

**Oregon Institute of Technology
Medical Imaging Technology Department
Nuclear Medicine Technology Program Assessment
2015-2016**

1. Introduction

The Nuclear Medicine Technology (NMT) program began accepting students into the program in 1999 and graduated its first class of students in 2001 on the Oregon Tech campus in Klamath Falls. As of June, 2015, our program has a 100% pass rate on the nationally recognized ARRT registry board examination (196 graduates) and 99.42% pass rate on the NMTCB registry examination (183 graduates).

Enrollment trends from 2002-2016 have varied from 39 to 54 students (total) in the past. The number of graduates has gradually increased from 5 students in 2002, to as many as 21 students in 2004. From 2005 until fall 2015, graduate numbers have ranged from 15 - 18 students. The total number of students in the Nuclear Medicine Technology program in the fall of 2015 between the sophomore, junior and senior classes was 47 students.

The retention rates for our program in fall of 2015 were 100% for seniors, 100% for juniors, and 94% for sophomores.

The graduate salary range has been \$50,000 to \$70,000 with a mean of \$58,000 per year.

II. Program Purpose, Objectives and Student Learning Outcomes:

The Nuclear Medicine faculty consisted of three instructors who met formally in the fall of 2015 and agreed to continue to adopt the student learning outcomes listed below. In addition, our Advisory Board reviews and provides input every May at our annual Advisory Board Meeting.

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.

The program surveys alumni/employer/clinical externship partners every year in the spring to identify whether we are meeting or exceeding these program objectives and if we need to make any adjustments.

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 using scientific knowledge and skills in scientific reasoning.
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 spring or fall conference through the Northwest Chapter of the 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.

In the fourth year of training, students complete an 11 month clinical externship in a hospital affiliated with our program. This is referred to as their *Externship*. Students continue to pay tuition for this training and spend 38 hours a week for 11 months in the clinical environment with direct, and then eventually, indirect supervision by registered and licensed technologists. Students work on developing “competency” with all exams performed in the department as well as taking examinations online through the school and submitting case studies and site profiles as well. Each term, student professionalism skills are evaluated and this evaluation is part of their grade for the term.

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.

Nuclear Medicine Technology Student Learning Outcomes Assessment Schedule	2010 - 2011	2011- 2012	2012- 2013	2013- 2014	2014- 2015	2015- 2016
1. The student will demonstrate proficiency in providing patient care.	X			X		
2. The student will demonstrate knowledge of radiation safety precautions and ALARA concepts.			X			X
3. The student will demonstrate recognition of, and adherence to, ethical and professional responsibilities.			X			X
4. The student will perform Nuclear Medicine imaging procedures according to program and /or departmental protocol using scientific knowledge and skills in scientific reasoning.		X			X	
5. The student will demonstrate proficiency in obtaining a relevant patient history.		X			X	
6. The student will demonstrate knowledge of various radiopharmaceuticals and their uses in nuclear medicine imaging.	X			X		
7. The student will demonstrate knowledge, understanding, and appropriate uses of instrumentation used in a Nuclear Medicine department.	X			X		
8. The student will demonstrate knowledge of quality control procedures for instrumentation used in Nuclear Medicine.		X			X	
9. The student will demonstrate knowledge of radiation therapy procedures used in Nuclear Medicine.			X			X

Table 1. Nuclear Medicine Technology Education Cycle

IV. Student Learning Outcomes:

The NMT faculty conducted formal assessment of three program learning outcomes during 2015-2016, as outlined below.

PSLO #2. The student will demonstrate knowledge of radiation safety precautions and ALARA concepts.

Direct Assessment #1: Sixteen sophomore students in the NMT 225 course, spring 2016 term, were given a take home assignment with the five questions listed below. Students were asked to submit their answers and were given an evaluation rubric for this assignment.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results
1. The student will identify (5) actions or steps that can be taken to reduce radiation exposure to themselves in a Nuclear Medicine department.	Student essay/Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%
2. The student will list the requirements for what constitutes level I, II, and III transportation index.	Student essay/Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%
3. The student will identify (5) actions or steps that can be taken to limit or reduce unnecessary radiation exposure to their patients.	Student essay/Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%
4. The student will list (5) steps to take to identify or measure radioactive contamination within a Nuclear Medicine department.	Student essay/Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%

Table 1. Assessment Results for PSLO #2, sophomores in NMT 225, spring 2016.

