Nuclear Medicine Technology

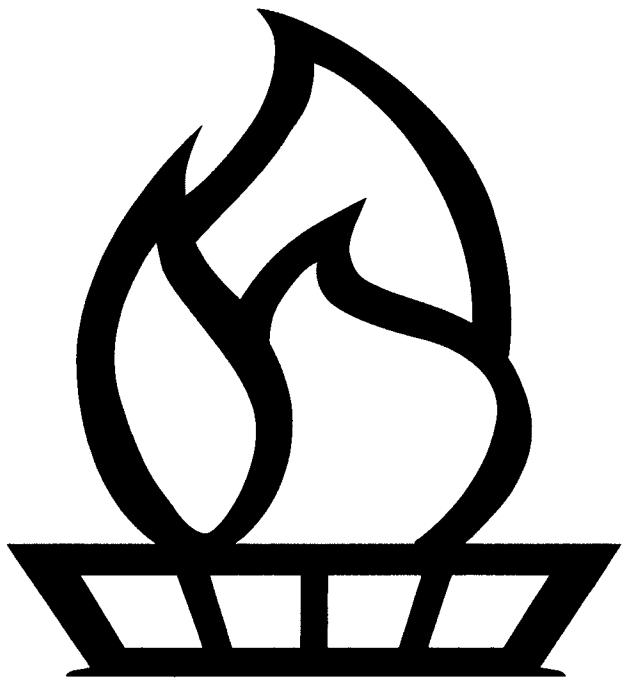
APRC 2008-2009

Section 1 of 2

Academic Program Review:

Nuclear Medicine Technology

August 2008



Program Review Panel:
Sheila MacEachron, Chair
Tracy Glentz, Program Faculty
Timothy VanderLaan, Program Faculty
Sonya Knoll, Faculty Member, CAHS
Kim Hancock, Faculty Member, Outside of CAHS
Jack Serio, Individual with Special Interest in NMT

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Academic Program Review
Nuclear Medicine Technology Program
2007 – 2008

Section One: Overview

Overview:

Nuclear Medicine Technology Program's Mission Statement
The mission of the Nuclear Medicine Technology (NMT) program is to prepare graduates for entry-level positions within the field of Nuclear Medicine Technology.

History of the Nuclear Medicine Technology Program
The Nuclear Medicine Technology curriculum was activated in September 1974 as a seven (7) quarter Associate in Applied Science degree program in response to the needs voiced by the nuclear medicine community. At that time, a considerable number of individuals were working in the field who did not meet minimum standards of education and experience. Data obtained from the American Hospital Association revealed there was indeed a need for a college-based program for nuclear medicine technology in Michigan. Since that time, the curriculum has expanded to include a Bachelor of Science degree program. The primary goal of the program was, and still is, to educate fully qualified nuclear medicine technologists.

Overview of the Nuclear Medicine Technology Program
The Nuclear Medicine Technology (NMT) program is in the process of implementing a new curriculum. The Bachelor of Science degree as it existed in the past (2+2) was not being utilized by the students. The program faculty put forth a new Bachelor of Science degree curriculum during fall semester 2007 in response to changes in the profession and demand by students for a Bachelor of Science degree that was continuous (not 2+2). The proposed curriculum was approved by the university in December 2007. The first students will enroll in the revised curriculum fall semester 2008. This will be the only degree program offered in NMT beginning fall semester 2009. The curriculum follows the guidelines of The Society of Nuclear Medicine Technology as well as the Joint Review Committee on Educational Programs in Nuclear Medicine Technology. Professional organizations within the field of nuclear medicine technology are advocating for advanced degrees as entry-level for the profession. A Bachelor of Science degree may become the industry standard in the near future. The program faculty fully supports closing the Associate of Applied Science degree in NMT and implementing the Bachelor of Science degree in NMT.

The first six semesters of the Bachelor of Science degree curriculum consists of nuclear medicine, general education, science and health care management courses. The last two semesters will be clinical application at an approved affiliate site. Students follow the academic calendar during internship.

Students will have the option of pursuing the Bachelor of Science degree at either the Big Rapids campus or the Grand Rapids campus.

The final cohort of Associate in Applied Science degree students will begin fall semester 2008 at the Big Rapids campus and are scheduled to graduate May 2010. The first three semesters of this curriculum

consists of nuclear medicine, general education and science courses. The last two semesters are clinical application at an approved affiliate site. Students follow the academic calendar during internship.

At the completion of either degree the student is able to sit for one or both national certification and registry examinations (ARRT and NMTCB).

One additional Bachelor of Science degree option is available for graduates of the Associate in Applied Science degree program. This degree is designed with the working Nuclear Medicine Technologist in mind. These individuals are seeking ways to complete an advanced degree while maintaining their normal work schedules. Students complete the majority of the courses via FerrisConnect. The program will offer the nuclear medicine technology courses on-line. On campus students will not be allowed to enroll in these courses. Admission to this degree include successful completion of an Associate in Applied Science degree in Nuclear Medicine Technology and NMTCB and/or ARRT certification / licensure. There are no similar programs in the State of Michigan and very few within the United States.

Curriculum check sheets are included in Appendix A.

The nuclear medicine technology faculty includes Sheila MacEachron, Program Coordinator and Tracy Glentz, Clinical Coordinator, as well as Timothy VanderLaan, Temporary Faculty.

Clinical internship is completed at one of twenty-five affiliated hospitals in Michigan. Internship is two semesters in length and students follow the academic calendar.

Clinical Affiliates:

Hospital	Location in Michigan
Alpena Regional Medical Center	Alpena
Battle Creek Health Systems	Battle Creek
Bay Regional Medical Center	Bay City
Borgess Medical Center	Kalamazoo
Bronson Methodist Hospital	Kalamazoo
Covenant Healthcare	Saginaw
Foote Memorial Hospital	Jackson
Genesys Regional Medical Center	Grand Blanc
Gerber Memorial Hospital	Fremont
Henry Ford Hospital	Detroit
Ingham Regional Medical Center	Lansing
Marquette General Hospital	Marquette
Memorial Healthcare	Owosso
Memorial Medical Center	Ludington
Mercy Health Partners	Muskegon
Mid Michigan Medical Center	Midland
Munson Hospital	Traverse City
Oakwood Hospital	Dearborn
Saint Mary's Health Services	Grand Rapids
Saint Joseph Mercy Hospital	Ann Arbor

Hospital	Location in Michigan
Sparrow Health System	Lansing
Spectrum Health – Blodgett	East Grand Rapids
Spectrum Health – Butterworth	Grand Rapids
University of Michigan Medical Center	Ann Arbor
Veterans Administration Medical Center	Ann Arbor

A. Program Goals

1. The goal of the NMT program is for graduates to meet the terminal relevant educational tasks as defined by the Joint Review Committee (JRC) on Educational Programs in Nuclear Medicine Technology.

   The requirement for sponsorship with the JRC as stated in the Essentials and Guidelines for an Accredited Educational Program for the Nuclear Medicine Technologist is "The nuclear medicine technology program shall be conducted in an institution that has documented its commitment to quality, integrity and performance". The guideline is for graduates to "develop personal and professional attributes and values relevant to practice" (AKA terminal relevant educational tasks).

2. The current primary goal was established when the NMT program started in 1974 and has not changed significantly. The goals are reviewed annually by program faculty. The goal is driven by expectations of the accrediting body for nuclear medicine technology, the Joint Review Committee on Educational Programs in Nuclear Medicine Technology.

3. The program faculty in conjunction with the Adjunct Clinical Instructors strive to graduate qualified entry level nuclear medicine technologists. They use the terminal relevant educational tasks as defined by the Joint Review Committee on Educational Programs in Nuclear Medicine Technology as a template for ensuring that students are acquiring the necessary skills. By mastering these tasks, students upon graduation meet the needs of the professional community as well as the employers.

4. The primary goal has not changed significantly since the last program review because the goals are defined by the program's accrediting body. In order to remain compliant with the Joint Review Committee, the program must ascertain that graduates meet the relevant tasks which in turn meet industry standards.

5. The NMT program is a career-oriented program that utilizes a variety of teaching / learning techniques. For example, use of on-line programming to meet the needs of place-bound students, hands on laboratory practice prior to internship assignment, and extensive clinical practice.

B. Program Visibility and Distinctiveness

1. The Nuclear Medicine Technology programs offer Ferris State University students the opportunity to complete a college-based program with excellent employment potential. Students interested in a health care profession that involves technical skills, patient contact, computer proficiency and radiation handling are drawn to this field. Many of our students come from other curricula such as pre-medicine, pre-pharmacy and applied biology. The Nuclear Medicine Technology program offers these students an option without having to leave Ferris State University.

   The Ferris State University Nuclear Medicine Technology program is the only college-based nuclear medicine technology degree program in the state. Ferris State University offers the only Nuclear Medicine Technology program in the nation with an on-campus laboratory. It is currently one of the largest nationally in terms of enrollment. It is also unique in the fact that students receive didactic training prior to their internship instead of in conjunction with hospital training.

   The Bachelor of Science degree program for graduates of an Associate degree program in NMT is also unique. The program is designed with the working NMT in mind. Students complete the majority of the courses via FerrisConnect. All NMT courses are delivered on-line. There are no similar programs in the State of Michigan and currently two others within the United States.

2. The NMT program has been successful in attracting quality students through its entry requirements as well as through recruitment efforts.

   In order to apply to the program, high school students must:
   - Successfully complete one year of high school chemistry with an average letter grade of "B" or higher.
   - Achieve a high school cumulative grade point average of 3.0.
   - Earn an ACT math subscore of 19 or higher.

   In order to apply to the program, transfer students must:
   - Successfully complete one chemistry course with a lab component with a letter grade of "C" or higher.
   - Successfully complete MATH 110 with a letter grade of "C" or higher OR have earned an ACT math subscore of 19 or higher.
   - Achieve a cumulative grade point average of 2.5 or higher.

   With the above entry criteria in place, the NMT program has assessed the quality of students entering the professional sequence through ACT scores and cumulative GPAs. Students entering the AAS degree program between 2003 and 2007 had an average GPA of 3.17 (range of 3.00 to 3.27) and an average ACT of 21.972 (range of 21.88 to 22.05). Students entering the BS degree program in 2003, 2004 and 2007 had an average GPA of 3.25 (range of 3.04 to 3.49) and an average ACT of 21.63 (range of 21.40 to 21.89).

Recruitment efforts include the following:

- Visiting / lecturing high school chemistry and/or physics classes.
- Participating in DAWG Days, Open Lab Day, Educator's Academy and Summer Institute.

3. The only competitor in the State of Michigan is William Beaumont Hospital's certificate and associate degree program. Their program and the program at Ferris State University are very distinct. Beaumont's program accepts a small number of students and combines the didactic and internship experience. They, like Ferris' program, receive a large number of applicants and can only accept a limited number. This number is determined by the Joint Review Committee. The program faculty could not determine anything that they could learn from this hospital based program.

C. Program Relevance

1. Labor market analysis:
   The U.S. Department of Labor Bureau of Labor Statistics estimates that the occupational outlook for Nuclear Medicine Technologists will grow faster than average through 2014 and there will be a need for 21.5% more Nuclear Medicine Technologists nationwide. According to the Michigan Health Council's Occupations Employment Forecasts 2002 – 2012, the demand for Nuclear Medicine Technologists in the State of Michigan is expected to grow by approximately 100 by 2012.

2. Emerging issues, labor force, employer needs and student needs:
   The program faculty assesses emerging issues within the profession through publications from professional organizations, specifically workforce documents, advisory committee, employer needs, student needs and surveys.

   Workforce issues include:

   - Future nuclear medicine technologists must be able to understand molecular imaging.
   - The issues facing PET/CT and whether nuclear medicine technologists or radiographers should have ownership of this modality.
   - State licensure.
   - The CARE bill.

   Advisory committee members have been instrumental in providing input regarding the new Bachelor of Science degree curriculum. Members wanted students to understand the newer imaging modalities and supervisory practices. Both of these areas were incorporated into the new curriculum as courses. The members discussed how these areas were needed in order for the graduates of the program to become more employable.

   One of the student needs that have been recently addressed is internship clinical sites. Students expressed a desire for clinical sites in the Upper Peninsula, in Traverse City and in Holland. The program faculty were successful in securing Marquette General Hospital in Marquette and Munson Medical Center in Traverse City as clinical affiliates beginning fall semester 2008.

The implementation of the new BS degree completion program for graduates of the AAS degree program also addressed a need from the professional community. With growing pressure to have a BS degree in NMT for advancement within the profession, Ferris State University is meeting an important student need by offering courses on-line for the working NMT.

3. Why students come to FSU for NMT.
   a. How well does the program meet student expectation?
   Based on a survey of current students, the program meets students expectations. The students rated the following statements in the excellent and good range: "Courses in the NMT program are available and conveniently located" (85.7%); "Teaching methods, procedures and course content meet your occupational needs, interests and objectives" (80.0%); "Instructional support services are available to meet your needs and interests" (65.7%); and " Instructional materials are current and meaningful to the subject" (77.1%).

On the graduate survey, 93.8% indicated that the NMT program very well and well prepared them for their profession.

   b. How is student sentiment measured?
   Based on informal surveys and discussion with select student groups, students come to Ferris State University's Nuclear Medicine Technology program for the following reasons:

- On-campus laboratory
- Hands on experience
- Internship sites were conveniently located
- Small lab size
- Only university based program in the state of Michigan
- Faculty were friendly and had a good reputation
- Learned about program in FSUS 100
- Friend or relative completed the program

D. Program Value

1. Benefits to the university.
   The NMT program benefits Ferris State University by offering a unique program with high job placement rates. The program assists the university in meeting the workforce needs of the health care industry in the state. The quality of the program enhances the reputation of the university.

   Another benefit to the university is "capturing" the working NMTs who have graduated from the AAS degree program and are seeking a BS degree program in NMT. Graduates from other NMT programs (besides FSU's) could also take advantage of this offer. This degree benefits the university by increasing its visibility within the State of Michigan as well as potentially nationally.

The facilities are of benefit to the university by offering students a clean, safe environment in which to learn. The smart classrooms in the VFS building provide faculty with the technology to teach effectively and in a format (i.e. internet, doc cam) that may not be utilized or provided with other NMT programs. The equipment currently in the laboratory is state-of-the-industry.

The faculty and support personnel are beneficial to the university. The program faculty are respected in their field of expertise and students feel that the quality of instruction is high (survey of graduating students rated "instructors in the program provide instruction so it is interesting and understandable" as excellent 52.6% and very good 39.5%). Support personnel aid the faculty members in program matters (i.e. advising Pre-NMT students, application process, transcript evaluation) which allows the faculty members to concentrate on curricular issues.

2. Benefits to the students.

   Besides the unique laboratory setting, students benefit from their clinical experience. The students have the opportunity to learn from adjunct clinical faculty who have extensive clinical experience. They graduate as entry level NMTs. Employment opportunities are above average.

3. Value of the program to employers.

   On the employer survey, 100% of the respondents indicated that based on their experience with current and/or past employees, they would consider hiring another Ferris State University NMT graduate. 96.9% responded that the Ferris State University NMT program very well prepared or well prepared employees overall for employment with them.

4. Benefits to external entities.

   Program Coordinator, Sheila MacEachron, is a site visitor for the Joint Review Committee and has worked with several national groups to define standards for the diagnostic imaging professions. Clinical Coordinator, Tracy Glentz, has presented at the Lilly North Conference.

5. Benefits to general public groups.
   Faculty and students have provided services to groups outside the university. The Ferris Nuclear Medicine Association, for example, works closely with the Susan P. Wheatlake Fund to provide valuable information to the community regarding breast cancer.

Section Two: Collection of Perceptions

A. Graduate Follow-Up Survey

A survey instrument was prepared by the program faculty with advice from Institutional Research & Testing personnel. The surveys were emailed to graduates from 2002 to 2007. There were 16 responses. The low number of respondents could be due to lost emails or change of email addresses. The results of this survey as prepared by the office of Institutional Research & Testing are as follows:

Nuclear Medicine APR...Alumni

Frequencies

Prepared by: Institutional Research & Testing, 03/08

Statistics

	N		Mean	Median	Std. Deviation
	Valid	Missing	Valid	Missing	Valid
q1 When graduate	16	0			
q2 State of current residence	16	0			
q3 Age	16	0	2.75	3.00	.775
q4 Gender	16	0	1.69	2.00	.479
q5a Degree: AAS in Nuclear Medicine Technology	16	0	.94	1.00	.250
q5b Degree: BS in Nuclear Medicine Technology	16	0	.06	.00	.250
q5c Degree: BS in HCSA	16	0	.25	.00	.447
q5d Degree: BS in Applied Biology	16	0	.00	.00	.000
q5e Degree: Other	16	0	.00	.00	.000
q5f Other degree specified	16	0			
q6 Are you credentialed?	16	0	1.06	1.00	.250
q7a Credentials: ARRT	15	1	.33	.00	.488
q7b Credentials: NMTCB	15	1	1.00	1.00	.000
q8 Member of a profes'l Nuc Med organization	16	0	1.50	1.50	.516
q9a Organization: The Society of Nuclear Medicine	8	8	1.00	1.00	.000
q9b Organization: Local chapter	8	8	.50	.50	.535
q9c Organization: Other	8	8	.13	.00	.354
q9d Other organization specified	16	0			
q10 Obtained specialization	16	0	1.94	2.00	.250
q11a Specializations: CT	1	15	1.00	1.00	
q11b Specializations: MR	1	15	.00	.00	
q11c Specializations: PET	1	15	.00	.00	
q11d Specializations: Cardiology	1	15	.00	.00	
q11e Specializations: Other	1	15	.00	.00	
q11f Other specialization specified	16	0			
q12 How well Nuc Med Tec prog prepared you	16	0	3.19	3.00	.544
q13 Area perceive best prepared	16	0	2.38	3.00	.957

q14 Continued education	16	0	1.75	2.00	.447
q15 Degree type/area of study	16	0			
q16 Employment status	16	0	2.75	3.00	.577
q17 Salary range	15	1	4.87	5.00	1.457
q18 Current place of employment	14	2	3.00	2.00	2.774
q18a Other NMT employmt specified	16	0			
q19 How long employed there	15	1	3.87	4.00	1.846
q20 Present job title	16	0			
q21 Present status (if not NMT)	3	13	2.00	2.00	1.000
q21a Other status specified	16	0			
q22 Additional comments	16	0			

