believes that he or she has been erroneously accused of academic misconduct, the student may appeal the case through the procedures described in the College Catalog.

The course will be evaluated to determine if the stated objectives are being achieved by monitoring each student’s test results, final grades, class discussion and success rates on national exams. The objectives of this course are based on the essential guidelines provided by the ARRT and NMTCB. The examinations reflect mastery of these objectives; and therefore, provide a reasonable means of determining whether the stated objectives are being met. If it is determined that the objectives are not being met, the course content will be altered to better meet the student’s needs.

IVIV. College Policies

This class is governed by the policies and procedures stated in the current Chattanooga State Student Handbook. Additional or more specific guidelines may be found in the NMT Program Student Handbook, as well as the Allied Health Student Handbook. The instructor reserves the right to modify this syllabus in writing during the course of the semester

ADA Statement

Students who have educational, psychological, and/or physical disabilities may be eligible for accommodations that provide equal access to educational programs and activities at Chattanooga State. These students should notify the instructor immediately, and should contact Disabilities Support Services (Student Center, phone 697-4452) within the first two weeks of the semester in order to discuss individual needs. The student must provide documentation of the disability so that reasonable accommodations can be requested in a timely manner. All students are expected to fulfill essential course requirements in order to receive a passing grade in a class, with or without reasonable accommodations.

Disruptive Students

The term “classroom disruption” means behavior a reasonable person would view as substantially or repeatedly interfering with the activities of a class. A student who persists in disrupting a class will be directed by the faculty member to leave the classroom for the remainder of the class period. The student will be told the reason(s) for such action and given an opportunity to discuss the matter with the faculty member as soon as practicable. The faculty member will promptly consult with the division dean and the college judicial officer. If a disruption is serious and other reasonable measures have failed, the class may be adjourned and the campus police summoned. Unauthorized use of any electronic device constitutes a disturbance. Also, if a student is concerned about the conduct of another student, he or she should please see the teacher, department head, or division dean.

Affirmative Action

Students who feel that he or she has not received equal access to educational programming should contact the Affirmative Action Officer, at 697–4457.
Academic Integrity/Academic Honesty
In their academic activities, students are expected to maintain high standards of honesty and integrity. Academic dishonesty is prohibited. Such conduct includes, but is not limited to, an attempt by one or more students to use unauthorized information in the taking of an exam, to submit as one’s own work, themes, reports, drawings, laboratory notes, computer programs, or other products prepared by another person, or to knowingly assist another student in obtaining our using unauthorized materials. Plagiarism, cheating, and other forms of academic dishonesty are prohibited. Students guilty of academic misconduct, either directly or indirectly through participation or assistance, are immediately responsible to the instructor of the class. In addition of other possible disciplinary sanctions, which may be imposed through the regular institutional procedures as a result of academic misconduct, the instructor has the authority to assign an “F” or zero for an activity or to assign an “F” for the course.

The instructor reserves the right to modify this syllabus in writing anytime during the course of the semester.

This course is governed by the policies and procedures as stated in the current Chattanooga State Student Handbook. Additional or more specific guidelines may apply.
STUDENT ACKNOWLEDGEMENT STATEMENT
Please Fax to (423)697-3324 or scan and email to instructor by second week of class.

By my signature below, I attest that I have received and reviewed the PET 200, Positron Emission Tomography, course syllabus.

I understand the course requirements with regard to attendance, grading, objectives, course policies and procedures, including those regarding my conduct in this course. I agree to be held accountable for my performance and actions according to such requirements and also agree to the provisions of the Syllabus Guidelines Statement as written within the course syllabus.

I am also aware of the credit hours and tuition costs associated with the enrollment into this course.

Student Name (Please Print): ____________________________________________________________

Student Signature: _______________________________ Date: ______________