

**Oregon Institute of Technology  
Medical Imaging Technology Department  
Nuclear Medicine Technology Program Assessment  
2008-2009**

**I. Introduction**

The Nuclear Medicine Technology (NMT) program began accepting students into the program in 1999 and graduated its first class of students in 2001. The NMT program is the only Bachelor degree program in Nuclear Medicine Technology in the Northwest.

Enrollment trends from 2002-2007 have varied from 39 to 54 students. The number of graduates has gradually increased from 5 students in 2002, to as many as 21 students in 2004, to 19 students in 2007. The graduate salary range has been \$42,000 to \$67,000 with a mean of \$53,920 per year.

**II. Program Purpose, Objectives and Student Learning Outcomes:**

The Nuclear Medicine faculty consisted of two instructors who met formally in the fall of 2007 and several times informally since then and agreed to adopt the student learning outcomes listed below.

**Nuclear Medicine Technology Program Purpose**

The Bachelor of Science program in Nuclear Medicine Technology at Oregon Institute of Technology provides graduates with the knowledge and clinical skills necessary to become competent, ethical and caring professionals in the field of Nuclear Medicine.

**Program Educational Objectives:**

1. The program prepares students to perform as compassionate and caring health care professionals.
2. The program prepares our graduates to sit for the ARRT and NMTCB board exams.
3. The program prepares students to think critically, communicate effectively and demonstrate professional ethics.
4. The program prepares students to utilize diagnostic techniques, sound judgment and good decision making to provide patient services.
5. The program prepares students to be aware of radioactive exposure to themselves and patients.

**Student Learning Outcomes:**

1. The student will demonstrate proficiency in providing patient care.
2. The student will demonstrate knowledge of radiation safety precautions and ALARA concepts.
3. The student will demonstrate recognition of, and adherence to, ethical and professional responsibilities.
4. The student will perform Nuclear Medicine imaging procedures according to program and /or departmental protocol.
5. The student will demonstrate proficiency in obtaining a relevant patient history.

6. The student will demonstrate knowledge of various radiopharmaceuticals and their uses in nuclear medicine imaging.
7. The student will demonstrate knowledge, understanding, and appropriate uses of instrumentation used in a Nuclear Medicine department.
8. The student will demonstrate knowledge of quality control procedures for instrumentation used in Nuclear Medicine.
9. The student will demonstrate knowledge of radiation therapy procedures used in Nuclear Medicine.

### **Additional Student Learning Opportunities**

Students in the Nuclear Medicine Technology Program are given the opportunity to attend a fall or spring conference through the Northwest Chapter of the Society of Nuclear Medicine or the Western Regional Society of Nuclear Medicine. Students also have the opportunity to attend other meetings throughout the year sponsored by various other organizations such as Northwest Imaging Forums, Cardinal Health, and Educational Symposium Institute.

### **III. Three-Year Cycle for Assessment of Student Learning Outcomes**

The following are the nine main outcomes which will be assessed at a rate of three each per year on a three-year cycle, as listed in Table 1 below.

<b>Nuclear Medicine Technology Student Learning Outcomes Assessment Schedule</b>	<b>2007-2008</b>	<b>2008-2009</b>	<b>2009-2010</b>	<b>2010 - 2011</b>
1. The student will demonstrate proficiency in providing patient care.	X			
2. The student will demonstrate knowledge of radiation safety precautions and ALARA concepts.			X	
3. The student will demonstrate recognition of, and adherence to, ethical and professional responsibilities.			X	
4. The student will perform Nuclear Medicine imaging procedures according to program and /or departmental protocol.		X		
5. The student will demonstrate proficiency in obtaining a relevant patient history.		X		
6. The student will demonstrate knowledge of various radiopharmaceuticals and their uses in nuclear medicine imaging.	X			
7. The student will demonstrate knowledge, understanding, and appropriate uses of instrumentation used in a Nuclear Medicine department.	X			
8. The student will demonstrate knowledge of quality control procedures for instrumentation used in Nuclear Medicine.		X		
9. The student will demonstrate knowledge of In Vitro procedures.				
10. The student will demonstrate knowledge of radiation therapy procedures used in Nuclear Medicine.			X	

Table 1. Nuclear Medicine Technology Education Cycle

#### **IV. Student Learning Outcomes:**

The NMT faculty conducted formal assessment of three program learning outcomes during 2008-2009, as outlined below. The results for each assessment are summarized here and additional detail is available in the assessment coordinator's file cabinet.