Frequency Table

q1 When graduate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2000	2	12.5	12.5	12.5
	2001	2	12.5	12.5	25.0
	2002	3	18.8	18.8	43.8
	2004	1	6.3	6.3	50.0
	2005	2	12.5	12.5	62.5
	2006	3	18.8	18.8	81.3
	2007	3	18.8	18.8	100.0
	Total	16	100.0	100.0	

q2 State of current residence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	mi	1	6.3	6.3	6.3
	MI	13	81.3	81.3	87.5
	NC	1	6.3	6.3	93.8
	ON	1	6.3	6.3	100.0
	Total	16	100.0	100.0	

q3 Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	22-25	7	43.8	43.8	43.8
	26-30	6	37.5	37.5	81.3
	31-35	3	18.8	18.8	100.0
	Total	16	100.0	100.0	

q4 Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	5	31.3	31.3	31.3
	Female	11	68.8	68.8	100.0
	Total	16	100.0	100.0	

q5a Degree: AAS in Nuclear Medicine Technology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	1	6.3	6.3	6.3
	Selected	15	93.8	93.8	100.0
	Total	16	100.0	100.0	

q5b Degree: BS in Nuclear Medicine Technology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	15	93.8	93.8	93.8
	Selected	1	6.3	6.3	100.0
	Total	16	100.0	100.0	

q5c Degree: BS in HCSA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	12	75.0	75.0	75.0
	Selected	4	25.0	25.0	100.0
	Total	16	100.0	100.0	

q5d Degree: BS in Applied Biology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	*16*	*100.0*	*100.0*	*100.0*

q5e Degree: Other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	*16*	*100.0*	*100.0*	*100.0*

q5f Other degree specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		*16*	*100.0*	*100.0*	*100.0*

q6 Are you credentialed?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	*15*	*93.8*	*93.8*	*93.8*
	No	*1*	*6.3*	*6.3*	*100.0*
	Total	*16*	*100.0*	*100.0*	

q7a Credentials: ARRT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	*10*	*62.5*	*66.7*	*66.7*
	Selected	*5*	*31.3*	*33.3*	*100.0*
	Total	*15*	*93.8*	*100.0*	
Missing	System	*1*	*6.3*		
Total		*16*	*100.0*		

q7b Credentials: NMTCB

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Selected	*15*	*93.8*	*100.0*	*100.0*
Missing	System	*1*	*6.3*		
Total		*16*	*100.0*		

q8 Member of a profes'l Nuc Med organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	50.0	50.0	50.0
	No	8	50.0	50.0	100.0
	Total	16	100.0	100.0	

q9a Organization: The Society of Nuclear Medicine

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Selected	8	50.0	100.0	100.0
Missing	System	8	50.0		
Total		16	100.0		

q9b Organization: Local chapter

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	4	25.0	50.0	50.0
	Selected	4	25.0	50.0	100.0
	Total	8	50.0	100.0	
Missing	System	8	50.0		
Total		16	100.0		

q9c Organization: Other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	7	43.8	87.5	87.5
	Selected	1	6.3	12.5	100.0
	Total	8	50.0	100.0	
Missing	System	8	50.0		
Total		16	100.0		

q9d Other organization specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		15	93.8	93.8	93.8
	ATAWM; CCSNM	1	6.3	6.3	100.0
	Total	16	100.0	100.0	

q10 Obtained specialization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	6.3	6.3	6.3
	No	15	93.8	93.8	100.0
	Total	16	100.0	100.0	

q11a Specializations: CT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Selected	1	6.3	100.0	100.0
Missing	System	15	93.8		
Total		16	100.0		

q11b Specializations: MR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	1	6.3	100.0	100.0
Missing	System	15	93.8		
Total		16	100.0		

q11c Specializations: PET

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	1	6.3	100.0	100.0
Missing	System	15	93.8		
Total		16	100.0		

q11d Specializations: Cardiology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	*1*	*6.3*	*100.0*	*100.0*
Missing	System	*15*	*93.8*		
Total		*16*	*100.0*		

q11e Specializations: Other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	*1*	*6.3*	*100.0*	*100.0*
Missing	System	*15*	*93.8*		
Total		*16*	*100.0*		

q11f Other specialization specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		*16*	*100.0*	*100.0*	*100.0*

q12 How well Nuc Med Tec prog prepared you

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat prepared	*1*	*6.3*	*6.3*	*6.3*
	Well prepared	*11*	*68.8*	*68.8*	*75.0*
	Very well prepared	*4*	*25.0*	*25.0*	*100.0*
	Total	*16*	*100.0*	*100.0*	

q13 Area perceive best prepared

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Radiation safety	*5*	*31.3*	*31.3*	*31.3*
	Clinical procedures	*11*	*68.8*	*68.8*	*100.0*
	Total	*16*	*100.0*	*100.0*	

q14 Continued education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	25.0	25.0	25.0
	No	12	75.0	75.0	100.0
	Total	16	100.0	100.0	

q15 Degree type/area of study

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		12	75.0	75.0	75.0
	B.S. Health Administration; M.S. Career & Technical Education	1	6.3	6.3	81.3
	BHA Health Services Mgmt Certificate Long-Term Care Mgmt Certificate Public Relations LLB (in-progress)	1	6.3	6.3	87.5
	Certification in CT	1	6.3	6.3	93.8
	Health care services	1	6.3	6.3	100.0
	Total	16	100.0	100.0	

q16 Employment status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not employed	1	6.3	6.3	6.3
	Part-time (32 hours/wk or less)	2	12.5	12.5	18.8
	Full-time (more than 32 hours/wk)	13	81.3	81.3	100.0
	Total	16	100.0	100.0	

q17 Salary range

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than $20,000	1	6.3	6.7	6.7
	$40,000-$49,999	5	31.3	33.3	40.0
	$50,000-$59,999	3	18.8	20.0	60.0
	$60,000-$69,999	5	31.3	33.3	93.3
	$70,000-$79,999	1	6.3	6.7	100.0
	Total	15	93.8	100.0	
Missing	System	1	6.3		
Total		16	100.0		

q18 Current place of employment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Hospital, 250+ beds	5	31.3	35.7	35.7
	Hospital, up to 250 beds	5	31.3	35.7	71.4
	Clinic	1	6.3	7.1	78.6
	Other	3	18.8	21.4	100.0
	Total	14	87.5	100.0	
Missing	System	2	12.5		
Total		16	100.0		

q18a Other NMT employmt specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		13	81.3	81.3	81.3
	Agency	1	6.3	6.3	87.5
	Mobile PET/CT	1	6.3	6.3	93.8
	Variety of environments	1	6.3	6.3	100.0
	Total	16	100.0	100.0	

q19 How long employed there

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 6 months	1	6.3	6.7	6.7
	6-11 months	4	25.0	26.7	33.3
	1 year to less than 2 years	2	12.5	13.3	46.7
	2 years to less than 3 years	2	12.5	13.3	60.0
	3 years to less than 4 years	1	6.3	6.7	66.7
	4 years or more	5	31.3	33.3	100.0
	Total	15	93.8	100.0	
Missing	System	1	6.3		
Total		16	100.0		

q20 Present job title

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	12.5	12.5	12.5
	Lead PET technologist	1	6.3	6.3	18.8
	Nuc Med Tech	4	25.0	25.0	43.8
	Nuc Med Technologist	6	37.5	37.5	81.3
	Nuc Med Technologist (Lead Tech)	1	6.3	6.3	87.5
	Nuc Med Technologist, Senior & ACI (Adjunct Clinical Instructor for FSU)	1	6.3	6.3	93.8
	Travel Tech	1	6.3	6.3	100.0
	Total	16	100.0	100.0	

q21 Present status (if not NMT)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Seeking employment	1	6.3	33.3	33.3
	Employed in another field	1	6.3	33.3	66.7
	Not available for employment: Student	1	6.3	33.3	100.0
	Total	3	18.8	100.0	
Missing	System	13	81.3		
Total		16	100.0		

q21a Other status specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		16	100.0	100.0	100.0

q22 Additional comments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		13	81.3	81.3	81.3
	I feel that the great majority of what I learned was on my internship. I know that is what is supposed to happen, but it felt like I didn't learn nearly enough while on campus. What we did learn didn't make any sense until we reached internship (& many others have told me the same thing), because we were taught more theory than practical application. I was fortunate enough to have interned in an excellent department, otherwise I probably wouldn't have passed my boards. Much of what was taught in the classroom was extremely outdated, we spent great amounts of time on things that are not really even done in Nuc Med anymore & not enough time on what was really important to know. The curriculum needs to be revamped.	1	6.3	6.3	87.5
	Sheila did a wonderful job assisting us & helping us along the way. I still look back & remember her advice & support.	1	6.3	6.3	93.8
	The program really fails to prepare the student for the certification process. There also needs to be more info in the course focused upon the physics of radiation. There are a lot of areas covered, but no real depth to the workings of nuc med & the physics & instrumentation.	1	6.3	6.3	100.0
	Total	16	100.0	100.0	

Discussion:
The results of the graduate follow-up survey were overall very good. 93.8% of the respondents indicated that they were very well prepared (25%) or well prepared (68.8%) by the NMT program. They perceived that the clinical procedures (68.8%) best prepared them for employment. The majority (81.3%) were employed full time with 62.6% employed in a hospital setting. All but one respondent was credentialed.

Institutional Research & Testing also conducted a graduate follow-up survey report in 2005 – 2006. The information in this report pertaining to Nuclear Medicine Technology is as follows:

- 29 graduates were surveyed and 22 responded which was a 76% response rate.
- 95% Placement rate
- Average salary $35,784.

B. Employer Follow-Up Survey

A survey instrument was prepared by the program faculty with advice from Institutional Research & Testing personnel. Surveys were sent to 76 potential employers of Nuclear Medicine Technologists in the State of Michigan. Thirty-eight responded for a response rate of 50.0%.

Survey results are as follows:

1. In what capacities are/were graduates employed? (Please indicate all that apply.)

a.	Staff NMT, On Call Only	8/30	26.7%
b.	Staff NMT, Per Diem	7/30	23.3%
c.	Staff NMT, Temporary	3/30	10.0%
d.	Staff NMT, Part Time	14/30	46.7%
e.	Staff NMT, Full Time	30/30	100%
f.	Supervisor, NMT	15/30	50.0%
g.	Other: PACS Administrator	1/30	3.3%
	Manager	2/30	6.7%
	Clinical Applications Coordinator	1/30	3.3%

2. Please indicate how well the FSU Nuclear Medicine Technology program prepared the employee(s) overall for their employment with you.

a.	Poorly prepared	0/32	0%
b.	Somewhat prepared	1/32	3.1%
c.	Well prepared	21/32	65.6%
d.	Very well prepared	10/32	31.3%

3. In what area do you perceive the employees overall were the best prepared? (Please select only one.)

a.	Radiation safety	7/30	23.3%
b.	Instrumentation	1/30	3.3%
c.	Clinical procedures	19/30	63.4%
d.	Radiopharmacy	3/30	10.9%

4. In what are do you perceive the employees overall were least prepared? (Please select only one.)

a.	Radiation safety	3/28	10.7%
b.	Instrumentation	10/28	35.7%
c.	Clinical procedures	4/28	14.3%
d.	Radiopharmacy	11/28	39.3%

5. Do you feel that the employees were adequately prepared to assume their duties at your institution?

a.	Yes	30/30	100%
b.	No	0/30	0%

6. Based on your experience with current and/or past employees, would you consider hiring another FSU Nuclear Medicine Technology graduate?

a.	Yes	32/32	100%
b.	No	0/32	0%

7. What are your feelings in regards to Bachelor degree prepared entry level technologists?

    - I believe all Nuclear Medicine Technologists need to attain a B.S. in Nuc Med or in an administrative field.

- I do not feel this is necessary. Having a Bachelor's degree does not make them better technologists. They need strong hospital skills.
- Good idea.
- Program should include PET.
- I think it's a great idea! The field is quickly moving in that direction anyway.
- I feel that both degrees should be offered. Have a Bachelor's degree myself from Ferris, I feel more equipped to perform certain duties on the managerial level than my Associate's degree counterparts. However, having worked with both AS and BS employees, the playing field is pretty level in the everyday clinical practice.
- I think it would give the students more time to mature as a professional; not all the time, but some are graduating at 19 or 20 years of age. For some it might be a little early.
- The way to go. BS programs are the future.
- Bachelor degree is an excellent idea. The 2-year program does not have the broader knowledge I feel they should have, especially in decision making. Also, I hope the maturity level increases in FSU graduates. The 2-year degree tends to be an attitude of a quick degree that pays well. With very little "buy in" form the students. Overall, FSU graduates have been very good. And getting better.
- Students will be older and more mature, ready to handle the "real world".

Discussion:
The majority of the respondents (89.5%) currently employ Ferris State University NMT graduates and 100% would consider hiring another. The majority also indicated that employees were very well prepared (31.3%) or well prepared (65.6%) for employment. They perceived that employees were best prepared in the area of clinical procedures and least prepared in the area of radiopharmacy.

C. Graduating Student Exit Survey

The graduating student exit survey was developed by program faculty with input from Institutional Research & Testing. Forty students (100% response rate) completed the survey in April 2007. The students were asked to respond to 25 questions using the following rating guide:

E	=	Excellent means nearly ideal; top 5 – 10%
G	=	Good is a strong rating; top one-third
A	=	Acceptable is average; the middle third
BE	=	Below expectations is only fair; bottom one-third
P	=	Poor is seriously inadequate; bottom 5 – 10%
DK	=	Don't know

Survey results are as follows:

		E	G	A	BE	P	DK
1	Courses in the NMT Program are available and conveniently located.	16 40%	19 47.5%	4 10%	1 2.5%	0 0%	0 0%
2	Courses in the NMT Program are based on realistic prerequisites.	7 17.5%	21 52.5%	9 22.5%	3 7.5%	0 0%	0 0%
3	Written objectives for courses in your program are available to students.	22 55%	17 42.5%	1 2.5%	0 0%	0 0%	0 0%
4	Written objectives for courses in your program describe what will be covered in the course.	20 50%	19 47.5%	1 2.5%	0 0%	0 0%	0 0%
5	Teaching methods, procedures and course content meet your occupational needs, interests and objectives.	9 22.5%	20 50%	6 15%	5 12.5%	0 0%	0 0%
6	Teaching methods, procedures and course content provide practice for developing job skills.	8 20%	16 40%	8 20%	6 15%	2 5%	0 0%
7	Related courses (i.e. English, Chemistry) are pertinent to occupational instruction.	9 22.5%	22 55%	8 20%	1 2.5%	0 0%	0 0%
8	Related courses (i.e. English, Chemistry) are current and meaningful to you.	8 18%	22 56.4%	9 23.1%	1 2.5%	0 0%	0 0%
9	Internship is readily available at convenient locations.	16 40%	15 37.5%	6 15%	2 5%	1 2.5%	0 0%
10	Internship is coordinated with faculty.	13 36.1%	11 30.6%	8 22.2%	3 8.3%	1 2.8%	0 0%
11	Internship is considered by you to be a valuable introduction to a nuclear medicine technology field.	30 75%	9 22.5%	1 2.5%	0 0%	0 0%	0 0%
12	Career planning information or assistance meets your needs and interests.	4 10%	12 30%	17 42.5%	4 10%	3 7.5%	0 0%
13	Career planning information or assistance helps you make career decisions and choices.	4 10%	12 30%	17 42.5%	4 10%	3 7.5%	0 0%
14	Placement services are available to help you find employment opportunities.	2 5%	5 12.5%	7 17.5%	11 27.5%	14 35%	1 2.5%
15	Placement services are available to prepare you to apply for employment.	2 5%	7 17.5%	12 30%	9 22.5%	9 22.5%	1 2.5%
16	Instructors in the program know the subject matter and occupational requirements.	24 63.2%	11 28.9%	2 5.3%	0 0%	1 2.6%	0 0%
17	Instructors in the program are available for help when you need it.	18 47.4%	14 36.8%	4 10.5%	2 5.3%	1 2.9%	0 0%
18	Instructors in the program provide instruction so it is interesting and understandable.	20 52.6%	15 39.5%	3 7.9%	0 0%	0 0%	0 0%
19	Instructional support services (i.e. tutoring, FLITE) are available to meets your needs and interests.	11 28.9%	13 34.2%	7 18.4%	5 13.2%	1 2.6%	1 2.6%
20	Instructional support services (i.e. tutoring, FLITE) are available to all students on an equal basis.	11 28.9%	13 34.2%	10 26.3%	1 2.6%	2 5.3%	1 2.6%
21	Instructional equipment is current and representative of industry.	11 31.4%	13 32.5%	15 37.5%	6 15%	4 10%	0 0%
22	Instructional equipment is in sufficient quantity to avoid long delays in use.	3 8.3%	14 38.9%	11 30.6%	4 11.1%	3 6.3%	1 2.8%
23	Instructional equipment is in good condition.	4 11.1%	13 36.1%	6 16.7%	10 27.8%	3 8.3%	0 0%
24	Instructional materials (i.e. textbooks) are current and meaningful to the subject.	16 42.1%	16 42.1%	6 15.8%	0 0%	0 0%	0 0%
25	Instructional materials (i.e. textbooks) are available at reasonable costs.	8 21.1%	10 26.3%	13 34.2%	4 10.5%	3 7.9%	0 0%

Discussion:

Overall, the results of the survey were positive. High ratings were indicated in the areas of relevance of courses and quality of instruction. Internship statements were rated very highly as were the statements relating to instructors. The lowest ratings were seen in the cost of textbooks and in related course as being meaningful.

In the area of relevance of courses, 70% of students rated "courses in the NMT program are based on realistic prerequisites" at excellent and good. "Related courses are pertinent to occupational instruction" 77.5% at excellent and good; "Related courses are current and meaningful to you" 74.4% at excellent and good; and "Internship is considered by you to be a valuable introduction to a nuclear medicine technology field" 97.5% at excellent and good.

In the area of quality of instruction, the following statements were rated at excellent or good: "Instructors in the program know the subject matter and occupational requirements" 92.1%; "Instructors in the program provide instruction so that it is interesting and understandable" 92.1%; "Instructional materials are current and meaningful to the subject" 84.2%; and "Instructional materials are available at a reasonable cost" 47.2%.