Evaluation of the data: 6/26/2016

These data were analyzed on June 26, 2016 according to the rubric given to the students by the assessment coordinator. All (16) students received a score of 3 or 4 for each of the four questions, thereby resulting in a score of 100% for each of the (4) questions.

Action(s) to be taken: 6/26/2016

The Minimum Acceptable Performance for each category was 80% of students with a score of at least 3. The students achieved 100% for all categories. Therefore, no further action is required.

Direct Assessment #2: Fifteen senior students in the NMT 410 Externship Course, spring 2016, were sent a take home assignment with the five questions listed below. Students were asked to submit their answers and were given an evaluation rubric for this assignment.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results
1. The student will identify (5) actions or steps that can be taken to reduce radiation exposure to themselves in a Nuclear Medicine department.	Student essay/Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%
2. The student will list the requirements for what constitutes level I, II, and III transportation index.	Student essay/Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%
3. The student will identify (5) actions or steps that can be taken to limit or reduce unnecessary radiation exposure to their patients.	Student essay/Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%
4. The student will list (5) steps to take to identify or measure radioactive contamination within a Nuclear Medicine department.	Student essay/Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%

Table 3. Assessment Results for PSLO #2, seniors in NMT 410, spring 2016

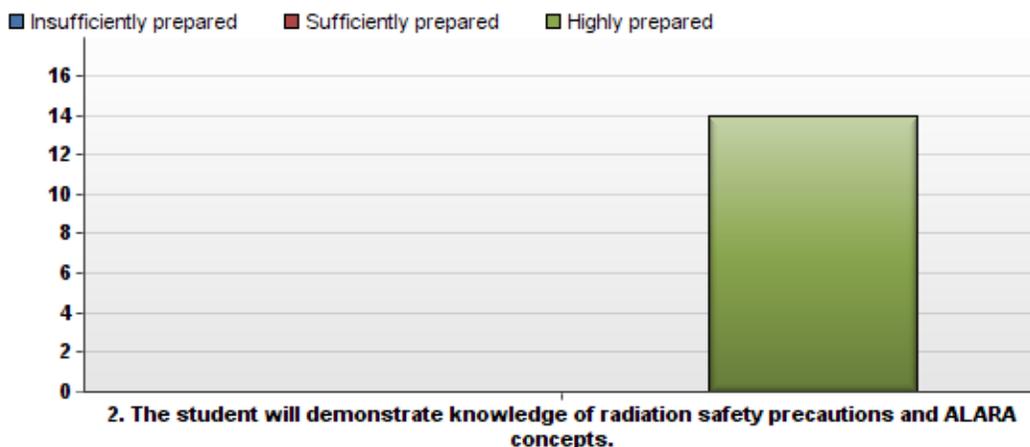
Evaluation of the data: June 26, 2016

These data were analyzed on June 26, 2016 according to the rubric given to the students by the assessment coordinator. All (16) students received a score of 3 or 4 for each of the four questions, thereby resulting in a score of 100% for each of the (4) questions.

Action(s) to be taken: June 26, 2016

The Minimum Acceptable Performance for each category was 80% of students with a score of at least 3. The students achieved 100% for all categories. Therefore, no further action is required.

Indirect Assessment: Senior Exit surveys in the NMT 410 Externship course.



Evaluation of the data: 6/26/2016

Senior exit surveys were sent to all externship students in the NMT 410 course. Fourteen of the sixteen students responded to the survey with approximately 1-2 months left in their 11 month clinical externship. One hundred percent of students responded that they felt they had been *Highly Prepared* by Oregon Tech for this PSLO.

Action(s) to be taken: 6/26/2016

None required. We are more than pleased with these results.

PSLO #3. Student Learning Outcome: The student will demonstrate recognition of, and adherence to, ethical and professional responsibilities.

Ethics

The faculty asked students to complete an ethics homework assignment that required them to list three provisions in the ARRT Code of Ethics and explain why they selected each of those provisions as important. In addition, students were asked to analyze a program-related ethics scenario and answer four questions related to that scenario. The assignments were scored using an Oregon Tech ethics rubric with the performance criteria shown below.

