



# BROWARD COMMUNITY COLLEGE COURSE OUTLINE

**LAST REVIEW:** 2008-2009      **NEXT REVIEW:** 2013-2014      **STATUS:** A  
*(i.e. 2003-2004)*      *(i.e. 2008-2009)*      *(A, I, D)*

**COURSE TITLE:** Nuclear Medicine Clinical Education III

**COMMON COURSE NUMBER:** NMT 1824

**CREDIT HOURS:** 3

**CONTACT HOUR BREAKDOWN**  
*(per 16 week term)*

**CLOCK HOURS:**  
*(Voc. Course ONLY)*

Lecture:                      Lab: 0

Clinic: 384                      Other: 0

**PREREQUISITE(S):** NMT 1312 and NMR 1814

**COREQUISITE(S):** None

**PRE/COREQUISITE(S):**

## **COURSE DESCRIPTION:**

Second in a five-course sequence of supervised clinical instruction in nuclear medicine technology. In addition to topics covered in NMT 1814, the student is expected to perform routine quality control and quality assurance procedures. Students must complete patient care competencies as determined by the program.

## **UNIT TITLES**

- 1.0 Introduction to the Nuclear Medicine Facility
- 2.0 Non-emergency Patient Care and Preparation for
- 3.0 Emergency Patient Care
- 4.0 Professional Behavior and Concern for the Patient
- 5.0 Administrative/Management Functions
- 6.0 In Vivo Imaging Procedures
- 7.0 Nuclear Instrumentation
- 8.0 Scintillation Counters and Probes
- 9.0 Gas-Filled Detectors



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## ASSESSMENT:

Please provide a brief description (250 characters maximum) that details how students will be assessed on the course outcomes.

1. Complete clinical evaluation forms at midterm and end of term
2. Achieve 80 points out of a possible 100 points to successfully challenge a procedure
3. Clinical Conferences with instructors on site

*\*\*\* Complete the following only if course is seeking general education status \*\*\**

## GENERAL EDUCATION Competencies and Skills \*:

Please highlight in green font all Competencies/Skills from the list below that apply to this course. In the box to the right of the Competency/Skill, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 5.12) that apply.

1. Read with critical comprehension	
2. Speak and listen effectively	
3. Speak and listen effectively	
4. Think creatively, logically, critically, and reflectively	
5. Demonstrate and apply literacy in its various forms: <i>(highlight in green ALL that apply)</i>	
6. Apply problem solving techniques to real-world experiences	
7. Apply methods of scientific inquiry	
8. Demonstrate an understanding of the physical and biological environment and how it is impacted by human beings	
9. Demonstrate an understanding of and appreciation for human diversities and commonalities	
10. Collaborate with others to achieve common goals.	
11. Research, synthesize and produce original work	
12. Practice ethical behavior	
13. Demonstrate self-direction and self motivation	
14. Assume responsibility for and understand the impact of personal behaviors on self and society	
15. Contribute to the welfare of the community	

*\* General Education Competencies and Skills endorsed by '05-'06 General Education Task Force*



**Common Course Number: NMT 1824**

**Unit 1 Introduction to the Nuclear Medicine Facility**

**General Outcome:**

**1.0 The student shall be able to demonstrate an awareness of general clinical site operation and function.**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 1.1 Describe the position of the nuclear medicine service in the overall table of organization of the institution.
- 1.2 Name the major divisions within the department and describe their function and location.
- 1.3 Describe the personnel policies of the institution relevant to students.
- 1.4 Quote the "code" numbers used in the hospital and state the emergency dialing procedures for fire, cardiac arrest, radiation safety officer, security and other numbers of significance.
- 1.5 Locate and demonstrate the operation of emergency equipment within the nuclear medicine department.
- 1.6 Describe departmental procedures for patient scheduling, dose administration, room assignments, image, data, and report processing, patient record filing systems and retrieval of previous reports/films.
- 1.7 Describe the physical layout of the entire hospital and the system used to locate patient rooms, wards, offices and patient holding areas.
- 1.8 Describe the departmental daily survey routines and regulations for storage, waste disposal and general supplies access.
- 1.9 Describe how to use the telephone system in the department.