D. Student Program Evaluation

The survey instrument was developed by program faculty with input from Institutional Research and Testing. Thirty-five of the 38 on-campus students responded to the survey for a response rate of 92.1%. The students were asked to respond to 25 questions using the following rating guide:

E	=	Excellent means nearly ideal; top 5 – 10%
G	=	Good is a strong rating; top one-third
A	=	Acceptable is average; the middle third
BE	=	Below expectations is only fair; bottom one-third
P	=	Poor is seriously inadequate; bottom 5 – 10%
DK	=	Don't know

Survey results are as follows:

		E	G	A	BE	P	DK
1	Courses in the NMT Program are available and conveniently located.	17 48.6%	13 37.1%	4 11.4%	0 0%	1 2.9%	0 0%
2	Courses in the NMT Program are based on realistic prerequisites.	17 48.6%	18 51.4%	0 0%	0 0%	0 0%	0 0%
3	Written objectives for courses in your program are available to students.	22 62.9%	12 34.3%	0 0%	0 0%	0 0%	1 2.9%
4	Written objectives for courses in your program describe what will be covered in the course.	22 62.9%	8 22.9%	4 11.4%	0 0%	0 0%	1 2.9%
5	Teaching methods, procedures and course content meet your occupational needs, interests and objectives.	18 51.4%	10 28.6%	5 14.3%	1 2.9%	1 2.9%	0 0%
6	Teaching methods, procedures and course content provide practice for developing job skills.	21 60.0%	10 28.6%	3 8.6%	1 2.9%	0 0%	0 0%
7	Related courses (i.e. English, Chemistry) are pertinent to occupational instruction.	12 34.3%	14 40.0%	5 14.3%	4 11.4%	0 0%	0 0%
8	Related courses (i.e. English, Chemistry) are current and meaningful to you.	13 37.1%	14 40.0%	7 20.0%	0 0%	1 2.9%	0 0%
9	Internship is readily available at convenient locations.	16 45.7%	6 17.1%	11 31.4%	1 2.9%	1 2.9%	0 0%
10	Internship is coordinated with faculty.	16 45.7%	10 28.6%	4 11.4%	0 0%	0 0%	5 14.3%
11	Internship is considered by you to be a valuable introduction to a nuclear medicine technology field.	27 77.1%	6 17.1%	0 0%	0 0%	0 0%	2 5.7%
12	Career planning information or assistance meets your needs and interests.	11 31.4%	16 45.7%	3 8.6%	0 0%	1 2.9%	4 11.4%
13	Career planning information or assistance helps you make career decisions and choices.	13 37.1%	10 28.6%	3 8.6%	2 5.7%	1 2.9%	6 17.1%
14	Placement services are available to help you find employment opportunities.	3 8.6%	4 11.4%	2 5.7%	0 0%	2 5.7%	24 68.6%
15	Placement services are available to prepare you to apply for employment.	6 17.1%	3 8.6%	1 2.9%	0 0%	2 5.7%	23 65.7%
16	Instructors in the program know the subject matter and occupational requirements.	26 74.3%	9 25.7%	0 0%	0 0%	0 0%	0 0%
17	Instructors in the program are available for help when you need it.	20 57.1%	11 31.4%	2 5.7%	0 0%	1 2.9%	0 0%
18	Instructors in the program provide instruction so it is interesting and understandable.	16 45.7%	15 42.9%	2 5.7%	1 2.9%	0 0%	0 0%
19	Instructional support services (i.e. tutoring, FLITE) are available to meets your needs and interests.	12 34.3%	11 31.4%	3 8.6%	1 2.9%	2 5.7%	6 17.1%
20	Instructional support services (i.e. tutoring, FLITE) are available to all students on an equal basis.	12 34.3%	11 31.4%	4 11.4%	0 0%	2 5.7%	6 17.1%
21	Instructional equipment is current and representative of industry.	11 31.4%	11 31.4%	8 22.9%	0 0%	3 8.6%	2 5.7%
22	Instructional equipment is in sufficient quantity to avoid long delays in use.	15 42.9%	11 31.4%	5 14.3%	3 8.6%	0 0%	3 8.6%
23	Instructional equipment is in good condition.	14 40.0%	11 31.4%	6 17.1%	2 5.7%	0 0%	2 5.7%
24	Instructional materials (i.e. textbooks) are current and meaningful to the subject.	16 45.7%	11 31.4%	6 17.1%	2 5.7%	0 0%	0 0%
25	Instructional materials (i.e. textbooks) are available at reasonable costs.	5 14.3%	12 34.3%	13 37.1%	2 5.7%	2 5.7%	1 2.9%

Overall, the results of the survey were positive and parallel the results of the graduate survey in the areas of relevance of courses and quality of instruction.

E. Faculty Perceptions

The faculty perception survey was completed by the two program faculty members.

The survey directed the faculty member to rate each item using the following guide along with the explanations accompanying each question.

E = Excellent
G = Good
A = Acceptable
BE = Below expectations
P = Poor
DK = Don't know

	E	G	A	BE	P	DK	Comments
Participation in Development of Program Excellent: Administrators and others involved in developing and revising the college plan for this program seek and respond to faculty, students and community input. Poor: Development of this program does not take into consideration needs or requirements outside of the immediate programmatic needs.		2 100%					
Course Objectives Excellent: Objectives have been developed for the courses in the Nuclear Medicine Technology Program and are used to plan and organize instruction. Poor: No objectives have been developed for the courses in the Nuclear Medicine Technology Program.	1 50%	1 50%					Objectives are being developed as a program for the new BS degree which keeps everyone "on the same page". New program objectives are clear and reasonable.
Use of Information on Labor Market Needs Excellent: Current data on labor market needs and emerging trends in the job market are used in developing and evaluating this program. Poor: Labor market data is not used in planning or evaluation.		1 50%	1 50%				
Use of Joint Review Committee Standards Excellent: JRC standards are used in planning and evaluating this program and content of its courses. Poor: No recognition is given to JRC standards in planning and evaluating this program and content of its courses.	2 100%						
Use of Student Follow-Up Information Excellent: Current follow-up on graduates and those who do not complete the entire program are consistently used in evaluating the program. Poor: Student follow-up information has not been used in evaluating this program.				2 100%			Graduate surveys are done inconsistently by the program faculty. Rely on FSU to gather data except during review years. Utilize evaluations of ACIs to see if changes need to be made.
Relevance of Supportive Courses Excellent: Applicable supportive courses (such as MRIS) are relevant to program goals and current to the needs of the students.		2 100%					CCHS 101, 102, & 103. All new BS degree courses.

Poor: Supportive course content reflects no planned approach to meeting needs of students in this program.							
Provision For Work Experience / Internship Excellent: Ample opportunities are provided for related work experience and available for students. Poor: Few opportunities are provided to students for related work experience.	2 100%						More time in radiopharmacy to come.
Program Availability and Accessibility Excellent: Students and potential students desiring enrollment in this program are identified through recruitment activities, treated equally in enrollment selection, and not discouraged by unrealistic prerequisites. The program is readily available and accessible at convenient times and locations. Poor: The program is not available or accessible to most students seeking enrollment. Improper discriminatory selection procedures are practiced.	2 100%						
Efforts to Achieve a Bias Free Environment Excellent: Emphasis is given to assuring that no illegal or improper bias (whether it be gender, race or other) occurs in the program. Poor: Improper bias appears to be the norm.		1 50%	1 50%				
Provision For Program Advisement Excellent: Instructors in the program advise students on program and course selection. Registration procedures facilitate course selection and sequencing. Poor: Instructors make no provision for advising students on course and program selection.	1 50%	1 50%					Group advising works well. Harder to advise professional sequence students now that a pre-NMT advisor and a BS off campus degree advisor are involved. A bit complicated now with BS and on line.
Provision For Career Planning and Guidance Excellent: Students in this program have ready access to career planning and guidance services. Poor: Little or no provision is made for career planning and guidance services for students enrolled in this program.			2 100%				
Adequacy of Instructional Facilities Excellent: Instructional facilities and equipment meet the program objectives and student needs. Poor: Facilities and equipment for this program generally are restrictive, dysfunctional or overcrowded.				2 100%			We need a camera or two in the lab. Most equipment is great but cameras are desperately needed. Floor tiles need replaced. Lab needs updated.
Use of Advisory Committees Excellent: The advisory committee for this program is active and representative of the occupation. Poor: The advisory committee for this program is not representative of the occupation and is not functional.	1 50%	1 50%					

Discussion:
Overall, the program faculty are pleased with the program and high ratings (Excellent – Good) were achieved on the survey.

In the areas of curriculum, the faculty indicated the following: Course objectives (1 excellent, 1 good); Use of Joint Review Committee standards (2 excellent); Relevance of supportive courses (2 good); and Provision for internship (2 excellent).

In the area of resources, the faculty indicated the following: Adequacy of instructional facilities (2 below expectations).

In the area of admission standards, the faculty indicated the following: Program availability and accessibility (2 excellent).

In the area of degree of commitment by the administration, the faculty indicated the following: Participate in development of program (2 good).

In the areas of processes and procedures used, the faculty indicated the following: Use of information on labor market needs (1 good, 1 average); Use of student follow-up information (2 below expectations); Efforts to achieve a bias free environment (1 good, 1 average); Provision for program advisement (1 excellent, 1 good); Provision for career planning and guidance (2 average); and Use of advisory committee (1 excellent, 1 good).

Several issues need to be evaluated. Student follow-up information / graduate surveys need to be performed on an annual basis. Feedback from these surveys will need to be discussed at program meetings. A second area of concern is the adequacy of instructional facilities. The program faculty indicated a need for gamma scintillation cameras and for an update / renovation of the lab area.

F. Advisory Committee Perceptions

The NMT program utilizes the Adjunct Clinical Instructors from the clinical affiliates as our advisory committee. Their input is crucial to the success of the program.

A survey was sent to 25 Adjunct Clinical Instructors/Advisory Committee members and eleven responded (11/25, 44.0%).

	ACI for FSU NMT Program	**Employers of FSU Graduates**	**Alumnus of FSU NMT Program**
I feel that I represent the constituency(ies) checked. (Please check all that apply.)	10/11 90.9%	5/11 45.5%	10/11 90.9%

	Strongly Agree	**Agree**	**Undecided**	**Disagree**	**Strongly Disagree**
I understand the vision and goals of the Ferris State University Nuclear Medicine Technology Program	5/11 45.5%	4/11 36.3%	1/11 9.1%	1/11 9.1%	0/11 0%
I understand and value the purpose and tasks of the Advisory Committee	4/11 36.3%	5/11 45.5%	2/11 18.2%	0/11 0%	0/11 0%

The efforts of the Advisory are valued by the Nuclear Medicine Technology Program faculty and the Ferris State University administration	2/11 18.2%	8/11 72.7%	0/11 0%	1/11 9.1%	0/11 0%
As an Advisory Committee member, I get adequate information and guidance from the Nuclear Medicine Technology Program faculty	4/11 36.3%	5/11 45.5%	1/11 9.1%	1/11 9.1%	0/11 0%
The Advisory Committee is utilized appropriately for input on program improvement	4/11 36.3%	3/11 27.4%	4/11 36.3%	0/11 0%	0/11 0%
The Advisory Committee addresses internal problems and conflicts in an effective manner	4/11 36.3%	2/11 18.2%	5/11 45.5%	0/11 0%	0/11 0%
The efforts of the Advisory Committee to achieve programmatic goals are usually successful.	4/11 36.3%	3/11 27.4%	4/11 36.3%	0/11 0%	0/11 0%

"Positive" comments from the survey:

- I think that a lot of ACIs have a lot of good suggestions for the good of the Nuclear Medicine Technology program and I do wish there was a way to better communicate them to FSU, and between other ACIs. We have learned a lot each year with the students that come through the program and see ways to improve certain things. I have seen some changes this year with the check off and behavioral trait forms, so that was very nice to see. I am glad that those suggestions were taken and implemented.
- Tracy has been a nice addition to the program. She is always available and willing to answer questions. Always has a positive attitude and easy to work with.
- Since our facility is just starting to accept students this year for the first time, I cannot answer this survey adequately at this time.

"Negative" comments from the survey:

- The Nuclear Medicine Program has step (sic) backwards in the past few years, the students coming out of the Ferris State University program are not as well prepared as those of earlier graduates. I believe several things maybe (sic) contributing to this, the increase of class size, the age of the students, lack of commitment of student and environment. This is not only my opinion, it the (sic) opinion of many of my staff, who assess (sic) in the training of the interns.
- It would be nice as an ACI to have a syllabus of when student's evaluations/assignments are due. Also, a copy of the form they are required to have filled out each month/week.

Discussion:
The majority of the respondents understand the vision and goals of the program and feel that their efforts are valued by the NMT faculty and Ferris State University administration. An area of concern, however, is the number of respondents who indicated they were undecided regarding their utilization, their ability to address internal problems and ability to achieve programmatic goals. The program faculty will need to address these concerns with the Advisory Committee.

It will also be important in the future to survey the Advisory Committee on issues regarding curriculum, outcomes, facilities, equipment, graduates, and trends that affect job placement as well as other relevant information. The program faculty do seek this information during ACI meetings and ACIs are open during their discussions.

Section Three: Program Profile

A. Profile of Students

1. Student Demographic Profile

Ferris State University
APR 03 – 07
Pre-Nuclear Medicine
AAS

Term	Enrolled	Male	Female	Unknown	Black	Hispanic	Indian/ Alaskan	Asian/ Pac Islander	White	Foreign	Full Time	Part TIme
200308	46	10	36	3	3	1	0	0	39	0	39	7
200408	51	19	32	1	1	1	0	0	48	0	41	10
200508	67	26	41	3	1	0	0	2	61	0	59	8
200608	59	29	30	3	1	2	0	2	51	0	50	9
200708	45	21	24	1	4	0	0	0	40	0	40	5

Ferris State University
APR 03 – 07
Pre-Nuclear Medicine
BS

Term	Enrolled	Male	Female	Unknown	Black	Hispanic	Indian/ Alaskan	Asian/ Pac Islander	White	Foreign	Full Time	Part TIme
200408	2	2	0	0	0	0	0	0	2	0	2	0

Ferris State University
APR 03 – 07
Nuclear Medicine Technology
AAS

Term	Enrolled	Male	Female	Unknown	Black	Hispanic	Indian/ Alaskan	Asian/ Pac Islander	White	Foreign	Full Time	Part TIme
200308	57	25	32	3	3	0	0	1	50	0	47	10
200408	56	20	36	5	2	1	0	0	48	0	47	9
200508	49	16	33	2	0	1	0	2	44	0	39	10
200608	43	19	24	2	1	1	0	0	39	0	33	10
200708	52	23	29	0	4	2	0	3	43	0	41	11

Ferris State University
APR 03 – 07
Nuclear Medicine Technology
BS

Term	Enrolled	Male	Female	Unknown	Black	Hispanic	Indian/ Alaskan	Asian/ Pac Islander	White	Foreign	Full Time	Part TIme
200308	11	4	7	0	2	0	0	0	9	0	8	3
200408	7	3	4	0	1	0	0	0	6	0	5	2
200708	6	3	3	0	0	0	0	0	6	0	0	6

Ferris State University
Administrative Program Review 2007
Enrollment (Headcounts)
Pre-Nuclear Medicine
AAS

Term	Fresh On	Fresh Off	Fresh Total	Soph On	Soph Off	Soph Total	Junior On	Junior Off	Junior Total	Senior On	Senior Off	Senior Total
200308	20	0	20	15	0	15	7	0	7	4	0	4
200408	24	0	24	14	0	14	8	0	8	5	0	5
200508	34	0	34	19	0	19	11	0	11	3	0	3
200608	25	0	25	24	0	24	6	0	6	4	0	4
200708	17	0	17	16	0	17	9	0	9	3	0	3

Ferris State University
Administrative Program Review 2007
Enrollment (Headcounts)
Pre-Nuclear Medicine
BS

Term	Fresh On	Fresh Off	Fresh Total	Soph On	Soph Off	Soph Total	Junior On	Junior Off	Junior Total	Senior On	Senior Off	Senior Total
200408	1	0	1	0	0	0	1	0	1	0	0	0

Ferris State University
Administrative Program Review 2007
Enrollment (Headcounts)
Nuclear Medicine Technology
AAS

Term	Fresh On	Fresh Off	Fresh Total	Soph On	Soph Off	Soph Total	Junior On	Junior Off	Junior Total	Senior On	Senior Off	Senior Total
200308	9	0	9	23	0	23	15	0	15	10	0	10
200408	2	0	2	17	0	17	21	0	21	16	0	16
200508	2	0	2	17	0	17	13	0	13	17	0	17
200608	4	0	4	10	0	10	12	0	12	17	0	17
200708	0	0	0	12	0	12	20	0	20	20	0	20

Ferris State University
Administrative Program Review 2007
Enrollment (Headcounts)
Nuclear Medicine Technology
BS

Term	Fresh On	Fresh Off	Fresh Total	Soph On	Soph Off	Soph Total	Junior On	Junior Off	Junior Total	Senior On	Senior Off	Senior Total
200308	0	0	0	0	0	0	3	0	3	8	0	8
200408	0	0	0	0	0	0	0	0	0	7	0	7
200708	0	0	0	0	0	0	1	0	1	5	0	5

Ferris State University
APR 03 – 07
Enrollment by Residency and Age
Pre-Nuclear Medicine Technology
AAS

Term	Blank	Resident	Midwest Compact	Non-Resident	Average Age
200308	0	45	1	0	25
200408	0	51	0	0	24
200508	0	67	0	0	22
200608	0	58	0	1	21
200708	0	45	0	0	21

Ferris State University
APR 03 – 07
Enrollment by Residency and Age
Pre-Nuclear Medicine
BS

Term	Blank	Resident	Midwest Compact	Non-Resident	Average Age
200408	0	2	0	0	23

Ferris State University
APR 03 – 07
Enrollment by Residency and Age
Nuclear Medicine Technology
AAS

Term	Blank	Resident	Midwest Compact	Non-Resident	Average Age
200308	0	54	3	0	27
200408	0	54	2	0	27
200508	0	48	0	1	25
200608	0	43	0	0	24
200708	0	52	0	0	24

Ferris State University
APR 03 – 07
Enrollment by Residency and Age
Nuclear Medicine Technology
BS

Term	Blank	Resident	Midwest Compact	Non-Resident	Average Age
200308	0	11	0	0	30
200408	0	6	0	1	31
200708	0	6	0	0	24

a) Gender, race/ethnicity, and age.
Allied health professions have typically been thought of as being held predominantly by women. In many areas, such as dental hygiene, this is true. In diagnostic imaging programs, however, the number of men enrolled has been higher than other allied health programs. Although there are usually more women than men enrolled in NMT, the number is close to a 50/50 ratio each year. In AY 2003-2004, there were 57 students enrolled in the AAS degree program. 43.9% were male. In AY 2007-2008, 52 students were enrolled and 44.2% were male. The lowest percent of males, 32.7%, enrolled occurred in AY 2005-2006. The overall average percent of males enrolled in the AAS program from 2003 to 2008 was 40.1%. Between the years of 2003 and 2007, there were 24 students enrolled in the BS degree program. The overall average percent of males enrolled was 41.7%. The gender of the classes does not impact the curriculum, scheduling or delivery methods in the program.

Between the years of 2003 and 2007, 257 students were enrolled in the AAS degree program. 87.1% (224/257)were white, 4.7% (12/257) were "unknown", 3.9% (10/257) were black, 2.3% (6/257) were Asian/Pacific Islander, 1.9% (5/257) were Hispanic, and 0% (0/257) were Indian/Alaskan. Between the years of 2003 and 2007, 24 students were enrolled in the BS degree program. 87.5% (20/24) were white and 12.5% (3/24)were black and 4.1% (1/24) were "unknown". The race/ethnicity make-up of the classes does not impact the curriculum, scheduling or delivery methods in the program.

The average age of students enrolled in the AAS degree program between 2003 and 2008 was 25.4 years with a range of 27 to 24 years. The oldest average age was documented in 2003 and 2004 and the youngest average age in 2006 and 2007. The average age is dropping but not significantly. The average age of students enrolled in the BS degree program between 2003 and 2008 was 28.3 years with a range of 31 to 24 years. The oldest average age was in 2004 and the youngest in 2007. The average age has dropped significantly over time. The average age of the classes does not impact the curriculum, scheduling or delivery methods in the program.

b) In-state and out-of-state
The NMT program has had one non-resident student in each of the degree programs between 2003 and 2008. Five students were part of the Midwest Compact. Since internship must be completed within the state of Michigan and at specific affiliate sites, the program appeals to in-state students. Whether a student is in-state or out-of-state does not impact the curriculum, scheduling or delivery methods in the program.

c) Full-time and part-time
Between 2003 and 2007, 80.5% (207/257)of students enrolled in the AAS degree program were full-time and 19.5% (50/257) were part-time. In the BS degree program, 54.2% (13/24) were full-time and 45.8% (11/24) were part-time. Whether a student is full-time or part-time does not impact the curriculum, scheduling or delivery methods in these degree programs.