Direct Assessment #1: Fourteen junior students in the NMT 388 Extern Prep course, spring 2016 term, were given this ethics assignment as per the instructions described above.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results
1. Demonstrates knowledge of the professional code of ethics	Student Essay, OIT Ethics Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%
2. Using code of ethics, describes ethical issue(s)	Student Essay, OIT Ethics Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%
3. Describes parties involved and discusses their points of view	Student Essay, OIT Ethics Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%
4. Describes and analyzes possible/alternative approaches	Student Essay, OIT Ethics Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%
5. Chooses an approach and explains the benefits and risks.	Student Essay, OIT Ethics Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%

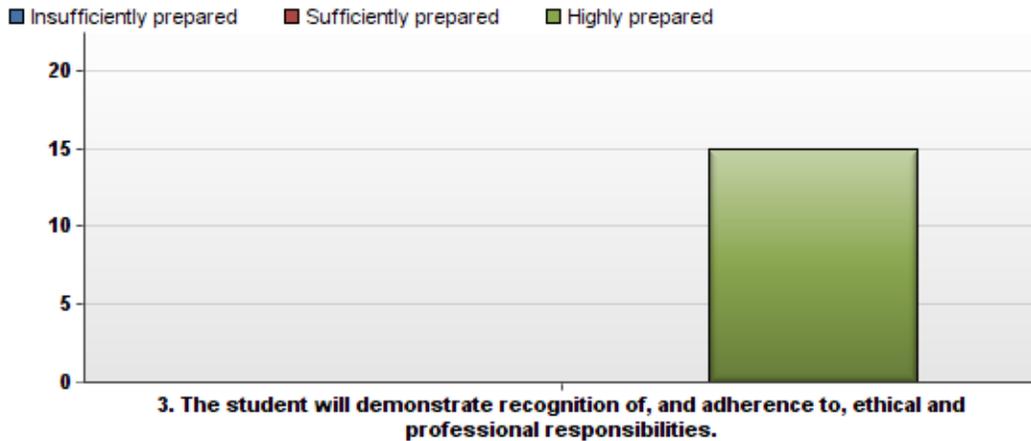
Table 4. Assessment Results for PSLO #3, juniors in NMT 388, spring 2016

Evaluation of the Data: 6/26/2016

These data were analyzed on June 26, 2016. The results for all (5) categories were 100%.

Action(s) to be taken: The students achieved scores of 100% in each of the (5) categories. Therefore, no further action is necessary.

Indirect Assessment #1: Fourteen of Sixteen senior externship students in the NMT 410 Externship course responded to the NMT end of the year externship survey. The following are the results of those responses to PSLO #3, when asked how well the student's felt they were prepared for the skill item listed in PSLO #3.



Evaluation of the data: 6/26/2016

Senior exit surveys were sent to all externship students in the NMT 410 course. These students responded to the survey with approximately 1-2 months left in their 11 month clinical externship. One hundred percent of students responded that they felt they had been *Highly Prepared* by Oregon Tech for this PSLO.

Action(s) to be taken: 6/26/2016

None required.

PSLO #9. Student Learning Outcome: The student will demonstrate knowledge of radiation therapy procedures used in Nuclear Medicine.

The students were given four questions related to radiation therapy issues and procedures and asked to answer them to the best of their ability as an essay. This was a take home essay and the students were given the assignment, as well as the rubric by which they would be evaluated. The students were given one week in which to complete this assignment. The students were evaluated based on rubric proficiency scores of 1-4.