**Student Learning Outcome #4:** The student will perform Nuclear Medicine imaging procedures according to program and /or departmental protocol.

**Direct Assessment #1:** Junior students in the NMT 312 course. For this assessment, we used the scoring sheet for our Lab Practical evaluation at the end of the term. This scoring sheet is broken into (4) sections: *Patient History*, *Patient Positioning*, *Computer Acquisition*, and *Computer Processing*. The total points possible for *Patient History* was (10 points), *Patient Positioning* (14), *Computer Acquisition* (11), and *Computer Processing* (14).

The students were given full credit for each section if they asked the appropriate question(s) for the *Patient History* section and demonstrated the knowledge and/or skills required in each of the other three sections. The benchmark for each category was 80% of students with a score of: *Patient History* (8 out of 10), *Patient Positioning* (11 out of 14), *Computer Acquisition* (8 out of 11), and *Computer Processing* (11 out of 14).

<b>Performance Criteria</b>	<b>Assessment Methods</b>	<b>Measure Scale</b>	<b>Minimum Acceptable Performance</b>	<b>Results</b>
1. The student will correctly identify all of the pertinent patient history questions.	NMT 312 In Vivo Mid Term Lab Practical	Lab Practical Evaluation Form (1) point per skill item	80% of students who correctly ask 8 out of 10 questions	93%
2. The student will properly position the patient for all possible views.	NMT 312 In Vivo Mid Term Lab Practical	Lab Practical Evaluation Form (1) point per skill item	80% of students with a score of 11 out of 14	93%
3. The student will properly set up the acquisition for the patient study.	NMT 312 In Vivo Mid Term Lab Practical	Lab Practical Evaluation Form (1) point per skill item	80% of students with a score of 8 out of 11	100%
4. The student will process the patient data according to protocol as demonstrated in lab.	NMT 312 In Vivo Mid Term Lab Practical	Lab Practical Evaluation Form (1) point per skill item	80% of students with a score of 11 out of 14	100%

**Evaluation of the data: 3/9/2009**

The benchmark of at least 80% was achieved in each category.

**Action(s) to be taken: 3/18/2009**

Since the students achieved the benchmark of at least 80% in each of the categories, no further action is required at this time.

**Direct Assessment #2:** Clinical Instructors for our NMT 410 students.

Thirteen clinical instructors affiliated with our program responded to a survey identifying how well their externship student performed on SLO #4. This evaluation was done spring term 2008 just before the senior externship students completed their training and graduated. Three responses were possible for this SLO: *Insufficiently Prepared*, *Sufficiently Prepared*, and *Highly Prepared*.

The results were encouraging. Seventy seven percent (77.78%) of the clinical instructors responded that their student was *Sufficiently Prepared* and 22.22% responded that their student was *Highly Prepared*.

**Evaluation of the data: 5/12/2009**

There was no benchmark set for this survey. We simply wanted to identify any SLOs that were consistently low or high amongst the various sites so that we could make the necessary adjustments in our curriculum to improve those results. Since there were no responses that were *Insufficiently Prepared*, we are satisfied with these results.

**Action(s) to be taken: 5/12/2009**

We are pleased with these results and no further action is required at this time.

**Indirect Assessment #1: NMT 410 senior externship students.**

Nineteen of our senior externship students in the NMT 410 Externship course responded to a survey I sent to them spring term 2008 that identified our SLOs. These students were near the end of their 11 month training and only a few weeks away from graduating. Three responses were possible for this SLO: *Insufficiently Prepared*, *Sufficiently Prepared*, and *Highly Prepared*. The survey was completed by each student and returned to my office before the end of spring term.

These results were also encouraging. Fifty percent (50%) of students responded that they were *Sufficiently prepared* and 50% of students responded that they were *Highly Prepared*.

**Evaluation of the data: 5/12/2009**

There was no benchmark set for this survey. We wanted to identify any SLOs that were consistently low or high amongst the various sites, from the students' perspective, so that we could make the necessary adjustments in our curriculum to improve those results. There were no results that were *Insufficiently Prepared*, and therefore, we are pleased with these results.