The BS degree program for graduates of an AAS degree will take into account the fact that the students enrolled are working NMTs. The courses will be offered on a rotational basis for students enrolled part-time.

d) Attend classes during the day, in the evenings and on weekends.
The professional courses in the NMT program on campus are held during the day Monday through Friday. No evening or weekend courses are offered at this time. Internship is offered during the day only with no evenings or weekends. Students may elect to enroll in general education, core curriculum, and non professional courses during the evenings or weekends. Non professional courses may also be taken fully on-line.

e) Enrolled in classes on- and off-campus.
Students in the AAS degree program take all of their professional courses together at the Big Rapids campus of Ferris State University. Non professional courses, including core curriculum, may be taken on-line, in person or at an off campus location. Internship during the second year is off campus at an affiliate clinical site with the coursework performed via FerrisConnect.

Students enrolled in the BS degree programs take all their professional courses together either at the Big Rapids or Grand Rapids campuses of Ferris State University. Each student is assigned to a cohort and may not travel between the two campuses for their professional courses. Non professional courses, including core curriculum, may be taken on-line, in person or at an off campus location. The Grand Rapids cohort may also enroll in courses at Grand Rapids Community College. Internship during the last year is off campus at an affiliate clinical site with the coursework performed via FerrisConnect.

f) Enrolled in 100% on-line and/or mixed delivery courses
Professional courses for both the AAS and BS degree programs are supplemented through FerrisConnect. Students access lecture materials, assignments, syllabi, program policies, and practice worksheets in this manner. Internship didactic courses are delivered 100% on-line via FerrisConnect. The program faculty has found FerrisConnect to be a powerful tool for student preparedness and quick access to supplemental materials such as images, links, etc.

g) How does the above information impact the curriculum, scheduling and/or delivery methods?
The issue of gender, race/ethnicity, and age does not impact the curriculum, scheduling and delivery methods in the program.

Whether a student is in-state or out-of-state does not impact the curriculum, scheduling and delivery methods in the program.

Whether a student is full-time or part-time does not impact the curriculum, scheduling and delivery methods in the program.

All professional courses in the NMT program are currently offered during the day with no evening or weekend classes. There are no plans at this time to change the format.

Students are able to enroll in non professional courses on-line, in person or at an off campus location. Internship will be at affiliate sites with the coursework performed via FerrisConnect. Students enrolled in the BS completion degree will complete their

professional courses via FerrisConnect. There are no plans at this time to change the format.

The Grand Rapids cohort will begin fall semester 2008 based on the number of students that are commuting from that area. Although the above information does not indicate where students live, the program faculty were aware of this issue and wanted to meet the needs of these students.

2. Quality of Students

Ferris State University
APR 03 – 07
Enrollment by FSU GPA and ACT
Pre-Nuclear Medicine
AAS

Term	Avg GPA	Min GPA	Max GPA	Avg ACT	Min ACT	Max ACT
200308	2.99	1.715	4.000	20.50	12	26
200408	2.97	0.874	4.000	22.52	15	29
200508	2.84	1.576	4.000	21.75	14	29
200608	2.99	1.690	4.000	21.87	15	30
200708	2.99	1.920	3.94	21.26	16	26

Ferris State University
APR 03 – 07
Enrollment by FSU GPA and ACT
Pre-Nuclear Medicine
BS

Term	Avg GPA	Min GPA	Max GPA	Avg ACT	Min ACT	Max ACT
200408	3.01	3.014	3.014	22.50	22	23

Ferris State University
APR 30 – 07
Enrollment by FSU GPA and ACT
Nuclear Medicine Technology
AAS

Term	Avg GPA	Min GPA	Max GPA	Avg ACT	Min ACT	Max ACT
200308	3.00	1.766	3.929	21.88	17	32
200408	3.18	2.043	3.864	21.88	9	32
200508	3.27	2.202	4.000	22.05	9	31
200608	3.15	2.170	4.000	21.91	14	31
200708	3.27	2.51	3.94	22.14	14	28

Ferris State University
APR 03 – 07
Enrollment by FSU GPA and ACT
Nuclear Medicine Technology
BS

Term	Avg GPA	Min GPA	Max GPA	Avg ACT	Min ACT	Max ACT
200308	3.23	2.313	3.903	21.89	18	28
200408	3.04	2.250	3.620	21.40	19	25
200708	3.49	3.23	3.7	21.60	20	23

Ferris State University
APR Graduated 2002-03 Through 2006-07
Average GPA and ACT
AAS

Term	Avg GPA	Min GPA	Max GPA	Avg ACT	Min ACT	Max ACT
2002-2003	3.29	2.629	3.818	22.45	17	27
2003-2004	3.29	2.100	3.959	22.92	19	27
2004-2005	3.26	2.678	3.861	21.91	17	32
2005-2006	3.39	2.687	3.803	21.89	9	26
2006-2007	3.33	2.431	3.940	23.16	18	31

Ferris State University
APR Graduated 2002-03 Through 2006-2007
Average GPA and ACT
Nuclear Medicine Technology
BS

Term	Avg GPA	Min GPA	Max GPA	Avg ACT	Min ACT	Max ACT
2002-2003	2.83	2.528	3.130	16.50	14	19
2003-2004	3.54	3.104	3.930	23.80	19	28
2004-2005	3.58	3.539	3.620	23.00	21	25

a) Range and average GPA and ACT of students currently enrolled in the NMT programs
The average GPA for the AAS degree program in 2007 is 3.27 with a range of 2.51 to 3.94. From 2003 to 2007, the average GPA has risen from 3.00 to 3.27. The average ACT is 22.14 with a range of 14 to 28. From 2003 to 2007, the average ACT has remained fairly even. The maximum ACT score, however, has decreased from 32 to 28.

The average GPA for the BS degree program in 2007 is 3.49 with a range of 3.23 to 3.7. From 2003 to 2007, the average GPA has increased from 3.04 to 3.49. The average ACT is 21.60 with a range of 20 to 23. From 2003 to 2007, the average ACT has remained almost identical at 21.89, 21.40 and 21.60. The maximum ACT score, however, has decreased from 28 to 23.

The minimum cumulative GPA to enter the program from the college level is 2.50; however, the average GPA of currently enrolled students is significantly higher at 3.27 and 3.49.

b) Range and average GPA and ACT of students graduating from the NMT programs.
The average GPA for the AAS degree program ranged from 3.26 to 3.39 between 2003 and 2007 with an overall average of 3.312. The average GPA for the BS degree program ranged from 2.83 to 3.58 between 2003 and 2007 with an overall average of 3.317.

The average ACT score for the AAS degree program ranged from 21.89 to 23.16 with an overall average of 22.466. The average ACT score for the BS degree program ranged from 16.50 to 23.80 with an overall average of 21.10.

Overall, the NMT students exhibit strong academic performances. A minimum 2.5 cumulative GPA must be maintained while in the professional sequence.

c) In addition to GPA and ACT, identify and evaluate measures that are used to assess the quality of students entering the program.
In addition to the cumulative GPA requirements of 2.5 for college students and 3.0 for high school students, students must meet the following in order to apply to the program:

- Successfully complete a chemistry course with a lab component with a letter grade of "C" or better (for high school applicants, successfully complete one year of chemistry with an average letter grade of "B").
- Successfully complete MATH 110 with a letter grade of "C" or higher OR have earned an ACT math subscore of 19 or higher.

d) Identify academic awards (i.e. scholarships) students have earned in the program.
Each year students have an opportunity to apply for two major scholarships offered through The Society of Nuclear Medicine. The first, The Paul Cole Scholarship, is based on financial need and awards $1000 to approximately 12 students per year. The second, The Mickey Williams Scholarship, awards $5000 to a minority student. In 2008, two Ferris State University students, Brittany Anderson and Qyuhn Mai, received Paul Cole Scholarships. In 2007, Theresah Semana became the first Ferris State University student to receive the Mickey Williams Scholarship. Also, in 2007, Jami Hogan and Michelle Benaske received Paul Cole Scholarships. It is relatively common, as long as students apply, for Ferris State University students to receive this scholarship. The names and photographs of the students are published in several Society of Nuclear Medicine publications. This provides external recognition for the NMT program and emphasizes the fact that Ferris State University has outstanding students.

e) Scholarly / creative activities of students in the program.
Ferris State University NMT students are invited to participate in Central Chapter Society of Nuclear Medicine activities such as the annual spring meeting and continuing education "road shows". Each year approximately 8 students attend the annual meeting at various locations within a nine state region (i.e. Chicago, Detroit, Indianapolis, and Cincinnati). Students can attend at a significantly reduced cost and are invited to all continuing education presentations during the three day meeting. These meetings allow the students to network with NMTs, manufacturers, radiopharmaceutical company representatives, and others in the profession. These relationships can help students find employment upon graduation and can provide valuable information regarding equipment, procedures, etc.

The NMT students also participated in the Michigan Energy Conference hosted by Ferris State University in April 2008. They entered the poster contest and one group as well as two individuals placed in the top five.

f) Other accomplishments of students in the program.
Students have the opportunity to join the Ferris Nuclear Medicine Association. This RSO is social as well as service oriented. Each year the members decide on a charity of choice and provide assistance to this charity in various ways. One year members helped Big Brothers/Big Sisters with a fund raising event. Several years the group has adopted a family in the community and provided Thanksgiving dinner, Christmas gifts and food, and Easter dinner to this family.

Other accomplishments include students on the Dean's list and in the Honors Program. There have also been many student athletes in the program during the last four years, including Levi Slager (football), Brent Scanlon (football), and Daniel Volk (track and cross country).

The program faculty believe there is a direct correlation between student accomplishments and the quality of students.

3. Employability of Students

Institutional Research & Testing conducted a graduate (one year post graduation) follow-up survey report in 2005 – 2006. The information on this report pertaining to NMT is as follows:

- 29 graduates were surveyed and 22 responded which was a 76% response rate.
- 95% placement rate.
- Average salary $35,784.

According to the graduate survey conducted by the program, 81.3% (13/16) of the respondents were employed full-time, 12.5% (2/16) were employed part-time, and 6.3% (1/16) were not employed.

a) How many graduates have become employed full-time in the field within one year of receiving their degree?
The 2005 – 2006 survey report by Institutional Research & Testing would indicate a 95% placement rate within one year of graduation. The program faculty through informal surveys with recent graduates would state that the program has a 100% placement rate in recent years for those pursuing employment.

b) What is the average starting salary of graduates?
Institutional Research & Testing conducted a graduate follow-up survey report in 2005 – 2006. The information pertaining to Nuclear Medicine Technology program graduates indicated an average annual salary of $35,784. It was not clear, however, if the annual salary was from full time or part time Nuclear Medicine Technologists.

c) How many graduates have become employed as part-time or temporary workers in the field within one year of receiving their degree?
The NMT program does not track whether graduates obtain part-time or temporary work in the field within one year of receiving their degree.

d) Describe the career assistance available to the students.
Career assistance is available through the following methods:

- Faculty members. Potential employers routinely call or email the faculty members with job openings.
- Internship. Approximately 25% of graduates are hired by their internship site.
- Central Chapter of The Society of Nuclear Medicine. Students that participate in events sponsored by this organization meet potential employers as well as network with manufacturers' sales representatives who are aware of job openings – many times prior to postings.
- The Advance. This professional magazine lists job openings throughout the United States and internationally.

Career assistance, however, is not perceived as strong on the graduate exit surveys. On the statements ,"Career planning information or assistance meets your needs and interests" and "Career planning information or assistance helps you make career decisions and choices", 17.5% stated these were below expectations or poor. On the statement, "Placement services are available to help you find employment opportunities", 62.5% indicated this was below expectations or poor. On the statement, "Placement services are available to prepare you to apply for employment", 45% indicated this was below expectations or poor. The program faculty need to address these issues.

e) How many graduates continue to be employed in the field?
The NMT program does not track continued employment.

f) Describe and comment on the geographic distribution of employed graduates.
Ferris State University NMT graduates are employed throughout the United States and Canada. The majority of NMTs working in hospitals in Michigan are Ferris State University graduates. Some states such as Florida are experiencing a shortage of NMTs and graduates can easily find employment.

g) How many students and/or graduates go on for additional educational training?
Each year one or two students pursue advanced degrees in Physician Assisting, Medicine or Medical Physics. Two students have achieved degrees in Pharmacy after graduating from the NMT program. Approximately 45% of students in the AAS degree program are also pursuing BS degrees in Health Care Systems Administration. With the closure of the AAS degree program and the implementation of the BS degree program, this percentage is expected to decrease. It should also be noted that approximately 15% of the students in the AAS degree program have a BS degree (i.e. Exercise Physiology from CMU, Biology from MSU, Chemistry from UM) prior to entering the NMT program.

According to the graduate survey, 12 out of 16 respondents (75%) received a B.S. degree in Health Care Systems Administration, 1 received a MS degree in Career and Technical

Education, 1 received a BHA Health Services Management Certificate, 1 received certification in CT, and 1 received a degree in Health Care Services.

h) Where do most students and/or graduates obtain their additional educational training?
In the past, graduates of the AAS degree program would obtain their BS degrees primarily at Ferris State University in Health Care Systems Administration. With the off campus BS degree now being offered in NMT, AAS degree graduates may continue to pursue their education at Ferris State University in either NMT or Health Care Systems Administration.

B. Enrollment

1) Anticipated fall enrollment
The anticipated fall enrollment for the AAS degree program is 69 students (30 first year, 39 second year). Twenty-eight students are anticipated in the BS degree program on the Big Rapids campus and 16 students on the Grand Rapids campus.

2) Have enrollment and student hour production increased or decreased since the last program review?

According to the Ferris State University Fact Book, the following numbers of students were enrolled in the Nuclear Medicine Technology programs:

Degree	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008
Pre-NMT AAS	46	51	67	59	45
Pre-NMT BS	0	2	0	0	0
AAS	57	56	49	43	52
BS	11	7	0	0	6

The number of BS degree students in the "old" degree dropped to zero when the degree was placed on hiatus. Six students enrolled in the "new" degree last year and there are currently ten students enrolled in NUCM 360 and NUCM 380 this fall.

The number of AAS degree students decreased for several years due to a decrease in the number of internship sites available. The number was increased last year as new clinical affiliates were added. The AAS degree will no longer start professional sequence students beginning fall semester 2009.

Please note, however, that the Fact Book does not correctly reflect enrollment due to dual degree enrollments.

The student hour production data from the Ferris State University Productivity Report Fall 2002 – Winter 2007 for the NMT program is as follows:

Student Credit Hours

Year	Summer	Fall	Winter	F + W
2004 – 2005	0.00	710.00	534.00	1,244.00
2005 - 2006	170.00	630.00	0.00	630.00

Full Time Equated Faculty

Year	Summer	Fall	Winter	Avg F + W
2004 – 2005	0.00	2.00	2.11	2.05
2005 - 2006	1.20	1.93	0.00	0.96

SCH/FTEF

Year	Summer	Fall	Winter	F + W
2004 – 2005	NA	355.00	253.08	605.35
2005 - 2006	141.67	326.67	NA	653.33

Student hour production has remained stable due to limited enrollment.

3) Since the last program review, how many students apply to the program annually?
During the January 2008 application period, 117 students applied. Eighty-seven applicants were qualified to enter the program. An additional 30 were in courses that would make them eligible after spring semester 2008. Accurate information was not available prior to January 2008.

4) Of those who apply, how many and what percentage were admitted?
During the January 2008 application period, 87 applicants were qualified to enter the program. An additional 30 students were in courses that would make them eligible after spring semester 2008. Students waiting to enter the program are designated as Pre-Nuclear Medicine students.

5) Of those who are admitted, how many and what percentage enroll?
Of the students that were admitted to the NMT program, 100% enroll.

6) Current enrollment goals, strategy and efforts to maintain/increase/decrease the number of students in the program.
The NMT program enrollment goal is to maintain 48 students in the BS degree program – 32 on the Big Rapids campus and 16 on the Grand Rapids campus. The enrollment goal for the BS completion degree is 20 students per semester.

C. Program Capacity

1) What is the appropriate program enrollment capacity?
The number of students allowed to participate at our clinical affiliates is limited to the number allowed by the Joint Review Committee on Educational Programs in Nuclear Medicine Technology. The current number is 48. This number also limits the number of students entering the professional sequence.

D. Retention and Graduation

1) Annual attrition rate

	2003 - 2004	2004 – 2005	2005 - 2006	2006 - 2007	2007 - 2008
AAS Degree Attrition Rate	Not available	5.6% (2 due to personal reasons)	19.4% (5 due to grades; 2 due to personal reasons)	5% (1 due to grades; 1 for personal reasons)	7.5% (3 due to grades; 2 will start with F08 cohort)
BS Degree Attrition Rate	0%	0%	Not Applicable	Not Applicable	0%

2) What are program's current goals, strategy and efforts to retain students?
Although the attrition rate is relatively low, there are methods that can aid in retaining students in the NMT program. NMT program faculty can respond to student and graduate assessment of teaching and improve their techniques. Improvement can be made through attending professional development seminars at Ferris State University and professional continuing education seminars at various Society of Nuclear Medicine meetings.

The NMT program is a competency-based one where students must master skills in order to successfully complete a course or an internship. There are some students who are unable to master the skills and do not earn a letter grade of "C" or higher as required in a professional sequence course.

3) Describe and assess trends in number of degrees awarded in the program.
The numbers of degrees awarded according to the Ferris State University Fact Books are as follows:

Degree	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
AAS	21	21	34	29	36
BS	1	5	2	0	0

The number of students accepted into the professional sequence varied year-to-year up to 2005. The variance was due to a limited number of internship sites. Beginning in 2006, the number remained stable as the number of internship slots began to exceed the number of students accepted into the professional sequence. Since the program is limited by the Joint Review Committee based on internship slots, the number of degrees awarded reflects this number minus any attrition.

4) How many students enroll in the program graduate from it within the prescribed time?
100% of students will graduate from the AAS degree NMT program within two years of starting their professional sequence courses.

Students entering Ferris State University as first year college students can expect an approximate one to two year wait to enter the program. The time frame may vary depending on the number of applicants who apply each January to the program and the number of applicants that are eligible. Students that are waiting to enter the program, they can complete general education, core curriculum and major courses (except those with a prefix of NUCM).

5) On average, how long does it take a student to graduate from the program?
Students entering the NMT program follow a lock step program with little room for variance. The majority of the students in the professional sequence will graduate in two years from the AAS degree program, three years for the BS degree program and approximately two years for the off campus BS degree program.

E. Access

1) Describe and assess the program's actions to make itself accessible to students.
The NMT AAS degree program is a professional sequence program in which each cohort starts together and completes each course together for five successive semesters. This sequence is essential because of the limited number of faculty and the necessity to keep interns on the same cycle for assessment. Off campus didactic and accelerated courses are not offered because of this curriculum model. On campus didactic courses are supplemented with FerrisConnect. During internship, courses are totally on-line via FerrisConnect.