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**Unit 2 Non Emergency Patient Care and Preparation for Procedures**

**General Outcome:**

**2.0 The student shall be able to demonstrate an understanding of non emergency procedures.**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 2.1 Use correct body mechanics and support holds when moving or assisting patients.
- 2.2 Use side rails or stretcher/wheelchair straps on patients as appropriate.
- 2.3 Monitor the disoriented, unconscious, sedated, or pediatric patient.
- 2.4 Provide for patient comfort before, during and after the nuclear medicine procedure.
- 2.5 Use correct medical asepsis techniques during venipuncture procedures.



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## **Unit 3** Emergency Patient Care

### **General Outcome:**

**3.0 The student shall be able to demonstrate an understanding of Emergency Patient Care.**

### **Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 3.1 Determine vital signs as needed, including blood pressure, pulse, respiratory rate and temperature.
- 3.2 Recognize an emergency that requires immediate notification of a physician and make the proper notification.
- 3.3 Recognize an emergency that requires immediate notification of the hospital "code" team and make the proper notification.
- 3.4 Perform Cardiopulmonary resuscitation techniques appropriately, if necessary.
- 3.5 Find and assist with the use of the emergency cart as appropriate.
- 3.6 Maintain life support equipment as appropriate.
- 3.7 Provide appropriate care in response to patient seizures, hemorrhage and/or fainting.



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**Unit 4 Professional Behavior and Concern for the Patient**

**General Outcome:**

**4.0 The student shall be able to demonstrate an understanding of professional behavior.**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 4.1 Welcome the patient to the department, introducing yourself and addressing the patient by name.
- 4.2 Address patients, families, co-workers and hospital personnel by appropriate names or titles.
- 4.3 Demonstrate no ridiculing, degrading, or discriminatory attitudes, comments or behaviors in the clinical facility.
- 4.4 Avoid the display of emotional reactions such as distaste, disgust and/or surprise.
- 4.5 Do not discuss anything confidential or potentially alarming to the patient within the patient's hearing.
- 4.6 Refrain from discussion of patients with colleagues in patient areas and/or in any way that is not pertinent for relevant to the procedure or patient care.
- 4.7 Prevent unnecessary exposure of the patient's body.
- 4.8 Work proficiently and schedule carefully in order to minimize patient waiting periods as much as possible.



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**Unit 5 Administrative/Management Functions**

**General Outcome:**

**5.0 The student shall be able to demonstrate an understanding of management within a nuclear medicine department.**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 5.1 Inventory supplies and determine when to restock routine items as well as radiopharmaceuticals and/or radioassay kits that have specific shelf lives.
- 5.2 Assist with completing purchase orders and interacting with suppliers of various materials
- 5.3 Interact with hospital and departmental staff to schedule patients studies effectively, including determination of the correct sequence for multiple procedures, both in nuclear medicine and in radiology.
- 5.4 Maintain appropriate records of patient doses, quality control procedures, radioactive waste disposal, patient reports, film reports and all other records required by the hospital, JCAHO, NRC or licensing bodies.
- 5.5 Maintain and update a departmental procedure manual.
- 5.6 Develop a personal procedure manual to reflect the level of knowledge of procedures performed in the facility.



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**Unit 6 In Vivo Imaging Procedures**

**General Outcome:**

**6.0 The student shall be able to demonstrate an understanding of In Vivo imaging procedures.**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 6.1 Perform the following tasks associated with routine imaging procedures:
  - a. review requisition for completeness of information
  - b. retrieve and/or prepare patient file
  - c. identify relevant data from medical records and records on requisition as appropriate
  - d. obtain positive patient identification, conduct patient interview and explain study (obtain formal consent when needed)
  - e. establish whether the patient has undergone the necessary pre-examination procedures when appropriate
  - f. determine whether the patient has received any medication or had any examination that would interfere with or contraindicate the nuclear medicine study
  - g. take appropriate corrective action or make appropriate notation on requisition if patient has either not undergone necessary pre-examination procedures for has had any medication or examination that would interfere with the nuclear medicine study
  - h. prepare patient and/or instruct patient as to any particular preparation necessary for the imaging procedure
  - i. calculate the correct radiopharmaceutical dose to be administered
  - j. determine radiopharmaceutical administration time and time at which imaging should be performed post-administration
  - k. set up administration tray and prepare the correct radiopharmaceutical in the appropriate dosage.
  - l. correctly administer the radiopharmaceutical according to procedure protocol where permitted by law or policy
  - m. select instrument, collimator and auxiliary equipment for the study and determine that all equipment is functioning properly
  - n. correctly select and adjust instrument parameters for the images as each vie is performed
- 6.2 When preparing for cisternography, set up the injection tray and assist in preparing and maintaining a sterile field for intrathecal injection by the physician.
- 6.3 When performing a lung ventilation study, set up and determine the functional status of the trap or special ventilatory system to be used and use it correctly during the procedure.