Direct Assessment #1: Fourteen junior students in the NMT 388 course, spring 2016 term

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results
1. Describe when a written directive is needed and what it concludes.	NMT Radiation Therapy Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%
2. Describe what a quality management program and its impact on Radiation Therapy procedures.	NMT Radiation Therapy Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%
3. Describe current R/P treatments for lymphoma and their protocols.	NMT Radiation Therapy Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%
4. Describe indications and protocols for both high and low dose I131 therapy.	NMT Radiation Therapy Rubric	Proficiency scores of 1-4	80% of students with a score of at least 3	100%

Table 6. Assessment Results for PSLO #9, juniors in NMT 388, spring 2016

Evaluation of the Data: 6/26/2016

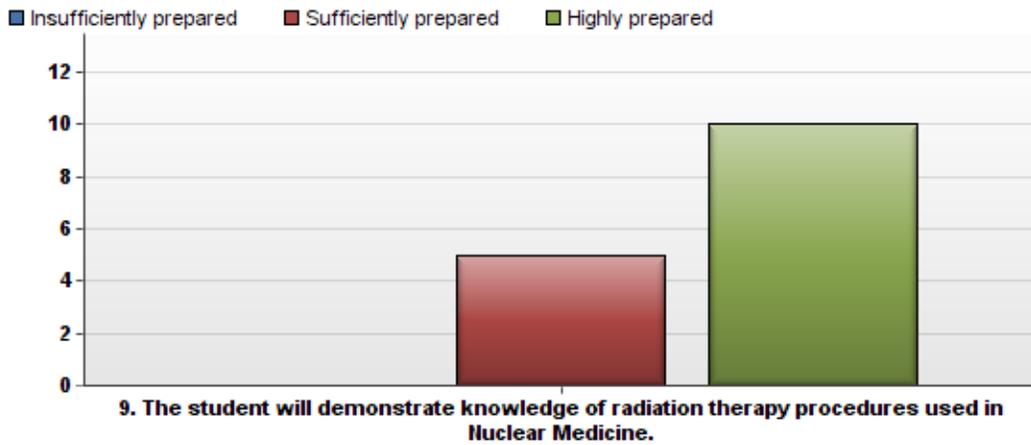
This assessment was a take home assignment for juniors in the NMT 313 course. Minimum acceptable performance for each performance criteria was 80% of students scoring at least a 3 or 4 in each category according to the rubric used for this assessment.

Students scored 100% for all four performance criteria, exceeding the minimum acceptable performance for each criteria.

Action(s) to be taken: None

Since students exceeded the minimum acceptable performance of at least 80% of students achieving a score of 3 or 4 for each performance criteria, no further action is required.

Indirect Assessment #1: Fifteen of the sixteen senior externship students in the NMT 410 Externship course responded to this question on the survey.



Evaluation of the data: 6/26/2016

Senior exit surveys were sent to all externship students in the NMT 410 course. These students responded to the survey with approximately 1-2 months left in their 11 month clinical externship. Of the fifteen students who responded to this question on the survey, Sixty-seven percent of students responded that they felt they had been *Highly Prepared* by Oregon Tech for this PSLO. Thirty-three percent of students felt they had been *Sufficiently Prepared* by Oregon Tech for this PSLO. There were 0% of students that felt *Insufficiently Prepared* by Oregon Tech for this PSLO.

Action(s) to be taken: 6/26/2016

None required.

Indirect Assessment #2: Graduate scores for 14 graduates on the ARRT board exam for 2015.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results
Section content on <i>Diagnostic and Therapeutic Procedures</i> for the ARRT National board exam.	ARRT board exam.	Mean section scaled score of 1-10	80% of students with a 7.5 out of 10	9.1 Average scaled score 100% with at least a 7.5 out of 10

Table 7. Assessment Results for PSLO #9, graduate ARRT board exam scores, 2015

Evaluation of the Data: 6/26/2016

These data come from the ARRT summary report for the 2015 graduates who took the ARRT registry examination for Nuclear Medicine. The number of examinees taking the exam were (14) and the percent of examinees passing was 100%. The students scored highest in the Category of *Diagnostic and Therapeutic Procedures* with a Mean Section Scaled Score of 9.2.

Action(s) to be taken: No further actions required at this time.

ESLO: Additional Assessment on Cultural Diversity: Winter term 2016

Thirteen of our junior students in the NMT 355, Computed tomography course winter term 2016, were asked to identify (3) cultural/ethnic groups. Students were then asked if these groups share the same perceptions and views on advanced directives and the end of life decision process. Student were asked to research the data and list (4) sources for their conclusions. There was no rubric used for this assignment.