The NMT BS degree program is also a professional sequence program with one cohort starting on the Big Rapids campus and one cohort starting on the Grand Rapids campus. Each cohort starts together and completes each course together for eight successive semesters. Again, this sequence is necessary due to the limited number of faculty and the necessity to keep interns on the same cycle for assessment. Off campus didactic and accelerated courses are not offered. On campus didactic courses are supplemented with FerrisConnect. During internship, courses are totally on-line via FerrisConnect. Students are not allowed to begin the Big Rapids cohort and finish at the Grand Rapids cohort and vice versa.

The NMT BS degree program is an accelerated one. The students complete six sequential semesters, including summer semesters, of didactic training followed by two semesters of internship. The whole degree program takes 33 months to complete, less than 3 years. This is an advantage for students desiring to enter the job market in a relatively short period of time.

The NMT off campus BS degree program is not a lock step program. Students may enroll in one or more courses per semester. Progression is at the student's discretion. Professional courses are offered via FerrisConnect.

2) Discuss what effects the actions described in (1) have had on the program.
Program visibility: The NMT BS completion degree increases the program's visibility due to its structure.
Market share: Students elect to enroll in the Ferris State University NMT program because of its hands on laboratory as well as the reputation of the faculty and clinical affiliates.
Enrollment: Enrollment will increase due to the BS completion degree offering.

Faculty load: There is no effect on faculty load.

3) How do the actions described in (1) advance or hinder program goals and priorities?
The actions advance program goals which are to meet relevant tasks as defined by the Joint Review Committee.

The on campus lab definitely advances the goal of graduating entry-level NMTs. The skills developed prior to internship help the students gain confidence and reduce the time spent on basic skills at the clinical affiliate.

F. Curriculum

Curriculum check sheets and example syllabi may be found in Appendices A and B.

1) Program requirements

Prerequisites:

The program does not include prerequisite courses prior to entry into the professional sequence. Students must meet qualifications (i.e. chemistry course with a lab component, math requirement, and cumulative GPA requirement) before applying to the program but there are no prerequisite courses.

General education courses:

The following are general education course that must be completed for the AAS degree in NMT:

Course	Rationale
FSUS 100, Freshman Seminar	FSU requirement for first year students
MATH 115, Intermediate Algebra	Fulfills FSU math requirement for AAS degree; JRC recommendation
ENGL 150, English 1	Fulfills FSU communications requirement for AAS degree; Prerequisite for ENGL 250
ENGL 250, English 2	Fulfills FSU communications requirement for AAS degree
COMM 105, COMM 121 or COMM 221, Communications Courses	Fulfills CAHS core curriculum requirement
Social Awareness Elective	Fulfills FSU social awareness requirement for AAS degree
Cultural Enrichment Elective	Fulfills FSU cultural awareness requirement for AAS degree

There are no directed electives.

Students are required to successfully complete the following general education courses for the BS degree in NMT:

Course	Rationale
FSUS 100, Freshman Seminar	FSU requirement for first year students
MATH 116, Intermediate Algebra & Numerical Trigonometry	Fulfills FSU math requirement for BS degree; Prerequisite for PHYS 211; JRC recommendation
ENGL 150, English 1	Fulfills FSU communications requirement for BS degree; Prerequisite for ENGL 250
ENGL 250, English 2	Fulfills FSU communications requirement for BS degree; Prerequisite for ENGL 321
ENGL 321, Advanced Composition	Fulfills FSU communications requirement for BS degree; Fulfills CAHS core curriculum requirement
COMM 105, COMM 121 or COMM 221, Communications Courses	Fulfills CAHS core curriculum requirement
Social Awareness Foundation Course	Fulfills FSU social awareness requirement
Social Awareness Elective	Fulfills FSU social awareness requirement
Social Awareness 200+ Elective	Fulfills FSU social awareness requirement
Cultural Enrichment Elective	Fulfills FSU cultural enrichment requirement
Cultural Enrichment Elective	Fulfills FSU cultural enrichment requirement
Cultural Enrichment 200+ Elective	Fulfills FSU cultural enrichment requirement

Students in the AAS degree and BS degree programs must also meet computer competency.

Education in Health and Basic Sciences:

Student are required to successfully complete the following courses for the AAS degree in NMT (excluding NUCM courses):

Course	Rationale
MRIS 102, Orientation to Medical Vocabulary	JRC recommendation
CCHS 101, Orientation to Health Care	Fulfills CAHS core curriculum requirement; JRC recommendation
CCHS 102, Safety Issues	Fulfills CAHS core curriculum requirement
CCHS 103, Health Care Skills	Fulfills CAHS core curriculum requirement; JRC recommendation
CHEM 121, General Chemistry 1 OR CHEM 114, Introduction to General Chemistry	Fulfills FSU scientific understanding requirement for BS degree; JRC recommendation; Prerequisite for BIOL 205
BIOL 205, Human Anatomy & Physiology	Fulfills FSU scientific understanding requirement for BS degree; JRC recommendation

Students are required to successfully complete the following courses for the BS degree in NMT (excluding NUCM courses):

Course	Rationale
MRIS 102, Orientation to Medical Vocabulary	JRC recommendation
CCHS 101, Orientation to Health Care	Fulfills CAHS core curriculum requirement; JRC recommendation
CCHS 102, Safety Issues	Fulfills CAHS core curriculum requirement
CCHS 103, Health Care Skills	Fulfills CAHS core curriculum requirement; JRC recommendation
CHEM 114, Introduction to General Chemistry	Fulfills FSU scientific understanding requirement for BS degree; JRC recommendation; Prerequisite for BIOL 205
BIOL 205, Human Anatomy & Physiology	Fulfills FSU scientific understanding requirement for BS degree; JRC recommendation
PHYS 211, General Physics 1	JRC recommendation
PHYS 212, General Physics 2	JRC recommendation
EHSM 315, Epidemiology and Statistics	JRC recommendation
HCSA 335, Supervisory Practices for Health Care Workers	JRC recommendation for health management course

2) Has the program been significantly revised since the last review, and if so, how?
The NMT program has undergone significant revision since the last program review. The BS degree was placed on hiatus in 2004 due to low enrollment. It was revised and approved in November 2007. The major revision was to change it to a 3+1 degree instead of a 2+2 degree. The BS degree was also accelerated to allow students to complete it within a three year period of time instead of a traditional four year time period. A cohort is also being offered for the first time in Grand Rapids. This new BS degree will be offered beginning fall semester 2008.

   The BS degree will also be offered as an off campus completion degree program for graduates of an AAS degree program in NMT.

   The AAS degree will enroll its last cohort fall semester 2008. The program faculty fully support closing the AAS degree and only offering the BS degree in the future.

3) Are there any curricular or program changes currently in the review process?
There are no curricular or program changes currently in the review process.

4) Are there any plans to revise the current program within the next three to five years?
There are no plans to revise the current program but based on assessment of the new BS degree program there may be minor revisions to the curriculum within the next three to five years.

   The program faculty are also researching certificate options (i.e. cardiovascular NM, exercise physiology, PET).

G. Quality of Instruction

1) Discuss student and alumni perceptions of the quality of instruction.
Students on campus and graduating students from the program rate the quality of instruction very high. The majority of the statements were rated in the good to excellent range. The highest ratings were received in the area of instructors knowing the subject matter and occupational requirements (on campus students 100%, graduating students 92.1%), in the area of instructors being available for help when needed (on campus students 88.5%, graduating students 84.2%) and in the area of instructors providing instruction so it is interesting and understandable (on campus students 88.6%, graduating students 92.1%). High ratings were also received in the areas regarding written objectives (on campus students 85.8%, graduating students 97.5%).

The results of the graduate (alumni) follow-up survey were overall very good. 93.8% of the respondents indicated that they were very well prepared (25%) or well prepared (68.8%) by the NMT program. They perceived that the clinical procedures (68.8%) best prepared them for employment.

2) Discuss advisory committee and employer perceptions of the quality of instruction.

Advisory committee perceptions of quality of instruction:
The majority of the respondents understand the vision and goals of the program (45.5% strongly agree, 36.3% agree) and feel that their efforts are valued by the NMT faculty and Ferris State University administration (18.2% strongly agree, 72.7% agree).

Employer perceptions of quality of instruction:
The majority of the respondents (89.5%) currently employ Ferris State University NMT graduates and 100% would consider hiring another. The majority also indicated that employees were very well prepared (31.3%) or well prepared (65.6%) for employment. They perceived that employees were best prepared in the area of clinical procedures and least prepared in the area of radiopharmacy.

3) What departmental and individual efforts have been made to improve the learning environment, add and use appropriate technology, train and increase the number of undergraduate and graduate assistants, etc?
Improvement of the learning environment within the College of Allied Health Sciences has been seen in the classrooms that were recently renovated to "smart" classrooms. The computer systems (including doc cam) have greatly improved the learning environment. The students in the NMT program particularly like the table set up versus the individual desk set up in the classrooms.

The program faculty actively seek donations of equipment and supplies for the laboratory. In 2007, for example, Sheila MacEachron, was able to obtain a donation from DigiRad for a specialized small field of view camera. Clinical affiliates donate product inserts, saline vials, kits, needles, etc to the program.

Vocational education funds have been used to purchase uptake probe and well systems, survey meters and miscellaneous laboratory equipment since the last program review.

Another improvement currently under construction is the diagnostic imaging reading room. Students and faculty will be able to view films on the PACS (Picture Archiving Computer System) or using a view box. The use of images from all diagnostic imaging modalities will broaden the students knowledge base.

The NMT program does not utilize undergraduate or graduate assistants.

4) Describe the types of professional development faculty have participated in, in efforts to enhance the learning environment.

The program faculty have participated in the following professional development activities:

Sheila MacEachron, Program Coordinator:

- Accelerated Learning Workshop, April 2008.
- Joint Review Site Visitor Training, January 2008.
- FerrisConnect Training, November – December 2007.
- Equity in the Classroom Conference, March 2007.
- Central Chapter Society of Nuclear Medicine Fall Meeting and Conference, October 2006.
- Career Cluster Conference, October 2006.
- Central Chapter Society of Nuclear Medicine Annual Meeting, March 2006.
- Medical Imaging Forum, May 2005.
- American Democracy Project Conference, July 2004.
- PET/CT Continuing Education Program, March 2004.

Tracy Glentz, Clinical Coordinator:

- Conference for Teaching, Learning and Civic Engagement, May 2008.
- Lily North Educators Conference, October 2007.
- New Faculty Transition Program 2004.

5) What efforts have been made to increase the interaction of students with faculty and peers?
Based on the fact that students are in a lock step program, the faculty have extensive interaction with the students during lectures and laboratory sessions for two to three years. In addition to these mandatory interactions, faculty are active with the Recognized Student Organization, the Ferris Nuclear Medicine Association, and participate in social (i.e. Homecoming Parade, car wash) and service (i.e. shopping for adopted family, raking leaves) events. Faculty also interact with students during College of Allied Health Sciences activities such as Alumni Return Day, Hockey Night, and group advising sessions.

6) Discuss the extent to which current research and practice regarding inclusive pedagogy and curriculum infuse teaching and learning in this program.
The program faculty use information obtained through professional development and accrediting bodies to evaluate teaching and course content. Course objectives for the new BS degree NUCM courses are written, for example, as a program and the Society of Nuclear Medicine guidelines as well as the JRC guidelines are used.

H. Composition and Quality of Faculty

1) List the names of all tenured and tenure-track faculty by rank.
The NMT program has a faculty member, Sheila MacEachron, assigned as the Program Coordinator and a faculty member, Tracy Glentz, as the Clinical Coordinator.

Sheila MacEachron, MS, CNMT

- Assistant Professor, Tenured
- Ferris State University since 1994
- Distinguished Faculty Award, 2002
- MS, Career and Technical Education, Administration Option
- B.S., Nuclear Medicine Technology
- A.A.S., Dental Assisting
- CNMT, Nuclear Medicine Technology Board Certified

Tracy Glentz, MS, CNMT

- Instructor, Tenure Track
- Ferris State University since 2004
- MS, Career and Technical Education
- B.S., Health Administration
- A.A.S., Nuclear Medicine Technology
- CNMT, Nuclear Medicine Technology Board Certified

2) Workload
Annualized workload is 36 contact hours.

NMT program faculty are given release time for both Program and Clinical Coordination.

3) Recruitment
The program utilizes the Ferris State University process for recruiting faculty. The position is advertised through newspaper and trade journals and through working within the professional community.

New NMT program faculty requirements include:

- 3 years of NMT experience
- CNMT and/or ARRT certifications
- Masters Degree
- Prior teaching experience preferred

The program does not have specific diversity goals for gender and race/ethnicity in the faculty. The best qualified applicant who meets the hiring standards will be offered the position.

The NMT program is currently fully staffed and is not seeking a faculty member at this time. If a position becomes available, the most qualified applicant will be hired regardless of gender, race and/or ethnicity.

4) Orientation
New faculty in the program attend the faculty transition program offered at Ferris State University. New faculty are also required to select a tenure committee chair who act as a mentor for the first four years of employment. CAHS orientation seminars are offered at the beginning of the academic year. Faculty member, Tracy Glentz, attended the new faculty transition program and regarded it as highly effective.

5) Reward structure
   a) In addition to salary, the NMT program faculty are rewarded with departmental and college funds to offset travel to professional development activities and meetings. Faculty members are encouraged to apply through the Faculty Affairs Committee for CAHS funding. The reward is limited to $500 per faculty member per year. Faculty members are also encouraged to apply for Timme funding. Departmental incentive funds have been available on a limited basis to offset the cost of travel for professional development.

   b) The existing salary structure does have an impact on the program's ability to attract and retain faculty. The qualifications and experience needed for an applicant to be eligible to teach will place them in the high end of the pay structure at a healthcare facility. NMTs who hold advanced degrees (beyond the current terminal degree of an AAS in NMT) earn considerably more than an educator in NMT. These individuals are often in administrative positions. According to a 2006 survey conducted by the Nuclear Medicine Technology Certification Board, NMTs with a Master's degree earn a median annual base salary of $72,800. Those with a B.S. degree earn $62,788. In contrast the median annual base salary of a Program Director is $67,000 and a faculty member is $60,550.

   c) The reward structure currently in place is adequate to support faculty productivity in teaching, research and service.

   d) Enhancing diversity and inclusion is not part of the reward structure.

6) Graduate instruction
There are no graduate programs within the NMT program or within the Department of Dental Hygiene and Medical Imaging.

7) Non-Tenure-Track and Adjunct Faculty
   a) A temporary full time faculty member, Tim VanderLaan, is part of the NMT program. He was hired to teach at the Grand Rapids campus and to oversee interns in the Grand Rapids area.

Timothy VanderLaan, Temporary Full Time Faculty
- Ferris State University since fall 2007
- B.A., Psychology
- A.A.S., Nuclear Medicine Technology
- CNMT, Nuclear Medicine Technology Board Certified

Adjunct faculty are hired as needed to ensure that students are afforded the proper ratio of faculty for instruction.

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b) The percentage of program courses that were taught in 2007 - 2008 by non-tenure-track faculty was 17.6%. No program courses were taught by non-tenure track faculty prior to this time.

c) In order for non-tenure-track and adjunct faculty to teach in the NMT program, they must:
- Hold current CNMT and/or ARRT certification
- Be a graduate of an accredited NMT program

Timothy VanderLaan meets the criteria as listed above.

d) The use of non-tenure-track and adjunct faculty are considered appropriate, as needed, by the program faculty.

The accreditation body for NMT, the Joint Review Committee on Educational Programs in Nuclear Medicine Technology, does not take a specific stance on the use of non-tenure-track and adjunct faculty. They do mandate that courses are taught by NMTs with proper credentials and experience.

I. Service to Non-Majors

The NMT program does not provide service courses for other majors.

J. Degree Program Cost and Productivity Data

Student Credit Hours

Year	Summer	Fall	Winter	F + W
2004 – 2005	0.00	710.00	534.00	1,244.00
2005 - 2006	170.00	630.00	0.00	630.00

Full Time Equated Faculty

Year	Summer	Fall	Winter	Avg F + W
2004 – 2005	0.00	2.00	2.11	2.05
2005 - 2006	1.20	1.93	0.00	0.96

SCH/FTEF

Year	Summer	Fall	Winter	F + W
2004 – 2005	NA	355.00	253.08	605.35
2005 - 2006	141.67	326.67	NA	653.33

The degree program cost is relative to the equipment intensive labs and mandated class size.

SCH/FTEE will not change significantly for the NMT program due to the limited class size and number of affiliate sites.

K. Assessment and Evaluation

1) List and describe what variables are tracked and why when assessing the effectiveness of the program.

The following variables are tracked:

- Graduation rates are reviewed annually to monitor retention and number of graduates.
- Nuclear Medicine Technology Certification Board results are supplied annually by the organization. Results are used to make any necessary changes.
- Mastery internship performance evaluations are completed each semester of internship and are used to monitor student progress.
- Lab practicals are included in each lab course to monitor progress of students on campus.
- Interns are surveyed at the end of each semester of internship in regards to their affiliate site and ACI. Changes are made as necessary.
- Students complete SAIs near the end of each course. Instructors use this feedback to improve teaching and learning.
- Advisory Committee meet twice a year. Their input is crucial to the success of the program.
- Each course in the program has specific objectives and course outcomes. These are evaluated annually.

2) Provide trend data for the variables listed in (1).
The primary way that the NMT program faculty assess effectiveness is through board certification scores by the Nuclear Medicine Technology Certification Board (NMTCB). The majority of the graduates sit for this examination.

	2003	**2004**	**2005**	**2006**	**2007**
FSU Pass Rate	100% (23/23)	95.8% (23/24)	79.3% (23/29)	97.1% (33/34)	83.3% (25/30)
FSU Average Score	79.74	78.29	77.10	78.03	78.53
National Pass Rate (For 1st Timers)	87.1%	91.6%	90%	93.7%	91.7%
National Average Score	78.89	79.41	79.53	79.71	79.87

The NMT program's pass rate and average score has been higher than and lower than the national pass rate for first timers between 2003 and 2007. The lowest pass rate was in 2005 which were the students enrolled in 2003. This group represented the lowest average GPA and lowest average ACT score.

3) Describe how the trend data in (2) is used to assess the rigor, breadth and currency of the degree requirements and curriculum.

a) Certification board exam.

1)) Rigor: How accurately do the students demonstrate knowledge of NMT (i.e. revising masteries and performance evaluations based on this information)?

2)) Breadth: How much material can be used critically by the student (i.e. critical thinking/problem solving during internship using performance evaluations)?

3)) Currency: We can measure if the program is providing the knowledge necessary to fulfill terminal relevant tasks and course outcome goals and then make changes as necessary.

b) Graduation rate.

1)) Rigor and breadth: The program will update the curriculum to meet students needs.

2)) Currency: What worth is the NMT program to the community and employers?

4) Describe how the trend data in (2) is used to assess the extent to which program goals are being met.

Utilizing the trend data, the following changes have been made to the NMT program:

- Curriculum was revised to meet professional needs in regards to breadth of knowledge. For example, inclusion of advanced imaging techniques, advanced cardiology and diagnostic imaging modalities (Positron Emission Tomography, Computed Tomography) which are now standards for the entry-level NMT.