**Action(s) to be taken: 5/12/2009**

We are pleased with these results and no further action is required at this time.

**Student Learning Outcome #5:** The student will demonstrate proficiency in obtaining a relevant patient history.

**Direct Assessment #1:** Junior students in the NMT 311 In-Vivo course fall term 2008.

For this assessment, I used our scoring sheet for our Lab Practical evaluation. This scoring sheet is broken into (4) sections, the first of which is *Patient History*. The students are required to ask each of the (11) questions listed above within five minutes.

The students were given a (1) if they asked the patient this question and a (0) if they did not. The benchmark for this assessment was at least 80% of the students asking each of the questions in each category.

<b>Performance Criteria</b>	<b>Assessment Methods</b>	<b>Measure Scale</b>	<b>Minimum Acceptable Performance</b>	<b>Results</b>
1. Ask patient's Height and weight	NMT 311 In Vivo Mid Term Lab Practical	(11) questions in this section; (1) point per item	80% of students who asked this question	100%
2. Ask if patient is pregnant or B.F.	NMT 311 In Vivo Mid Term Lab Practical	(11) questions in this section; (1) point per item	80% of students who asked this question	100%
3. Ask patient's age/DOB	NMT 311 In Vivo Mid Term Lab Practical	(11) questions in this section; (1) point per item	80% of students who asked this question	100%
4. Ask what Meds/allergies the patient has.	NMT 311 In Vivo Mid Term Lab Practical	(11) questions in this section; (1) point per item	80% of students who asked this question	100%
5. Ask if patient has had any lab exams	NMT 311 In Vivo Mid Term Lab Practical	(11) questions in this section; (1) point per item	80% of students who asked this question	87%
6. Ask about family history	NMT 311 In Vivo Mid Term Lab Practical	(11) questions in this section; (1) point per item	80% of students who asked this question	93%
7. Ask patients' symptoms/medical history	NMT 311 In Vivo Mid Term Lab Practical	(11) questions in this section; (1) point per item	80% of students who asked this question	100%
8. Ask about possible previous NM exams	NMT 311 In Vivo Mid Term Lab Practical	(11) questions in this section; (1) point per item	80% of students who asked this question	93%
9. Ask about other imaging exams	NMT 311 In Vivo Mid Term Lab Practical	(11) questions in this section; (1) point per item	80% of students who asked this question	100%
10. Ask about Food/liquids	NMT 311 In Vivo Mid Term Lab Practical	(11) questions in this section; (1) point per item	80% of students who asked this question	93%
11. Ask about possible treatments	NMT 311 In Vivo Mid Term Lab Practical	(11) questions in this section; (1) point per item	80% of students who asked this question	93%

**Evaluation of the data: 12/5/2008**

The benchmark of at least 80% was achieved in each category.

**Action(s) to be taken: 12/9/2008**

Since the students achieved the benchmark of at least 80% in each of the (11) categories, no further action is required at this time.

**Direct Assessment #2:** Junior students in the NMT 312 In-Vitro course winter 2009 term  
 For this assessment, we used the same scoring sheet as fall term for our Lab Practical evaluation. This scoring sheet is broken into (4) sections, the first of which is *Patient History*. The students are required to ask each of the (10) questions listed above within five minutes.

The students were given a (1) if they asked the patient this question and a (0) if they did not. The benchmark for this assessment was at least 80% of the students asking each of the questions in each category.