Cultural Diversity Assignment

Direct Assessment #1 Faculty rating of 13 junior students in NMT 355, winter 2016 term.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results
1. Identify three cultural/ethnic groups	Visual identification of three cultural groups listed	Scale 1-3 for each ethnic group identified	80% of students with a proficiency of 3	100%
2. Describe if these groups share the same perceptions and views on advanced directives and end of life decisions	Visual description of the perceptions of these three groups towards end of life decisions	Scale 1-3 for each ethnic group's perception identified	80% of students with a proficiency of 3	100%
3. Four sources cited/listed	Visual identification that at least (4) sources are listed	Scale of 1-4 for each source listed	80% of students with a proficiency of 4	100%

Table 8. Assessment Results for ESLO: Cultural Diversity, juniors in NMT 355, winter 2016.

Evaluation of the Data: 6/26/2016

This assignment was given in Steve Schultz's NMT 355 Compute Tomography course winter term 2016. Students were asked to identify three cultural/ethnic groups and to describe if these groups share the same perceptions and views on advanced directives and the end of life decision process. Students were also asked to list four sources for their research.

All thirteen students completed the assignment and achieved 100% in all three performance criteria.

Action(s) to be taken: No further actions required at this time.

V: Summary of Student Learning.

During the 2015-2016 academic year, the faculty assessed student learning outcomes #2, #3, and #9. In addition, faculty assessed the student ESLO: Cultural Diversity. The faculty observed the following:

PSLO #2. Student Learning Outcome: The student will demonstrate knowledge of radiation safety precautions and ALARA concepts.

Strengths: The students on campus performed very well here. In addition, the self-evaluation of our externship students in this area, as well as the evaluation by their clinical instructors, was excellent. We had two direct and one indirect assessment and they all met or exceeded expectations and/or requirements for this PSLO.

Areas Needing Improvement: None identified.

PSLO #3. Student Learning Outcome: The student will demonstrate recognition of, and adherence to, ethical and professional responsibilities.

Strengths: We had one direct assessment, and one indirect assessment for this PSLO. The students in the NMT 388 course also performed very well in this PSLO. In addition, the externship students in the NMT 410 course evaluated themselves on this PSLO. The data overwhelming support the conclusion that our students are very well prepared on campus, as well as on their externship, to demonstrate recognition of ethical and professional responsibilities.

Areas Needing Improvement: None identified.

PSLO #9. Student Learning Outcome: The student will demonstrate knowledge of radiation therapy procedures used in Nuclear Medicine.

Strengths: We had one direct assessment and two indirect assessments for this PSLO. The direct assessment demonstrated that 100% of junior students could clearly demonstrate knowledge of radiation therapy procedures used in Nuclear Medicine. When responding to this PSLO on the end of the year survey to the externship students in the NMT 410 course, the externship students overwhelmingly agreed that they had been either “sufficiently” or “highly prepared” for their externship experience as it relates to this PSLO.

The second Indirect Assessment came from the graduates in 2015 who performed extremely well on their national registry examinations with the ARRT in this category.

Areas Needing Improvement: Based on the data above, none!

VI. Closing the loop: From the 2014-2015 Assessment Report

NMT PSLO 4: No areas needing improvement identified.

NMT PSLO 5: No areas needing improvement identified.

NMT PSLO 8: Review and emphasis of Dose Calibrator QC should have been reviewed and re-assessed in the NMT 311 course fall term for sophomore students who had taken this course the previous spring term. This was not done and these students are now off campus on their clinical externship. However, these students take an externship exam in July, and this material is covered in that course and they will have to review and be re-assessed on this material again. I will include the results as an addendum to this report following that examination.

In keeping with the purpose of this assessment, we plan to review and re-assess the sophomore students who completed the NMT 225 course this past spring. The assessment mentioned in the NMT 2014-2015 report does not apply to them, but since this was identified as a weakness for the previous class of students, there is some value in reviewing this and re-assessing this material in the NMT 311 course fall term 2016 for these students.

In this way, we can re-assess the students this PSLO applies to, as well as the following class as well. However, the addendum will only include the students on externship who take the July 2016 examination with this material included.

VII. Additional Comments:

I will include the addendum, with results, for PSLO 8 that applies to this class of students, following the July examination in the section above: Closing the Loop, NMT PSLO 8. No other comments.

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