L. Administrative Effectiveness

1) Discuss the adequacy of administrative and clerical support for the program.
The administrative and clerical support for the NMT program is excellent. Theresa Raglin is the Department Head for Dental Hygiene and Medical Imaging and the department has been run in a more cooperative manner since her arrival. There is a dedicated secretary, Tina Smith, for the department. The new Dean, Ellen Haneline, is implementing new policies which reduce the load of the Program Coordinator and streamline the advising process, particularly for Pre-NMT students.

2) Are the program and/or department run in an efficient manner?
The program faculty feel the program and department are run in an efficient manner.

3) Are class and teaching schedules effectively and efficiently prepared?
Teaching schedules are prepared by the Department Head with input from the Program Coordinator in an efficient manner. The Department Head is open to suggestions from the program faculty and resolves any conflicts in a timely manner.

4) Are students able to take the courses they need in a timely manner?
The professional sequence of courses are sequential and offered once per year in the AAS degree and on campus BS degree programs. All NMT students are able to enroll in the courses required in a timely manner.

Section Four: Facilities and Equipment

A. Instructional Environment

1) Are current classrooms, labs and technology adequate?
The NMT program's human, physical, financial and learning resources are sufficient to support the educational goals and numbers of students admitted into the program.

The Nuclear Medicine Technology program's Big Rapids laboratory facilities are located in the Victor F. Spathelf (VFS) Center for Allied Health Sciences in Rooms 100, 100A, 101 and 102. The labs occupy approximately 1800 square feet of space.

VFS 100A (10' x 14') is located within VFS 100 (18' x 30') and is designated as the "hot lab". Radioactive materials are stored within this room which has restricted access.

VFS 100 contains primarily scintillation counters and auxillary equipment. VFS 101 and 102 (30' x 40') house gamma scintillation cameras, ECG monitors, treadmill, and Xenon delivery systems, as well as auxillary equipment.

Classroom instruction is provided within the VFS building in "smart" classrooms equipped with state-of-the-art computer systems. Students are encouraged to use the computer laboratory within the building. All facilities have barrier free access for students, faculty and staff.

Sheila's office occupies 140 square feet of space on the fourth floor of VFS. She has her own computer and printer. Adequate space is provided for confidential student advising.

Tracy's office occupies 100 square feet of space on the third floor of VFS. She also has her own computer and printer and has adequate space for confidential student advising.

Tim's office is located in the ATC building in Grand Rapids. He has his own computer and printer and room for student advising.

The Nuclear Medicine Technology program's Grand Rapids laboratory is currently under construction at the ATC building. The space allocated for the laboratory is approximately 22' x 40' and for the hot lab area is approximately 10' x 16'. The laboratory will house a gamma scintillation camera and auxillary equipment. The hot lab will contain a dose calibrator and auxillary equipment. It will have restricted access. Sufficient space will be provided for classroom instruction within the building and adequate equipment is available for instruction.

2) How does the condition of current facilities impact program delivery?
The smart classrooms in the VFS building are excellent and only impact in a positive manner.

The NMT laboratories are in need of updating and have a negative impact on recruitment efforts. The floor tiles are of several different styles and in need of repair in some areas. The walls are a pale peach color and look outdated. The NMT laboratory appears very outdated compared to the Radiography lab which was recently renovated and to the new

Diagnostic Medical Sonography when it is completed. Students that visit the campus for various recruiting events often base their decision on "how cool" the laboratory appears. The equipment, etc do not matter to them at this point of their decision making.

3) Describe the program's projected needs with respect to instructional facilities.
The laboratory space is adequate for current and projected needs. Floor space is limited but equipment can be reconfigured to accommodate each laboratory session.

4) Describe current plans for facilities improvement and indicate their status.
There are no current plans for facilities improvement in the NMT laboratory. There is a shared reading room that is under construction that will be utilized by the diagnostic medical imaging programs. This common area will store and allow access to scans by faculty and students.

5) Describe how proposed changes or improvements to facilities would enhance program delivery.
The new shared reading room will allow students to access images from other modalities and broaden their knowledge base.

B. Computer Access and Availability

1) Outside of computers in faculty and staff offices, identify the computing resources that are allocated to the program.
The Nuclear Medicine Technology program has a laptop computer available for use by faculty and in the laboratory. The computer can be used with a proxima/prism unit for lecture presentations. There is no printer available in the laboratory to use with this computer.

2) Discuss how these resources are used.
WebCT and, now, FerrisConnect is used extensively by the program faculty. Students use FerrisConnect to download lectures (PowerPoint), labs, and assignments. Interns also take quizzes and exams via this delivery system. Overall, the students and faculty express satisfaction with this type of delivery.

Students on-campus are encouraged to use the various computer laboratories throughout campus.

All interns at clinical affiliates have access to computers.

3) Discuss the adequacy of these resources and identify needed additional resources.
Resources are adequate and there are no additional resources needed at this time.

4) Does an acquisition plan to address these needs currently exist? Describe the plan.
Not applicable.

5) Discuss the efficacy of online services available to the program?
WebCT was utilized by the program faculty and now FerrisConnect is utilized. The system is very efficient overall. Students occasionally complain that the system is unavailable or they

are having difficulties logging into the system. It is difficult also to download assignments that contain images due to the large size of these files. Overall, however, the students and faculty members express satisfaction with this type of delivery.

6) Discuss the adequacy of computer support, including the support for on-line instruction if applicable.
Computer support for FerrisConnect has been adequate. It is frustrating at times when faculty members are having difficulties that need immediate attention and they have to leave a message. Support personnel, however, have responded promptly to new course requests. Faculty members within the College of Allied Health Sciences have formed an informal "support group" regarding web based delivery and help each other out.

C. Other Instructional Technology

1) Identify other types of instructional technology resources that are allocated or available to the program.
The NMT program depends upon the donation of equipment and supplies from hospitals and radiopharmaceutical companies. Funding is also provided through alumni contributions, vocational education funds and equipment funding through the VPAA office.

The program is fortunate to have state-of-the-industry well counters, uptake probes, GM survey meters and dose calibrators.

2) Discuss how these resources are used.
The equipment is used so students may gain hands on knowledge of these instruments which makes transitioning to internship easier.

3) Discuss the adequacy of these resources and identify needed additional resources.
The equipment listed above is more than adequate. NMT Adjunct Clinical Instructors visiting on campus often remark that they wish they had the equipment we have.

The program currently does not have any gamma scintillation cameras except for a specialized DigiRad camera that has limited capabilities. In the past, there have been two to three gamma scintillation cameras available for student use. Two gamma scintillation cameras were recently dismantled and sold for parts because they were obsolete and in need of repair. To continue to use them would have presented safety hazards. The program faculty actively seek donated gamma scintillation cameras. Donations are needed because the high cost of purchasing a system is prohibitive. Munson Medical Center in Traverse City has a system that would like to donate fall semester 2008 and Sheila is working on the details with the chief technologist. Two additional systems are desirable. One more for the Big Rapids campus and one for the Grand Rapids campus.

4) Does an acquisition plan to address these needs currently exist? Describe the plan.
The only acquisition plan that currently exists is to actively seek donations.

5) Discuss the impact of adequacy of other types of instructional technology resources and support of these resources on the program.
There are no other types of instructional technology resources utilized by the NMT program.

D. Library Resources

1) Discuss the adequacy of the print and electronic and other resources available through FLITE for the program.
FLITE provides a valuable service to the Nuclear Medicine Technology students. There are adequate numbers of print and electronic sources of information for the students. Of particular importance is that students can access the Federal Depository Library for U.S. Government Documents. Since the field of nuclear medicine is heavily regulated by government agencies, access to these documents is mandatory. Another feature of importance is that interlibrary loan and document delivery services is available to all faculty and students, including distance education students (i.e. interns). Students can receive help using these resources by telephone, email, or real time chat reference service, submitted electronic forms via the Web site, or in person at the Reference Desk.

   Since 2002, 41 texts pertaining to nuclear medicine have been purchased by FLITE. Twenty-five periodicals pertaining to nuclear medicine and related fields are also available.

2) Discuss the service and instruction availability provided by the library faculty and staff with respect to the needs of the program.
The FLITE faculty and staff have been exceptional. They provide tours and educational programs for the NMT students enrolled in FSUS 100.

3) Discuss the impact of the budget allocation provided by FLITE to your program.
Overall, the resources and the budget provided by FLITE for the program are excellent.

Section Five: Conclusions

A. Relationship to FSU Mission

The Nuclear Medicine Technology Program's mission and goals continue to support those of the university. The program is considered a national leader by their accrediting body, the Joint Review Committee on Educational Programs in Nuclear Medicine Technology.

B. Program Visibility and Distinctiveness

The Nuclear Medicine Technology programs offer Ferris State University students the opportunity to complete a college based program with excellent employment potential. Students interested in a health care profession that involves technical skills, patient contact, computer proficiency and radiation handling are drawn to this field. Many of the students come from other curricula such as pre-medicine, pre-pharmacy and applied biology. The program offers these students an option without having to leave Ferris State University.

The Nuclear Medicine Technology program is unique in its laboratory facility and provides more hands on experience prior to internship than any other nuclear medicine technology program in the nation.

C. Program Value

The NMT program benefits:

- The university by offering a unique program with high job placement rates.
- The working NMT who is seeking a BS degree that can be completed on line.
- The students by offering hands on clinical skills on campus.
- The students through an excellent affiliate site.
- The students through program faculty that maintain professional credentials and are active in continuing education opportunities.
- The community through the student organization's community service.

D. Enrollment

Enrollment is strong in the NMT program. A new application process was implemented in January 2008. During this first application period, 117 students applied with 87 qualified to enter to the program. The enrollment goal of the program is to maintain 48 students in the BS degree program (32 on the Big Rapids campus and 16 on the Grand Rapids campus). The number of students allowed to participate at the clinical affiliates is limited to the number allowed by the Joint Review Committee which is currently 48. This number also limits the number of students entering the professional sequence each fall.

E. Characteristics, Quality and Employability of Students

As documented in the data, the quality of students entering the NMT program is excellent. The average GPA and average ACT scores are strong. Students entering the professional sequence must adhere to the progression policy as well as program policies regarding dress code, conduct, etc. The program faculty strive to maintain professionalism in the classroom and laboratory. The employers of our graduates are satisfied with the quality of instruction the students received on campus and during internship. Graduates can expect 100% job placement if they are willing to relocate.

F. Quality of Curriculum and Instruction

The program's first BS degree cohort will begin fall semester 2008. The program faculty believe that this new degree will enhance the quality of the curriculum and produce entry-level NMTs with more breadth of knowledge.

The program faculty are dedicated to the program and continually strive to improve teaching and learning.

The following have been identified as program strengths:

- BS degree in the accelerated format.
- The addition of a cohort in Grand Rapids to accommodate the large number of Grand Rapids natives who pursue this degree.
- The state-of-the-industry equipment in the laboratory (specifically, dose calibrators, well counters, uptake probes, survey meters).
- Administrative support.
- Student involvement in the Big Rapids community.
- Dedication of the program faculty.
- "Smart" classrooms in the College of Allied Health Sciences.
- FerrisConnect enhancement.
- Donations of equipment and supplies from the professional community.
- Advisory Committee involvement.

The following have been identified as program weaknesses:

- Lack of gamma scintillation cameras in the laboratory.
- Outdated laboratory facilities.
- Program faculty needs to have documented systematic assessment.
- Program faculty need to conduct annual graduate surveys as well as exit surveys.
- Program faculty need to work with appropriate personnel on campus to aid students in career planning and job placement.

The following has been identified as a strength at all the clinical affiliates:

- State-of-the-industry instruments and equipment.

The following has been identified as a weakness at the majority of the clinical affiliates:

- Lack of books and journals. Please note, however, that all students have access electronically to FLITE. Many journals, government documents, etc are available through this resource.

G. Composition and Quality of the Faculty

The number of faculty members are currently sufficient to continue to meet the program mission and goals. The faculty members are knowledgeable in their field of expertise and are dedicated to the program.

The following have been identified as strengths at all the clinical affiliates:

- Affiliate Clinical Instructors who are knowledgeable in the field of Nuclear Medicine Technology and who have a desire to educate students. These instructors are not reimbursed financially or with release time. They are truly dedicated to the program.
- Medical Directors who interact with students and are available to students as needed. They are instrumental to students preparing for case studies, term papers, etc.
- Nuclear Medicine Technologists who enjoy teaching and make the internship enjoyable for students.
- Clinical Affiliate personnel who assist students in finding employment, housing, etc during their internship.

The program underwent a site visit by Joint Review Commission site visitors at the end of June 2008. During their exit interview the following were listed as strengths of the program:

- The program faculty.
- The Affiliate Clinical Instructors .
- The Affiliate Medical Directors.
- The laboratory space and equipment.

The site visitors had no concerns regarding the program.

Appendix A: Curriculum check sheets

FERRIS STATE UNIVERSITY
COLLEGE OF ALLIED HEALTH SCIENCES

Nuclear Medicine Technology – Bachelor of Science

YEAR 1		YEAR 2	
Fall Semester	Grade	**Fall Semester**	Grade
CCHS 101 Orientation to Health Care	3 ____	ENGL 250 English 2	3 ____
CHEM 114 Intro to General Chemistry	4 ____	NUCM 215 Nuclear Medicine Imaging 1	3 ____
FSUS 100 Freshman Seminar, if required	1 ____	NUCM 216 Nuclear Medicine Imaging 1 Lab	1 ____
MATH 116 Inter. Algebra & Numerical Trig.	4 ____	PHYS 212 Introductory Physics 2	4 ____
MRIS 102 Orient. to Medical Vocabulary	1 ____	Cultural Enrichment Elective	3 ____
NUCM 100 Introduction to Nuclear Medicine	1 ____	Social Awareness Elective	3 ____
NUCM 101 Practical Math. in Nuclear Medicine	1 ____		**17**
	15		
Spring Semester		**Spring Semester**	
BIOL 205 Human Anatomy & Physiology	5 ____	EHSM 315 Epidemiology and Statistics	3 ____
CCHS 102 Safety Issues in Health Care	1 ____	ENGL 321 Advanced Composition	3 ____
CCHS 103 Health Care Skills	1 ____	HCSA 335 Supervisory Practices for Hlth Care	
COMM 105 Interpersonal Communications **OR**		Workers	4 ____
COMM 121 Principles of Public Speaking **OR**		NUCM 320 Nuclear Medicine Imaging 2	3 ____
COMM 221 Small Group Decision Making	3 ____	NUCM 321 Nuclear Medicine Imaging 2 Lab	1 ____
ENGL 150 English 1	3 ____	Social Awareness Elective (200+ level)	3 ____
NUCM 110 Principles of Nuclear Medicine	3 ____		**17**
NUCM 111 Principles of Nuclear Medicine Lab	1 ____		
	17		

Summer Semester		**Summer Semester**	
NUCM 205 Nuclear Medicine Instrumentation	3 ____	NUCM 340 Advanced Imaging Techniques	3 ____
NUCM 206 Nuclear Medicine Instrumentation Lab	1 ____	NUCM 350 Advanced Nuclear Cardiology	2 ____
NUCM 240 Cross Sectional Imaging	1 ____	NUCM 351 Advanced Nuclear Cardiology Lab	1 ____
PHYS 211 Introductory Physics 1	4 ____	NUCM 360 Mgt. & Leadership in NMT	3 ____
Cultural Enrichment Elective	3 ____	NUCM 380 Diagnostic Imaging Techniques	3 ____
Social Awareness Foundation	3 ____	Cultural Enrichment Elective (200+ level)	3 ____
	15		**15**

YEAR 3

Fall Semester	Grade		
NUCM 480 Research Methodology	2 ____		
NUCM 491 Clinical Application in NMT 1	10 ____		
	12		
Spring Semester			
NUCM 492 Clinical Application in NMT 2	10 ____		
NUCM 499 Capstone in NMT	2 ____		
	12		

CAHS Computer Competency requirement. Requirement can be met through successful completion of all NUCM courses.

One course from Social Awareness or Cultural Enrichment must meet the Global Consciousness Requirement, **and** one course from Social Awareness or Cultural Enrichment must meet the Race, Ethnicity, and/or Gender requirement.

All first-time-in-any-college freshman (FTIAC) must complete a one credit FSUS 100 requirement. FTIAC is defined as any freshman who has completed less than 12 credits at another higher education institution, excluding credits earned in dual enrollment, advanced placement, or proficiency testing such as CLEP. All FTIAC's are required to complete FSUS 100 their first term at the University.

A total of 120 credits are required for a Bachelor of Science degree at Ferris State University. Additional courses may be required in order to meet this requirement.

120 Semester Hours Required for Graduation

FERRIS STATE UNIVERSITY

COLLEGE OF ALLIED HEALTH SCIENCES

Nuclear Medicine Technology – Associate in Applied Science Degree

NOTE: Meeting requirements for graduation is the responsibility of the student. Your advisor is available to assist you.

FIRST YEAR

1st Semester

		Grade
*MATH 115 Intermediate Algebra		0-3 ____
CHEM 121 General Chemistry 1	**OR**	5 ____
CHEM 114 Introduction to Gen Chemistry		4 ____
ENGL 150 English 1		3 ____
FSUS 100 FSU Seminar		1 ____
NUCM 120 Principles of Nuclear Medicine		6 ____
		14-18

2nd Semester

BIOL 205 Human Anatomy & Physiology	5 ____
ENGL 250 English 2	3 ____
MRIS 102 Orient. to Medical Vocabulary	1 ____
CCHS 101 Orientation to Health Care	3 ____
CCHS 102 Safety Issues	1 ____
CCHS 103 Health Care Skills	1 ____
NUCM 125 Nuc. Med. Non-Imaging Proc.	3 ____
	17

Summer Semester

Social Awareness Elective	3 ____
Cultural Enrichment Elective	3 ____
COMM 105, COMM 121, or COMM 221	3 ____
NUCM 135 Nuc. Med. Imaging Procedures	4 ____
NUCM 140 Cross-Sectional Imaging	1 ____
	14

SECOND YEAR

1st Semester

	Grade
NUCM 291 Clinical Application in NMT 1	12 ____

2nd Semester

NUCM 292 Clinical Application in NMT 2	12 ____
CAHS Computer Competency	_____

* MATH 115, equivalency or proficiency (Math ACT subscore of 24 or better) required for graduation.

69 – 73 semester hours required for graduation

Revised 2/19/02
Revised 7/2/03

Appendix B: Example Syllabi

Ferris State University
College of Allied Health Sciences
Department of Dental Hygiene and Medical Imaging
Nuclear Medicine Technology Programs

Course Title:	Practical Mathematics in Nuclear Medicine	
Course Number:	NUCM 101	
Semester Hours:	One Credit	
Prerequisite:	Admission to B.S. Degree Program in Nuclear Medicine Technology	
Semester:	Fall 2008	
Classroom:	Big Rapids campus	VFS 326A
Instructor:	Big Rapids campus	Sheila MacEachron
Office:	Sheila MacEachron	VFS 405A
Telephone:	Sheila MacEachron	231 591-2310 or 231 591-2261
E-Mail:	Sheila MacEachron	maceacs@ferris.edu
Office Hours:	Sheila MacEachron	M 1:00 – 1:50 pm W 8:00 – 9:50 am, 1:00 – 1:50 pm R 1:00 – 1:50 pm

Required Textbooks:

Practical Mathematics in Nuclear Medicine Technology, Patricia Wells and Martha Pickett, The Society of Nuclear Medicine, 1999. ISBN: 0-932004-67-0.