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**Unit 6 In Vivo Imaging Procedures continued**

- 6.4 When performing a cystography procedure, explain the study to the patient and/or parents of a pediatric patient at a level that can be understood, administer the appropriate dosage and perform the study according to department criteria.
- 6.5 When performing cardiac stress testing, correctly place ECG leads and use and calibrate auxiliary equipment, including ECG machine and exercise/stress equipment.
- 6.6 When performing cardiac stress testing, recognize and correctly respond to signs and symptoms of patient stress. Note: student should not be expected to participate in stress testing without the presence/assistance/supervision of a physician.
- 6.7 When performing cardiac stress testing with drugs, properly calculate and prepare stressor and antidote rugs and recognize symptoms indicating need for an antidote to the stressor.
- 6.8 Correctly label each view in an imaging study with images that are unlabeled.
- 6.9 Given a set of images from a routine imaging study, describe the image and identify the anatomy.



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**Unit 7 Nuclear Instrumentation**

**General Outcome:**

**7.0 The student shall demonstrate an understanding of instrumentation.**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 7.1 Prepare the scintillation camera (planar or SPECT) for a procedure:
  - a. select and attach proper collimator
  - b. select and adjust imaging parameters
  
- 7.2 Recognize imaging artifacts that reflect malfunctioning or incorrectly adjusted instrument, e.g., off-peak pulse-height analyzer, damaged scintillation crystal or malfunctioning photo-multiplier tubes.
  
- 7.3 Perform and analyze a field uniformity check:
  - a. select a radionuclide source of appropriate quantity and energy
  - b. adjust pulse-height analyzer photopeak
  - c. obtain uniformity images using standardized technique
  - d. compare current field uniformity image with previous images and identify any nonuniformities
  
- 7.4 Given a scintillation camera field uniformity image that demonstrates nonuniformity, determine the source of nonuniformity through the following quality control checks:
  - a. presence of foreign objects on collimator
  - b. inhomogeneous distribution of activity from flood or point source
  - c. off peak
  - d. cracked crystal or loss of hermetic seal
  - e. cathode ray tube malfunction
  - f. lens cleanliness and function
  
- 7.5 Given abnormal quality control results for a scintillation camera, evaluate the results and determine whether service is necessary or adjustments can be made to correct for an abnormality.
  
- 7.6 Perform and analyze a detector linearity check, including the following:
  - a. parallel line phantom and uniformity check source
  - b. two images at 90 degrees to each other
  - c. evaluate images and identify line distortion
  
- 7.7 Given detector linearity, check images on a scintillation camera which demonstrate line distortion to determine the source of nonlinearity.



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**Unit 8 Scintillation Counters and Probes**

**General Outcome:**

**8.0 The student shall be able to demonstrate an understanding of scintillation counters and probes.**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 8.1 Conduct and record a chi-square evaluation and analyze the results for acceptable instrument performance.
- 8.2 Perform and record an energy linearity check and volumetric calibration.
- 8.3 Demonstrate knowledge of proper use and maintenance of the scintillation counter or probe.
- 8.4 Demonstrate statistical significance of counting and decay by comparing the mean and standard deviation of a sample counted for IK to the same sample counted ten times as long, or for a minimum of 10K count.
- 8.5 Demonstrate the importance of using a technique that will maintain the exact geometry from one count to another.
- 8.6 Demonstrate the effects of dead time on the capacity of the system.



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**Unit 9 Gas-Filled Detectors**

**General Outcome:**

**9.0 The student shall be able to demonstrate an understanding of gas filled detectors.**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 9.1 Perform the following with a G-M survey meter:
  - a. calibrate according to NRC specifications
  - b. perform a reference check source test and evaluate the results
  - c. compare results with those previously obtained
  - d. maintain records of calibration and testing
  - e. change batteries as appropriate
  
- 9.2 Perform the following with a dose calibrator:
  - a. determine linearity of response over entire range of radionuclide activity to be measured
  - b. determine significant geometrical variation in activity measured as a function of volume or configuration
  - c. test for accuracy with commonly used radionuclides that have adequate reference standards available
  - d. check for constancy (precision) by using a long-lived radionuclide standard
  - e. evaluate test results and determine when service is needed
  - f. maintain records for each of the above procedures