<b>Performance Criteria</b>	<b>Assessment Methods</b>	<b>Measure Scale</b>	<b>Minimum Acceptable Performance</b>	<b>Results</b>
1. Ask patient's Height and weight	NMT 312 In Vivo Mid Term Lab Practical	(10) questions in this section; (1) point per item	90% of students who asked this question	100%
2. Ask if patient is pregnant or B.F.	NMT 312 In Vivo Mid Term Lab Practical	(10) questions in this section; (1) point per item	90% of students who asked this question	100%
3. Ask patient's age/DOB	NMT 312 In Vivo Mid Term Lab Practical	(10) questions in this section; (1) point per item	90% of students who asked this question	100%
4. Ask what Meds/allergies the patient has.	NMT 312 In Vivo Mid Term Lab Practical	(10) questions in this section; (1) point per item	90% of students who asked this question	100%
5. Ask if patient has had any lab exams	NMT 312 In Vivo Mid Term Lab Practical	(10) questions in this section; (1) point per item	90% of students who asked this question	100%
6. Ask about family history	NMT 312 In Vivo Mid Term Lab Practical	(10) questions in this section; (1) point per item	90% of students who asked this question	100%
7. Ask patients' symptoms/medical history	NMT 312 In Vivo Mid Term Lab Practical	(10) questions in this section; (1) point per item	90% of students who asked this question	100%
8. Ask about possible previous NM exams	NMT 312 In Vivo Mid Term Lab Practical	(10) questions in this section; (1) point per item	90% of students who asked this question	100%
9. Ask about other imaging exams	NMT 312 In Vivo Mid Term Lab Practical	(10) questions in this section; (1) point per item	90% of students who asked this question	100%
10. Ask about Food/liquids	NMT 312 In Vivo Mid Term Lab Practical	(10) questions in this section; (1) point per item	90% of students who asked this question	100%
11. Ask about possible treatments	NMT 312 In Vivo Mid Term Lab Practical	(10) questions in this section; (1) point per item	90% of students who asked this question	100%

**Evaluation of the data: 3/9/2009**

The benchmark of at least 90% was achieved in all categories.

**Action(s) to be taken: 3/18/2009**

Since the students achieved the benchmark of at least 90% in each of the (10) categories, no further action is required at this time.

**Direct Assessment #3: Clinical Instructors for our NMT 410 students.**

Thirteen clinical instructors affiliated with our program responded to a survey identifying how well their externship student performed on SLO #5. This evaluation was done spring term 2008 just before the senior externship students completed their training and graduated. Three responses were possible for this SLO: *Insufficiently Prepared*, *Sufficiently Prepared*, and *Highly Prepared*. The survey was completed by the student's clinical instructor and returned to my office.

Forty four percent (44.44%) of the clinical instructors responded that their student was *Sufficiently Prepared* and 55.56% responded that their student was *Highly Prepared*.

**Evaluation of the data: 5/12/2009**

There was no benchmark set for this survey. We simply wanted to identify any SLOs that were consistently low or high amongst the various sites so that we could make the necessary adjustments in our curriculum to improve those results. Since there were no responses that were *Insufficiently Prepared*, we are satisfied with these results.

**Action(s) to be taken: 5/12/2009**

The data supports that no further action is required at this time.

**Indirect Assessment #3: NMT 410 senior externship students.**

Nineteen of our senior externship students in the NMT 410 Externship course responded to a survey I sent to them spring term 2008 that identified our SLOs. These students were near the end of their 11 month training and only a few weeks away from graduating. Three responses were possible for this SLO: *Insufficiently Prepared*, *Sufficiently Prepared*, and *Highly Prepared*. The survey was completed by each student and returned to my office before the end of spring term.

Thirty seven percent (37.50%) of students responded that they were *Sufficiently prepared* and 62.50% of students responded that they were *Highly Prepared*. There were no *Insufficiently Prepared* responses.

**Evaluation of the data: 5/12/2009**

There was no benchmark set for this survey. We wanted to identify any SLOs that were consistently low or high amongst the various sites, from the students' perspective, so that we could make the necessary adjustments in our curriculum to improve those results. There were no results that were *Insufficiently Prepared*, and therefore, we are pleased with these results.

**Action(s) to be taken: 5/12/2009**

The results indicate that no further action is required at this time.

**Student Learning Outcome #8:** The student will demonstrate knowledge of quality control procedures for instrumentation used in Nuclear Medicine.

**Direct Assessment #1:** Junior students in the NMT 325 course Spring term 2009.

For this assessment, I gave an unannounced quiz to our junior students in the NMT 325 Spect course. This course is exactly one year later than where the material on the quiz was first introduced and primarily taught in the NMT 225 course. The quiz was broken down into three separate sections: *Dose Calibrator QC*, *Gamma Camera QC*, and *Well Counter QC*. Each section included five questions regarding quality control procedures related to that subject.

The benchmark for this assessment was 80% of students getting (4) out of the (5) questions correct in each section.