Supplemental Reading:

Course Instructor Handouts
Internet

Required Materials:

Access to computer with internet.

Course Description:
This course is designed to examine the mathematics that Nuclear Medicine Technologists encounter in the practice of Nuclear Medicine Technology. Emphasis is placed on the application of mathematics in the clinical setting.

Course Outcomes:

1. To differentiate between the various mathematical applications in Nuclear Medicine Technology.
2. To perform mathematical calculations utilized in the clinical practice of Nuclear Medicine Technology.

Course Objectives:

I. Basic mathematical manipulations
   A. Solve algebraic equations by performing operations in the correct order.
   B. Explain the differences between positive and negative numbers.
   C. Solve algebraic equations with signed numbers obtaining the correct sign in the solution.
   D. Use a scientific calculator to perform the calculations required in nuclear medicine technology.

II. Significant digits and rounding
   A. Determine significant digits in numbers.
   B. Round numbers to significant digits following mathematical operations.

III. Scientific notation
   A. Convert between whole numbers and scientific notation.
   B. Solve mathematical problems using numbers in scientific notation.

IV. Mathematical units
   A. Describe the metric system.
   B. Define commonly used prefixes and identify symbols representing them.
   C. Convert between commonly used prefixes, such as between Ci and mCi or MBq and kBq.

V. Units and conversion of units
   A. Identify units of measurement commonly used in nuclear medicine, including traditional units and International System units (SI units).
   B. Convert between traditional units and Internal System units of measurement commonly used in nuclear medicine.

VI. Logarithms
   A. Define logarithm and antilog.
   B. Determine logs and antilogs in base 10 and base e using a scientific calculator.
   C. Perform mathematical calculations involving logs and antilogs as required in nuclear medicine.

VII. Graphs
   A. Differentiate between linear and exponential graphs and describe the conditions under which each type might be used.
   B. Construct a linear and exponential graph given the necessary information.
   C. Determine the slope of a line graph.
   D. Using semi-log graph paper, determine the physical half-life of a nuclide and/or exposure rate versus shielding.
   E. Given the appropriate information, construct bar graphs, line graphs and histograms.
   F. Calculate dosages using various nomograms.

VIII. Nuclear counting statistics

IX. Decay

X. Dose calculations

XI. Dilutions for preparation of standards

Course Outline:

XII. Basic mathematical manipulations
- E. Solve algebraic equations by performing operations in the correct order.
- F. Explain the differences between positive and negative numbers.
- G. Solve algebraic equations with signed numbers obtaining the correct sign in the solution.
- H. Use a scientific calculator to perform the calculations required in nuclear medicine technology.

XIII. Significant digits and rounding
- C. Determine significant digits in numbers.
- D. Round numbers to significant digits following mathematical operations.

XIV. Scientific notation
- C. Convert between whole numbers and scientific notation.
- D. Solve mathematical problems using numbers in scientific notation.

XV. Mathematical units
- D. Describe the metric system.
- E. Define commonly used prefixes and identify symbols representing them.
- F. Convert between commonly used prefixes, such as between Ci and mCi or MBq and kBq.

XVI. Units and conversion of units
- C. Identify units of measurement commonly used in nuclear medicine, including traditional units and International System units (SI units).
- D. Convert between traditional units and Internal System units of measurement commonly used in nuclear medicine.

XVII. Logarithms
- D. Define logarithm and antilog.
- E. Determine logs and antilogs in base 10 and base e using a scientific calculator.
- F. Perform mathematical calculations involving logs and antilogs as required in nuclear medicine.

XVIII. Graphs
- G. Differentiate between linear and exponential graphs and describe the conditions under which each type might be used.
- H. Construct a linear and exponential graph given the necessary information.
- I. Determine the slope of a line graph.
- J. Using semi-log graph paper, determine the physical half-life of a nuclide and/or exposure rate versus shielding.
- K. Given the appropriate information, construct bar graphs, line graphs and histograms.
- L. Calculate dosages using various nomograms.

XIX. Nuclear counting statistics

XX. Decay

XXI. Dose calculations

XXII. Dilutions for preparation of standards

Course Calendar:

This calendar is tentative and subject to change depending upon the progress of the class.

Date	Topic
W, September 3rd	Syllabus Basic Mathematical Manipulations Significant Digits and Rounding
W, September 10th	Scientific Notation Mathematical Units Module 1 Due Pre-Test
W, September 17th	Radiation Units and Conversion of Units Module 2 Due
W, September 24th	Logarithms Quiz 1
W, October 1st	Graphs Module 3 Due
W, October 8th	Nuclear Counting Statistics Module 4 Due
W, October 15th	Nuclear Counting Statistics continued Module 5 Due
W, October 22nd	Decay Quiz 2 (Comprehensive)
W, October 29th	Decay continued Module 6 Due
W, November 5th	Decay continued Module 7 Due
W, November 12th	Decay continued
W, November 19th	Decay continued Module 8 Due
W, November 26th	Decay continued Module 9 Due Quiz 3 (Comprehensive)
W, December 3rd	Dose Calculations Module 10 Due
W, December 10th	Dilutions for Preparation of Standards Post-Test Notebook Due
Exam Week	Exam date and time TBA

Evaluation:

Grading: Tests, assignments, etc are subject to change.

Assignments:	Modules	Ten (10) @ 10 Points Each
Notebook:	Notebook	One (1) @ 10 Points

Tests:	Pre-Test	One (1) @ 10 Points for participation
	Post-Test	One (1) @ 10 Points for participation
	Quizzes	Three (3) @ 20 Points Each
Total:		190 Points

Grading Scale:

100 – 95%	A	79 – 77%	C
94 – 92%	A –	76 – 74%	C-
91 – 89%	B+	73 – 71%	D+
88 – 86%	B	70 – 68%	D
85 – 83%	B-	67 - 65%	D-
82 – 80%	C+	65% and Below	F

Course Policies:

Attendance: Attendance is expected at every scheduled lecture session. While it is understood that extenuating circumstances may result in periodic absences, absences resulting in two (2) hours of missed lecture shall be deemed excessive. A decrease of 5% in the final grade will be made for every hour missed that is deemed excessive. The material covered in NUCM 100 is a base for all future nuclear medicine technology courses.

Tardiness: Tardiness in excess of three (3) lecture sessions will be handled in the same manner as attendance. Entering the classroom five (5) minutes or more after the start of the lecture is considered tardy.

Class Participation: Class participation is required during discussions. Sleeping during class will result in the student being asked to leave class with that class period being considered an absence.

Cell Phones, Pagers, Beepers, etc: Electronic devices including cells phones, pagers, and beepers are not allowed to be on during class. If extenuating circumstances exist, please talk to the instructor.

Missed Tests and Examinations: There will be no make-up tests or examinations given unless extenuating circumstances exist. Proof of reason for absence must be provided. The content of the make-up is at the course instructor's discretion.

Academic Dishonesty: Per Ferris State University, "cheating is defined as using or attempting to use, giving or attempting to give, obtaining or attempting to attain: products or prepared materials, information relative to a quiz or examination, or other work that a student is expected to do alone and not in collaboration with others. Plagiarism of written work shall also be considered an infraction. Students are expected to present the results of their own work except under circumstances in which the professor may have requested or approved the joint effort of a number of students. The penalty for the first offense of willful cheating consists of the student receiving zero for the assignment in which

the infraction occurs. However, cheating on quizzes or examinations means failure of the course. The students may appeal the decision to the Disciplinary Committee. Further offenses may result in suspension or dismissal".

Disruptive Behavior: Disruptive behavior (excessive talking, rudeness, vulgar language, etc.) will result in verbal and written warning. A second offense will result in the student being asked to leave that class and that class period will be considered an absence. Further offenses may result in suspension or dismissal from the program.

Support Services: Tutoring may be available through Student Development Services. The Academic Skills Center serves all students who need assistance. Appointments may be made with the course instructor for individual assistance as needed.

GENERAL POLICIES:

Religious Holidays:

Ferris State University will make reasonable accommodations for students who are absent from the University in observance of religious holidays. It is the responsibility of the student to notify the faculty in writing during the first week of the semester of their intention to be absent from class on their day(s) of religious observance. Upon formal notification, the faculty will excuse the student from the class, labs, and/or clinics for the holiday(s) and allow the student to make up missed exams; however, the student is responsible for completion of all missed work within a reasonable time as determined by the faculty.

Requests for absence to participate in religious activities other than recognized religious holidays, are not recognized by the University as excused absences. The student may present such a request to the faculty during the first week of the semester, and the faculty may approve such an absence at his or her discretion. If the instructor approves the absence, the student is responsible for completion of all missed work within a reasonable time as determined by the faculty.

If a student disagrees with the faculty member's determination, the student may make a written appeal to the Dean of the student's college. The decision of the Dean is final.

Disabilities Services:

Any student with a documented disability (physical, learning, mental, emotional) requiring a classroom accommodation should contact the Disabilities Services Office, located in Arts and Sciences Commons, 1017K, extension 3772, or ASC 1021, extension 5039.

Americans with Disabilities Act:

Support services and accommodations are provided for students with documented mobility, learning, hearing, vision, or physical disabilities, which interfere with the learning process. These services include educational, counseling, adaptive equipment, extended and/or alternative testings, and student note

takers. The Educational Counselor for Students with Disabilities can be contacted for assistance at ext. 3772 or 5039, and is located in ASC 1017.

Student Dignity:

The University expects all students and employees to conduct themselves with dignity and respect for students, employees, and others. It is each individual's responsibility to behave in a civil manner and make responsible choices about the manner in which they conduct themselves. Harassment of any kind is not acceptable at Ferris State University. The University does not condone or allow harassment of others whether engaged in by students, employees, supervisors, administrators, or by vendors or others doing business with the University. Harassment is the creation of a hostile or intimidating environment in which verbal or physical conduct, because of its severity or persistence, is likely to significantly interfere with an individual's work or education, or adversely affect a person's living conditions.

To assist with the understanding of what harassment is, this policy contains specific definitions of two of the more prevalent types of harassment – racial harassment and sexual harassment.

Racial Harassment:

Racial harassment includes any conduct, physical or verbal, that victimizes or stigmatizes an individual on the basis of race, ethnicity, ancestry, or national origin. Such behavior could involve any of the following:

1. The use of physical force or violence to restrict the freedom of action or movement of another person, or to endanger the health or safety of another person;

2. Physical or verbal conduct intentional or otherwise that has the purpose or effect of (or explicitly or implicitly threatens to) interference with an individual's personal safety, academic efforts, employment, or participation in University-sponsored activities.

3. The conduct has the effect of unreasonably interfering with an individual's work, or academic performance or creating an intimidating, hostile, or offensive working, learning, or living environment.

The attributes of racial harassment described above are also the attributes of most other types of harassment that can occur. Harassment may be based upon a person's status that is protected by law (i.e., religion, veteran status, handicap, etc.), or may be for some other reason not specifically covered by law. In any event, harassment of any type is not acceptable at Ferris State University.

Sexual Harassment:

Using the definition contained in the Equal Employment Opportunity Commission guidelines, adapted to include educational environments, sexual harassment is defined as follows:

Unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature constitutes sexual harassment when:

1) submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment or academic advancement;

2) submission to or rejection of such conduct by an individual is used as a factor in employment or academic decisions affecting such individuals;

3) such conduct has the purpose or effect of substantially interfering with an individual's work or academic performance, or creating an intimidating, hostile, or offensive working, living, or academic environment.

While sexual harassment most often takes place in situations of power differential between the persons involved, sexual harassment may also occur between persons of the same status, e.g., student-to-student. The person exhibiting sexually harassing conduct need not realize or intend the conduct to be offensive for the conduct to constitute sexual harassment.

Harassment Concerns:

Any person who believes he or she has been subjected to harassment of any kind (sexual, racial, or otherwise) should approach the individual whom they believe is responsible. He or she should identify the specific behavior, explain that he or she considers the behavior to be offensive and/or harassing, and ask the individual to stop the behavior. If assistance is needed to approach the individual, contact either an Academic Dean, the Dean of Students, the Director of Minority Student Affairs, or the Director of Affirmative Action.

If approaching the individual is not possible (i.e., you are uncomfortable or uncertain as to how the situation should be handled or concerned the situation may become volatile) or does not resolve the matter, it should then be reported immediately to an Academic Dean, the Dean of Students, the Director of Minority Student Affairs, the Director of Student Judicial Services, or the Director of Affirmative Action. If, for some reason, you are uncomfortable discussing your situation with any of these individuals, please report your situation to any member of University administration. The circumstances surrounding the matter will be fully investigated, including the nature of the harassment and the context in which it occurred.

All reports of harassment and subsequent investigations will be kept as confidential as possible. Anyone found to have violated this Policy will be subject to discipline up to and including discharge and dismissal, that may include, but not be limited to, official reprimand, official apology, sensitivity training, and/or other disciplinary action including dismissal. Likewise, because intentionally false accusations of harassment can have serious effects on innocent people, anyone found to have intentionally falsely accused another person of violating this Policy will be subject to discipline up to and including discharge or dismissal.

Consensual Relationships Between University Employees and Students:

Consensual relationships of an amorous or sexual nature that might be appropriate in other circumstances are deemed inappropriate when they occur between an employee of the University and a

student for whom he or she has a professional responsibility. For example, such a relationship would be inappropriate between a faculty member, administrator, supervisor, advisor, coach, or residential staff member and a student for whom he or she has professional responsibility. Even when both parties have consented to the development of such a relationship, the relationship can raise serious concerns about the validity of consent, conflicts of interest, and unfair treatment for others and may result in serious consequences. Employees and students of the University are expected to make responsible choice.

It is the policy of Ferris State University that any University employee who has professional responsibility for students shall not assume or maintain professional responsibility for any student with whom the University employee has engaged in an amorous or sexual relationship. Whether the relationship predated the assumption of professional responsibility or arose out of the professional association, the University employee will immediately disclose the relationship to the relevant unit administrator. The unit administrator will immediately arrange a meeting of the parties to the relationship to discuss alternative oversight of the student, and attempt to cooperatively agree to changes that will move professional responsibility of the student to another University employee. If no agreement is reached, the unit administrator will determine and direct the best method to deal with the situation.

Disruptive Behavior Policy Statement:

The College of Allied Health Sciences strives to maintain a positive learning environment and educational opportunity for all students. Consequently, patterns of behavior which obstruct or disrupt the learning environment of the classroom or other educational facilities will be addressed.

1. The instructor is in charge of the course. This includes assignments, due dates, methods and standards of grading, and policies regarding attendance, tardiness, late assignments, outside conferences, etc.

2. The instructor is in charge of the classroom. This includes the times and extent to which they allow questions or discussion, the level of respect with which they and other students are to be treated, and the specific behaviors they will allow within their classes. Open discussion of an honest opinion about the subject of a course is encouraged, but the manner in which the class is conducted is a decision of the instructor.

3. An instructor is entitled to maintain order in his/her class and has an obligation to other students to do so. Toward that end, an instructor is authorized and expected to inform a student that his/her behavior is disrupting a class and to instruct the student to stop that behavior. If the student persists, the instructor is authorized to direct the student to leave the class. If the student fails to comply with a directive to leave the class, the instructor will call Public Safety to assist with the student's removal.

4. If a student persists in a pattern of recurrent disruptive behavior, then the student may be subject to administrative action up to and including an involuntary withdrawal from

the course, following administrative review by the Allied Health Sciences Dean's Office, and/or University disciplinary proceedings.

5. Disruptive behavior cannot be sanctioned by a lowered course grade (e.g., from a B to a C) except insofar as quality of classroom participation has been incorporated into the instructor's grading policy for all students. (Note: Academic misconduct, which is covered by other regulations, can be a legitimate basis for lowering a grade or failing the student.)

6. Students as well as employees are bound by the University's policy against harassment in any form. Harassment will not be tolerated.

7. The office of the student's dean will be notified of any serious pattern or instance of disruptive behavior.

Honesty Policy:

The purposes of this policy are to encourage a mature attitude toward learning to establish a sound academic morale, and to discourage illegitimate aid in examinations, laboratory, and homework.

Cheating is defined as using or attempting to use, giving or attempting to give, obtaining or attempting to attain, products or prepared materials, information relative to a quiz or examination or other work that a student is expected to do alone and not in collaboration with others. **Plagiarism** (copying) of themes or other written work shall also be considered an infraction.

Students are required to present the results of their own work except under circumstances in which the instructor may have requested or approved the joint effort of a number of students.

The penalty for the first offense of willful cheating consists of the student receiving a zero for the assignment in which the infraction occurs. However, cheating on quizzes or examinations means failure in the course. The student may appeal the decision to the Disciplinary Committee.

Further offenses may result in suspension or dismissal from the University.

FERRIS STATE UNIVERSITY

COLLEGE OF ALLIED HEALTH SCIENCES

NUCLEAR MEDICINE TECHNOLOGY PROGRAM

NUCM 125 – CLINICAL PROCEDURES I

COURSE TITLE:	Clinical Procedures I			
COURSE NUMBER:	NUCM 125			
SEMESTER HOURS:	3 credits			
PREREQUISITES:	NUCM 120			
SEMESTER:	Spring 2008			
CLASS ROOM:	Lectures	T, R	8:00 – 8:50 AM	VFS 325
	Labs	M,T,W,R	1:00 – 3:50 PM	VFS 100

INSTRUCTOR INFO: Tracy Glentz, M.S., CNMT

VFS 310

Telephone: (231) 591-2272

E-mail: glentzt@ferris.edu

You may use the FerrisConnect E-mail address.

OFFICE HOURS: T, R 9:00 – 11:00 AM

COURSE DESCRIPTION: The first of two courses dealing with the in-depth study of clinical procedures

in the practice of the specialty of Nuclear Medicine Technology. The course is designed to develop cognitive and manipulative skills, work habits and attitudes necessary for the proper instrument calibration, performance of laboratory techniques, data collection, and manipulation to produce reliable results. Proper equipment operation, protocols, and quality assurance measures will be emphasized as well as preparation, quality control, and Biorouting of materials and radiopharmaceuticals used for diagnostic and therapeutic procedures.

REQUIRED MATERIAL: 1. Lab coats (provided by the student), ¾ length, long sleeved

2. Film badges (provided by FSU)

3. Ring Binder, minimum of two inch, provided by the student

4. Calculator, scientific, nonprogrammable, provided by the student

5. Internet access

REQUIRED TEXTBOOKS:

1. Nuclear Medicine and PET/CT Technology and Techniques, Donald Bernier, et al. The C.V. Mosby Co., 2004.

2. Review of Nuclear Medicine Technology: Preparation for Certification Examination, Ann M. Steves, Patricia C. Wells, SNM Publishing, 2004. ISBN 0-9726478-5- 1997.

SUPPLEMENTAL READING: Course Instructor Handouts

COURSE UNITS: BBP, NRC Regulations, Dose Preparation and QC, Venipuncture, Biorouting, Methods of Localization, Radionuclide Therapy, Thyroid, Radioassay, Radioimmunoassay, Monoclonal Antibodies, In-Vitro Studies.

GRADING:

Examinations, labs, assignments, etc. are subject to change.