<b>Performance Criteria</b>	<b>Assessment Methods</b>	<b>Measure Scale</b>	<b>Minimum Acceptable Performance</b>	<b>Results</b>
1. The student will demonstrate knowledge of Dose Calibrator QC	NMT 325 Spect Course	(5) Questions in this section	80% of students with a score of 4 out of 5	80%
2. The student will demonstrate knowledge of Gamma Camera QC	NMT 325 Spect Course	(5) Questions in this section	80% of students with a score of 4 out of 5	93%
3. The student will demonstrate knowledge of Well counter QC	NMT 325 Spect Course	(5) Questions in this section	80% of students with a score of 4 out of 5	73%

**Evaluation of the Data: 5/5/2009**

The benchmark of at least 80% was achieved for the *Dose Calibrator QC* (80%) and *Gamma Camera QC* (93%) sections. However, the benchmark was not achieved in the category of *Well counter QC*. Only 73% of students achieved the benchmark in this category. This assessment demonstrated that our students have not retained a sufficient knowledge of quality control procedures as they apply to Well counter instrumentation used in Nuclear Medicine.

**Actions to be taken: 5/5/2009**

We plan to emphasize the Well Counter quality control material in the NMT 225 course where it is originally taught. In addition, we plan to emphasize and evaluate this material in our NMT 313 and NMT 325 spring term courses next year for our current sophomores as a way of review. Finally, we plan to incorporate questions on this material for these same students who will be doing their NMT 410 externship this coming year.

**Direct Assessment #2:** Externship students in the NMT 410 course Spring term 2009.

<b>Performance Criteria</b>	<b>Assessment Methods</b>	<b>Measure Scale</b>	<b>Minimum Acceptable Performance</b>	<b>Results</b>
1. The student will demonstrate knowledge of Dose Calibrator QC	NMT 410 Externship	(5) Questions in this section	80% of students with a score of 4 out of 5	100%
2. The student will demonstrate knowledge of Gamma Camera QC	NMT 410 Externship	(5) Questions in this section	80% of students with a score of 4 out of 5	93%
3. The student will demonstrate knowledge of Well counter QC	NMT 410 Externship	(5) Questions in this section	80% of students with a score of 4 out of 5	87%

**Evaluation of the Data: 5/5/2009**

The benchmark of at least 80% was achieved in all three categories.

**Actions to be taken: 5/5/2009**

Since the benchmark of at least 80% was achieved in all three instrumentation quality control categories, no further action is required. However, I would like to note that a potential reason for the externship students performing much better than the junior students may be that the externship students are doing quality control on a daily or weekly basis and the practical application of this material may be reinforcing their knowledge of the material.

**Direct Assessment #3: Clinical instructors for our NMT 410 Externship course.**

Thirteen clinical instructors affiliated with our program responded to a survey identifying how well their externship student performed on SLO #8. This evaluation was done spring term 2008 just before the senior externship students completed their training and graduated. Three responses were possible for this SLO: *Insufficiently Prepared*, *Sufficiently Prepared*, and *Highly Prepared*. The survey was completed by the student's clinical instructor and returned to my office.

Fifty five percent (55.56%) of the clinical instructors responded that their student was *Sufficiently Prepared* and 33.33% responded that their student was *Highly Prepared*. Only 11.11% of clinical instructors responded that they felt their student was *Insufficiently Prepared* for this SLO.

**Evaluation of the data: 5/12/2009**

There was no benchmark set for this survey. We simply wanted to identify any SLOs that were consistently low or high amongst the various sites so that we could make the necessary adjustments in our curriculum to improve those results. Even though 11.11% of clinical instructors responded that their student was *Insufficiently Prepared*, 88.89% of clinical instructors responded with that their student was either *Sufficiently Prepared* or *Highly Prepared*. These data suggest that the *Insufficiently Prepared* responses may have more

to do with that individual student and their performance than how well the program as a whole is preparing students for this SLO.

**Action(s) to be taken: 5/12/2009**

The data supports that no further action is required at this time.

**Indirect Assessment #1: NMT 410 Externship students.**

Nineteen of our senior externship students in the NMT 410 Externship course responded to a survey I sent to them spring term 2008 that identified our SLOs. These students were near the end of their 11 month training and only a few weeks away from graduating. Three responses were possible for this SLO: *Insufficiently Prepared*, *Sufficiently Prepared*, and *Highly Prepared*. The survey was completed by each student and returned to my office before the end of spring term.

Fifty percent (50.0%) of students responded that they were *Sufficiently prepared* and 50.0% of students responded that they were *Highly Prepared*. There were no *Insufficiently Prepared* responses.

**Evaluation of the data: 5/12/2009**

There was no benchmark set for this survey. We wanted to identify any SLOs that were consistently low or high amongst the various sites, from the students' perspective, so that we could make the necessary adjustments in our curriculum to improve those results. There were no results that were *Insufficiently Prepared*.

**Action(s) to be taken: 5/12/2009**

The results indicate that no further action is required at this time.

**V. Summary of Student Learning.**

During the 2008-2009 academic year, the faculty assessed student learning outcomes #4, #5, and #8 and observed the following:

**Student Learning Outcome #4: The student will perform Nuclear Medicine imaging procedures according to program and /or departmental protocol.**

Strengths: For Direct Assessment #1, a benchmark of at least 80% was achieved in each category with results ranging from 93-100%. For Direct Assessment #2, using the responses from our clinical instructors on externship, 100% of the responses indicated the students were *Highly Prepared* or *Sufficiently Prepared* for this SLO. There were no *Insufficiently Prepared* responses. Finally, for Indirect Assessment #1, the student responses indicated the 100% of students were *Highly Prepared* or *Sufficiently Prepared* for this SLO. There were no *Insufficiently Prepared* responses.

Areas Needing Improvement: There were no any areas for SLO #4 that required or demonstrated the need for improvement at this time.

**Student Learning Outcome #5: The student will demonstrate proficiency in obtaining a relevant patient history.**

Strengths: The results for Direct Assessment #1 of our junior students in the NMT 311 and Procedures course fall term, indicated that the students met the minimum acceptable performance of at least 80% in each patient history category with values ranging from 87-100%. We re-evaluated the students again winter term in the NMT 312 course for Direct Assessment #2 and the results were all 100% for each category showing an improvement for the previous term.

Direct Assessment #3 revealed that 44% of our clinical instructors felt their student was *Sufficiently Prepared* and 56% *Highly Prepared* to demonstrate proficiency in obtaining a patient history. There were no *Insufficiently Prepared* responses.

Finally, Indirect Assessment #1 from our externship students indicated that 37.5% of students felt they were *Sufficiently Prepared* and 62.5% felt they were *Highly Prepared* for SLO #5. There were no *Insufficiently Prepared* responses.

Areas Needing Improvement: There were no any areas for SLO #5 that required or demonstrated the need for improvement at this time.

**Student Learning Outcome #8: The student will demonstrate knowledge of quality control procedures for instrumentation used in Nuclear Medicine.**

Strengths: Direct Assessment #1 and #2 both identified that the junior and externship level students met the benchmark of at least 80% in all performance criteria except the juniors students' knowledge of Well counter quality control (73%) which did not meet the minimum acceptable performance of 80%.

Direct Assessment #3 came from our clinical instructors on externship where 89% of clinical instructors responded that their student's were either *Sufficiently Prepared* or *Highly Prepared* for SLO #5. Only 11.11% of clinical instructors responded that their student was *Insufficiently Prepared* for this SLO. There was no benchmark for this survey.

Indirect Assessment #1 of our externship students indicated a 50% response that they were *Sufficiently Prepared* and 50% were *Highly Prepared* for this SLO. There were no *Insufficiently Prepared* responses.

Areas Needing Improvement: Direct Assessment #3 of our clinical instructors on externship indicated an 11% response of *Insufficiently Prepared* regarding this SLO. There was no benchmark for this survey and there was no correlative *Insufficiently Prepared* response from the student's same survey from the same site. This suggests the 11% clinical instructor's response may be more related to the individual student at that externship site than a weakness in our curriculum or training that would require a change in how we teach or emphasize the material in this SLO.

As mentioned above, Direct Assessment #1 of the junior students indicated one category in which the minimum acceptable performance was 73% and just barely missed the benchmark of

at least 80%. This category was the students' knowledge of well counter quality control and really related to one or two questions that were frequently missed on the assessment quiz.

Plans for improvement: I discussed the results of our assessment with the other faculty in our program on May 6<sup>th</sup>, 2009. We plan to emphasize the Well Counter quality control material in the NMT 225 course where it is originally taught. In addition, we plan to emphasize and evaluate this material in our NMT 313 and NMT 325 spring term courses next year for our current sophomores as a way of review. Finally, we plan to incorporate questions on this material for these same students who will be doing their NMT 410 externship this coming year.

The externship students took the same assessment quiz as outlined in the Direct Assessment #2 and performed much better, exceeding the benchmark of at least 80% in each category. This suggests that when the students are working with the equipment on a daily or weekly basis, they have a better understanding of the equipment and quality control procedures.

#### **VI. Changes resulting from Assessment.**

Last spring term 2008, I discussed our assessment findings with the other two faculty and reviewed the "Plans for Improvement" to be implemented for fall 2008 through spring 2009. We met again as faculty on May 6, 2009 to discuss any changes resulting from last years assessment and we discussed the results of our assessment for this academic year 2008-2009.

#### **Student Learning Outcome #6: The student will demonstrate knowledge of various radiopharmaceuticals and their uses in nuclear medicine imaging.**

This material was originally taught in the NMT 215 course, winter term in the sophomore year. For the short term, I re-assessed the juniors and externship students on this material last spring before the end of the term and they achieved the benchmark of at least 80% for this assessment and required no further actions at that time.

For the long term, our intent was to continue to emphasize this material this year (2008-2009) as it applied in the NMT 311, NMT 312, and NMT 313 courses during the junior year and incorporate about 10-15% of questions on quizzes and exams in these courses on this material. In discussions with the other two faculty in our program, we have incorporated these questions on the exams and quizzes in these courses, but we have not formally assessed these specific questions on radiopharmaceuticals apart from the other material covered on these quizzes and exams for these courses.

#### **Student Learning Outcome #7: The student will demonstrate knowledge, understanding, and appropriate uses of instrumentation used in a nuclear medicine department.**

Last spring term 2008, we did re-assess the junior and externship students on material related to this SLO before the end of spring term 2008. Although the students improved their understanding and performance on most categories, the junior students were still just below the benchmark of at least 80% (73%) in the categories of *Gas detectors* and *Well counter/dose calibrator QC* (67%). We did incorporate about 10-15% of questions on this material in our NMT 311, NMT 312, NMT 325, and NMT 410 Externship courses this year, but we did not formally assess these specific questions on gas detectors and well counter instrumentation apart from the other material covered on these quizzes and exams for these specific courses.

We did develop technical manuals for checking in radioactivity, doing surveys and wipe testing, and getting radioactivity from the hospital for the students to use and review. This year, we are having the students perform these quality control exams during every lab in the NMT 325, NMT 225, NMT 215 and NMT 313 courses.

For our externship students, we repeated the instrumentation quiz a second time and they met the benchmark of at least 80% in all categories except *Gas Detectors* (73%). These students graduated last June and took one or both of the national board exams. All students passed their board exams on all material including material for SLO #6 and #7.

### **Institutional ISLO #8: Critical Thinking**

We have required the students to discuss the implications and consequences of the results of the data processed for each exam we discuss in the NMT 311, NMT 312, and NMT 325 courses. In addition, we have included discussions of implications and consequences of results and what they mean for the patient in the NMT 311, NMT 312, NMT 313, NMT 325 and NMT 367 courses. We have also incorporated questions on exams and quizzes to evaluate student's critical thinking as it relates to implications of patient data.

For the lab practical in each of the NMT 311, NMT 312, and NMT 325 courses, we have included evaluative questions for critical thinking as it pertains to patient data that has been processed and given these questions a point value. These questions include:

- 1. What do these results mean for the patient?*
- 2. Are these results normal or abnormal? What constitutes a normal/abnormal result?*

Thus far, 100% of the junior students in these courses have received full credit for these their answers to these questions and all students have passed their lab practicals for these courses.

In addition, we incorporated the following questions as part of the NMT 410 externship students' evaluation each time they try to earn one of twenty five competencies:

- 1. Are these results normal or abnormal?*
- 2. What constitutes a normal result for this study?*
- 3. What do these data mean for this patient?*

The answers to these questions are used to help determine whether the student has demonstrated knowledge and skill to be competent in a particular exam. Thus far, the students have performed admirably and all of the externship students have earned their twenty five competencies this year.

## Appendix

### Curriculum Maps

**Student Learning Outcome #4:** The student will perform Nuclear Medicine imaging procedures according to program and /or departmental protocol **using scientific knowledge and skills in scientific reasoning.**

I = Introduced  
 R = Reinforced  
 E = Emphasized

	Sophomore			Junior			Senior		
<b>Fall</b>	NMT 217	Patient Care		NMT 311	In-Vivo Procedures	IE	NMT 410	Extern	RE
	NMT 212	Nuclear Med Physics		BUS 317	Health Care Mngment				
	PHY 217	Phy of MI		Math Science	Elective				
	CHE 250	Clinical Pharm for Nuc Med		COM	Elective				
<b>Win</b>	NMT 215	Radiopharm/ Radiochem		NMT 312	In-Vitro Procedures	RE	NMT 410	Extern	RE
	NMT 205	Nuclear Medicine Administration		NMT 367	PET Imaging				
	WRI 227	Tech Report		NMT 355	CT Imaging				
	SPE 321	Discussion Processes		BIO 335	Cross Sectional				
				Soc Science	Elective				
<b>Spr</b>	NMT 225	Nuclear Physics/Instrumentation		NMT 313	Therapeutic Procedures		NMT 410	Extern	RE
	NMT 256	Cardiovascular NM		NMT 325	Spect Imaging				
	BUS 316	Peri Art Disease		NMT 388	Extern Prep/Review				
	HUM	Humanities Elective		HUM Elective	HUM Elective				
	Soc Sci	Soc Sci elective		Social Science Elective	Social Sci Elective				

**Student Learning Outcome #5:** The student will demonstrate proficiency in obtaining a relevant patient history.

I = Introduced  
R = Reinforced  
E = Emphasized

	Sophomore			Junior			Senior		
<b>Fall</b>	NMT 217	Patient Care	I	NMT 311	In-Vivo Procedures	RE	NMT 410	Extern	RE
	NMT 212	Nuclear Med Physics		BUS 317	Health Care Mngment				
	PHY 217	Physics of Medical Imaging		Math Science	Elective				
	CHE 250	Clinical Pharm for Nuc Med		COM	Elective				
<b>Win</b>	NMT 215	Radiopharm/ Radiochem		NMT 312	In-Vitro Procedures	RE	NMT 410	Extern	RE
	NMT 205	Nuclear Medicine Administration		NMT 367	PET Imaging				
	WRI 227	Tech Report		NMT 355	CT Imaging				
	SPE 321	Discussion Processes		BIO 335	Cross Sectional				
				Soc Science	Elective				
<b>Spr</b>	NMT 225	Nuclear Physics/Instrumentation		NMT 313	Therapeutic Procedures		NMT 410	Extern	RE
	NMT 256	Cardiovascular NM		NMT 325	Spect Imaging				
	BUS 316	Peri Art Disease		NMT 388	Extern Prep/Review				
	HUM	Humanities Elective		HUM Elective	HUM Elective				
	Soc Sci	Soc Sci elective		Social Science Elective	Social Sci Elective				

**Student Learning Outcome #8:** The student will demonstrate knowledge of quality control procedures for instrumentation used in Nuclear Medicine.

I = Introduced

R = Reinforced

E = Emphasized

	Sophomore			Junior			Senior		
<b>Fall</b>	NMT 217	Patient Care		NMT 311	In-Vivo Procedures		NMT 410	Extern	RE
	NMT 212	Nuclear Med Physics		BUS 317	Health Care Mngment				
	PHY 217	Phy of MI		Math Science	Elective				
	CHE 250	Clinical Pharm for Nuc Med		COM	Elective				
<b>Win</b>	NMT 215	Radiopharm/ Radiochem		NMT 312	In-Vitro Procedures		NMT 410	Extern	RE
	NMT 205	Nuclear Medicine Administration		NMT 367	PET Imaging	RE			
	WRI 227	Tech Report		NMT 355	CT Imaging				
	SPE 321	Discussion Processes		BIO 335	Cross Sectional				
				Soc Science	Elective				
<b>Spr</b>	NMT 225	Nuclear Physics/Instrumentation	IE	NMT 313	Therapeutic Procedures		NMT 410	Extern	RE
	NMT 256	Cardiovascular NM		NMT 325	Spect Imaging	RE			
	BUS 316	Peri Art Disease		NMT 388	Extern Prep/Review				
	HUM	Humanities Elective		HUM Elective	HUM Elective				
	Soc Sci	Soc Sci elective		Social Science Elective	Social Sci Elective				