100 points	Comprehensive final exam
50 points	Group Poster Presentation
100 points	Tests (5 @ 20 points each)
50 points	Assignment modules (5 @ 10 points each)
20 points	Pop Quizzes 2 @ 10 points each
120 points	Laboratory Assignments (12 @ 10 points each)
60 points	Laboratory Examinations 3 @ 20 points each

A	=	100-95%	C	=	76-73%
A-	=	94-90%	C-	=	72-70%
B+	=	89-87%	D+	=	69-67%
B	=	86-83%	D	=	66-63%
B-	=	82-80%	D-	=	62-60%
C+	=	79-77%	F	=	<60%

EVALUATION:

1. Poster Presentation
2. Laboratory classes and Exams
3. Written and verbal tests, including Final Exam
4. Quizzes/Modules
5. Grades will be by letter grade

INSTRUCTIONAL METHODS:

1. Demonstration
2. Instructor assisted procedure performance
3. Instructor supervised procedure performance
4. Lecture
5. Procedure Critique/Student Presentation Critique
6. Selected reading assignments

ASSIGNMENTS:

1. Laboratory assignments
2. Nuclear Energy Poster presentation
3. Assignment Modules/Quizzes
4. Homework assignments as needed from the instructor.
5. Tests

LATE ASSIGNMENTS: Due dates for assignments will be clearly stated. Late assignments will Receive zero credit.

COURSE OUTCOMES:

Consistent with the aims and purposes of the Nuclear Medicine Technology Program, the Objectives of the NUCM 125 imply that upon completion of the course, the student will be able to:

1. Select and assemble a correct syringe and needle.
2. Correctly tie a tourniquet on the appropriate area.
3. Locate a vein by palpation.
4. Prep and area of venipuncture.
5. Perform venipuncture (straight stick, butterfly and angiocath) in an artificial arm.
6. Perform venipuncture (straight stick, butterfly and angiocath) in a student's arm, hand or wrist, or foot.
7. Handle a blood sample, according to specific instructions, and dispose of it in accordance with the rules governing biological samples.
8. Use aseptic technique throughout venipuncture procedures.
9. Determine activity limits, the total volume and radioactivity to be added to a kit.
10. Check total activity in a vial using a dose calibrator.
11. Calculate the concentration of radioactivity of a radioactive compound and label vial correctly.
12. Check radiopharmaceutical preparation for proper color and clarity.

13. Perform quality control/quality assurance tests.
14. Follow and understand manufacturer inserts.
15. Describe and perform proper blood and body fluid precautions.
16. Pass a written test on blood borne pathogens.
17. Describe and understand the methods of localization.
18. Describe and understand Biorouting of radionuclides and radiopharmaceuticals.
19. Assemble generator and shield with lead.
20. Elute generator using aseptic techniques.
21. Assay the generator eluate using a dose calibrator.
22. Record the generator eluate assay results and time of assay in a log book.
23. Check the eluate for radionuclide and chemical contaminations and record results.
24. Describe and understand the various radionuclide therapies used in nuclear medicine technology.
25. Describe and understand the anatomy and physiology of the thyroid gland.
26. Describe and understand the thyroid procedures used in nuclear medicine.
27. Have an understanding of radioimmunoassay.
28. Describe and understand the various nonimaging procedures performed in nuclear medicine.
29. Use laboratory equipment correctly and efficiently.
30. Describe and understand the concept of monoclonal antibodies and how they are used in nuclear medicine.

COURSE POLICIES:

General Attendance: Attendance is expected at every scheduled lecture and laboratory session per FSU policy. While it is understood that extenuating circumstances may result in periodic absences, absences resulting in four (4) hours of missed lecture/laboratory shall be deemed excessive. A decrease of 2% in the final grade will be made for every hour missed that is deemed excessive. The material covered in NUCM 125 will be used extensively during clinical internship and in the profession of Nuclear Medicine Technology. Please note: lectures are 50 minutes each and laboratory classes are 2 hours and 50 minutes each.

Lab Attendance: Students are expected to remain in lab during their entire session. Early dismissal is at the course/lab instructor's discretion. Leaving early will be counted as an absence and will be handled in the same manner as general attendance. Missing a lab session will result in zero points for that lab.

Tardiness: Tardiness in excess of four (4) lecture or laboratory sessions will be handled in the same manner as attendance. Entering the classroom 5 minutes or more after the start of lecture or laboratory is considered tardy.

Late Labs: Lab forms are to be completed and turned in at the end of laboratory unless otherwise stated. Late labs will not be accepted for credit. No exceptions.

Lab Safety / Health: Per Nuclear Regulatory Commission Regulations and Guidelines, radiation safety film badges must be worn at collar level and on the finger while in the Nuclear Medicine Technology lab. Lab coats (knee length or below) must be worn during all labs. Lab coats may not be worn outside the lab per OSHA guidelines. Shorts or skirts may not be worn in the lab unless tights or nylons are also worn. Open-toed shoes, clogs, sandals, etc may not be worn. Disposable gloves must be worn when handling blood or body fluids as well as radioactive materials. Other

protective gear will be provided as necessary. No food or drinks are allowed in the lab. Chewing gum, cough drops, mints, etc. are not allowed. Application of cosmetics (i.e. lip gloss or chap stick) is not allowed. Students may not enter the hot lab (VFS 100A) at any time without the permission of the lab instructor. Non-compliance of any of the above guidelines will result in no credit for the lab session. Further non-compliance could result in suspension and/or expulsion from the program.

Academic Dishonesty: Ferris State University's guidelines for academic dishonesty will be followed. Please refer to your student handbook, FSU website or NUCM 120 syllabus for details.

Class Participation: Class participation is required in the course. Sleeping during class will result in the student being asked to leave class with that class period being considered an absence. Class participation is required in both lecture and laboratory sessions.

Missed Quiz, Examination or Presentation: There will be no make-up quiz, examination or presentation unless extenuating circumstances exist. Proof of absence is required. The content of the make-up is at the course instructor's discretion. Lab practicals may not be made up under any circumstance.

Cell Phones, Pagers, Etc: Cell phones, pagers, etc must be turned off during class. If a situation arises that the device must remain on, please discuss this situation with the course instructor prior to the start of class.

Disruptive Behavior: Disruptive behavior (excessive talking, vulgar language, etc) will result in verbal and written warning. A second offense will result in the student being asked to leave that class, and that class period will be considered an absence.

Support Services: Computer support may be sought throughout the University. See the course instructor for specific information. Appointments may be made with the course instructor for individual assistance as needed.

General University Policies: Policies (i.e. harassment) were provided in the NUCM 120 course pack and student handbook. Please refer to the course pack, the FSU website, or the course instructor for further information.

Nuclear Medicine Technology Program
Department of Dental Hygiene and Medical Imaging
College of Allied Health Sciences
Ferris State University

Course Title:	Advanced Nuclear Cardiology
Course Number:	NUCM 440
Semester Hours:	3 Credits
Prerequisite:	Admission to B.S. Completion Degree Program or Permission of the instructor
Semester:	Spring 2008
Classroom:	WebCT
Instructor:	Sheila MacEachron, MS, CNMT
Office:	VFS 405A, Big Rapids Campus
Telephone:	231 591-2319 or 231 591-2261
E-Mail:	maceacs@ferris.edu
Office Hours:	Designated course hours: M 8:00 – 10:50 am Walk-In: T 9:00 – 10:50 am R 8:00 – 9:50 am Others by appointment
Required Textbooks:	None
Supplemental Reading:	Course instructor handouts, hospital protocols, internet
Required Materials:	Access to computer with internet.

Course Description:

This course prepares students to perform advanced nuclear cardiology procedures as well as provides information regarding electrocardiogram interpretation. Pharmacology and pathology are also emphasized.

Course Objectives

Provided with each unit.

Course Outline:

I. **Review of Anatomy and Physiology**
   A. Gross anatomy and function
   B. Cellular anatomy and function
   C. Blood Flow
      1. Coronary
      2. Systemic
   D. Conduction system
   E. Cardiac cycle
   F. Functional parameters (ejection fraction, stroke volume, cardiac output...)

II. **Pathology**
(Please note: For each of the following disease states these topics will be covered: characteristics, causes, population and treatment)
   A. The heart and great vessels
      1. Coronary artery disease
         a. Ischemia
         b. Infarction
         c. Hibernating or stunned myocardium
         d. Zones of ischemia, injury and infarction
         e. Coronary artery spasm
      2. Congenital abnormalities
         a. Transportation of the great vessels
         b. Dextracardia
         c. Septal defects
      3. Valve disease
         a. Mitral valve prolapsed / stenosis / regurgitation
         b. Tricuspid stenosis / regurgitation
      4. Infectious disease
      5. Pericardial effusion
      6. Cardiomyopathy
      7. Chemotherapeutic toxicity
      8. Congestive heart failure
      9. Arrhythmias
      10. Transplant rejection
      11. Thyroid related heart disease
      12. Cardiac tumors
      13. Coarctation of aorta
   B. Systemic vasculature
      1. Arteriosclerosis
      2. Aneurysms
      3. Phlebitis
      4. Deep vein thrombosis
      5. Hypertension

III. Cardiac Stress Testing Methods

A. Indications
B. Contraindications and adverse reactions
    1. Physical or pathological conditions
    2. Interfering drugs
    3. Precautions
    4. Adverse reactions
C. Patient preparation (including consent if applicable)
D. Equipment
    1. Treadmill
    2. Supine cycle
    3. Upright cycle
    4. Hand ergometer
    5. Electrocardiogram (ECG) monitor
    6. Blood pressure monitor
E. Basic procedure
    1. Protocols
    2. ECG
        a. Skin preparation
        b. Electrode placement
    3. Endpoints
F. Interventions and procedures
    1. Pharmacologic intervention
        a. Pharmaceuticals and mechanisms of action
            1. Dipyridamole
            2. Adenosine
            3. Dobutamine
            4. Arbutamine
        b. Indications / contraindications and adverse effects
        c. Antidotes for the reversal of the adverse effects
        d. Administration protocols
        e. Patient preparation
        f. Infusion pump
    2. Pharmacologic intervention with low level physical exercise
        a. Indications / contraindications and adverse effects
        b. Positive effects of introducing low level physical exercise
        c. Administration protocols
        d. Patient preparation
G. Interpretation
    1. Normal rhythm
    2. Arrhythmias
    3. Other ECG abnormalities

IV. Myocardial Perfusion/Viability

A. Indications
B. Radiopharmaceuticals
    1. Tracers
        a. Thallium-201

b. Tc-99m sestamibi
c. Tc-99m tetrofosmin
d. Tc-99m teboroxime
e. F-18 fluorodeoxyglucose (FDG)
f. N-13 ammonia
g. Dual nuclide: Tl-201 and a Tc-99m agent
h. Radiolabeled fatty acids

2. Physical and chemical characteristics
3. Kit and radiopharmaceutical preparation
4. Dose range and route of administration
5. Biorouting
   a. Uptake
   b. Distribution
   c. Excretion
6. Dosimetry

C. Contraindications and adverse reactions
1. Physical and pathologic conditions
2. Interfering studies
3. Interfering drugs
4. Precautions
5. Adverse reactions

D. Patient preparation

E. Equipment
1. Camera
2. Collimators
3. Computer
4. Cardiac monitor for gating, if applicable
5. Arm boards, Velcro straps, etc

F. Basic procedure and processing
1. Protocols
2. Dose range and administration technique
3. Acquisition parameters
4. Positioning views, including adaptations
5. Data processing
   a. Normalization
   b. Circumferential profile
   c. Polar maps
   d. Cines of gated studies (wall motion/wall thickness)
   e. Ejection fraction calculation
   f. Attenuation and motion correction software
   g. Filtering and reconstruction techniques
   h. 3-D displays
   i. Heart – lung ratio
6. Image formatting
7. Pitfalls

G. Interpretation of images and data
1. Normal
2. Normal variants

3. Abnormal
4. Artifacts
5. Diagnostic / prognostic value of the study
    a. Outcomes
    b. Treatment decisions
    c. Prognostic risk factors based on diagnosis

V. Equilibrium radionuclide angiography (ERNA), also known as multigated blood pool acquisition (MUGA), or radionuclide ventriculogram (RVG)

A. Indications
B. Radiopharmaceuticals
    1. Tc-99m tagged RBC
    2. Physical and chemical characteristics
    3. Kit and radiopharmaceutical preparation
        a. In vivo
        b. In vitro
        c. Modified in vivo / in vitro
    4. Dose range and route of administration
    5. Biorouting
        a. Uptake
        b. Distribution
        c. Excretion
C. Contraindications and adverse reactions
    1. Physical or pathologic conditions
    2. Interfering studies
    3. Interfering drugs
    4. Precautions
    5. Adverse reactions
D. Patient preparation
E. Equipment
    1. Camera
    2. Collimators
    3. Computer
    4. Cardiac monitor for gating
    5. Supine bicycle for exercise if applicable
    6. Infusion pump if applicable
F. Basic procedures and processing
    1. Protocols
    2. Dose range and administration techniques
    3. Acquisition parameters
    4. Positioning and views, including adaptations
    5. Data processing
        a. Ejection fraction calculations
        b. Cine display
        c. Other measurements
    6. Image formatting
    7. Pitfalls

G. Interventions and procedures
    1. Supine bicycle exercise
    2. Dobutamine
H. Interpretation of images and data
    1. Normal
    2. Normal variants
    3. Abnormal
    4. Artifacts
    5. Diagnostic/prognostic value of the study
        a. Outcomes
        b. Treatment decisions
        c. Prognostic risk factors based on diagnosis

VI. First pass angiography

A. Indications
B. Radiopharmaceuticals
    1. Tracers
        a. Tc-99m DTPA
        b. Tc-99m pertechnetate
        c. Any Tc-99m labeled radiopharmaceutical of at least 15 mCi
    2. Physical and chemical characteristics
    3. Kit and radiopharmaceutical preparation
    4. Dose range and route of administration
    5. Biorouting
        a. Uptake
        b. Distribution
        c. Excretion
C. Contraindications and adverse reactions
    1. Physical and pathologic conditions
    2. Interfering studies
    3. Interfering drugs
    4. Precautions
    5. Adverse reactions
D. Patient preparation
E. Equipment
    1. Cameras (multicrystal, single crystal)
    2. Collimators
    3. Computer
    4. Upright bicycle or treadmill, if applicable
F. Basic procedure and processing
    1. Protocols
    2. Dose range and administration technique
    3. Acquisition parameters
    4. Positioning and views, including adaptations
    5. Data processing
        a. Ejection fraction calculations
        b. Functional images
        c. Cine display

d. Left-to-right shunt quantitation
e. Other measurements
6. Image formatting
7. Pitfalls

G. Interpretation of images and data
1. Normal
2. Normal variants
3. Abnormal
4. Artifacts
5. Diagnostic/prognostic value of the study
a. Outcomes
b. Treatment decisions
c. Prognostic risk factors based on diagnosis

VII. Infarct imaging

A. Indications
B. Radiopharmaceuticals
1. Tracers
a. Tc-99m pyrophosphate
b. In-111 antimyosin
2. Physical and chemical characteristics
3. Kit and radiopharmaceutical preparation
4. Dose range and route of administration
5. Biorouting
a. Uptake
b. Distribution
c. Excretion
6. Dosimetry

C. Contraindications and adverse reactions
1. Physical conditions
2. Interfering studies
3. Precautions
4. Adverse reactions

D. Patient preparation
E. Equipment
1. Camera
2. Collimators
3. Computer

F. Basic procedure and processing
1. Protocols
2. Dose range and administration technique
3. Acquisition parameters
4. Positioning and views, including adaptations
5. Data processing
6. Imaging formatting
7. Pitfalls

G. Interpretation of images
1. Normal

2. Normal variants
3. Abnormal
4. Artifacts
5. Diagnostic/prognostic value of the study
    a. Outcomes
    b. Treatment decisions
    c. Prognostic risk factors based on diagnosis

VIII. Major vessel flow study (i.e. superior vena cava obstruction study)

A. Indications
B. Radiopharmaceuticals
    1. Tracers
        a. Tc-99m DTPA
        b. Tc-99m pertechnetate
    2. Physical and chemical characteristics
    3. Kit and radiopharmaceutical preparation
    4. Dose range and route of administration
    5. Biorouting
        a. Uptake
        b. Distribution
        c. Excretion
    6. Dosimetry
C. Contraindications and adverse reactions
    1. Physical conditions
    2. Interfering studies
    3. Precautions
    4. Adverse reactions
D. Patient preparation
E. Equipment
    1. Camera
    2. Collimators
    3. Computer
F. Basic procedure and processing
    1. Protocols
    2. Dose range and administration technique
    3. Acquisition parameters
    4. Positioning and views, including adaptations
    5. Image formatting
    6. Pitfalls
G. Interpretation of images
    1. Normal
    2. Normal variants
    3. Abnormal
    4. Artifacts
    5. Diagnostic/prognostic value of the study
        a. Outcomes
        b. Treatment decisions
        c. Prognostic risk factors based on diagnosis

IX. Deep vein thrombosis detection

A. Indications
B. Radiopharmaceuticals
    1. Tracers
        a. Tc-99m MAA
        b. Tc-99m apcitide
        c. Tc-99m human albumin microspheres (HAM)
    2. Physical and chemical characteristics
    3. Kit and radiopharmaceutical preparation
    4. Dose range and route of administration
    5. Biorouting
        a. Uptake
        b. Distribution
        c. Excretion
    6. Dosimetry
C. Contraindications and adverse reactions
    1. Physical conditions
    2. Interfering studies
    3. Precautions
    4. Adverse reactions
D. Patient preparation
E. Equipment
    1. Camera
    2. Collimators
    3. Computer
F. Basic procedure and processing
    1. Protocols
    2. Dose range and administration techniques
    3. Acquisition parameters
    4. Positioning and views, including adaptations
    5. Image formatting
    6. Pitfalls
G. Interpretation of images
    1. Normal
    2. Normal variants
    3. Abnormal
    4. Artifacts
    5. Diagnostic/prognostic value of the study
        a. Outcomes
        b. Treatment decisions
        c. Prognostic risk factors based on diagnosis

Course Calendar:

This calendar is tentative and subject to change depending upon the progress of the class.

Week of...	Topic*
January 14th	Syllabus Review of Anatomy and Physiology
January 21st	Pathology Discussion 1
January 28th	Pathology continued **Quiz 1** (Review of A & P and Pathology)
February 4th	Cardiac Stress Testing Methods Discussion 2
February 11th	Cardiac Stress Testing Methods continued **Quiz 2** (Cardiac Stress Testing Methods)
February 18th	Myocardial Perfusion / Viability Discussion 3
February 25th	Myocardial Perfusion / Viability continued **Quiz 3** (Myocardial Perfusion / Viability)
March 3rd	Equilibrium Radionuclide Angiography (ERNA) Discussion 4
March 17th	Equilibrium Radionuclide Angiography continued **Quiz 4** (ERNA)
March 24th	First Pass Angiography Discussion 5
March 31st	First Pass Angiography continued **Quiz 5** (First Pass Angiography)
April 7th	Infarct Imaging Discussion 6
April 14th	Major Vessel Flow Study
April 21st	Deep Vein Thrombosis Detection **Quiz 6** (Infarct Imaging, Major Vessel Flow Study, Deep Vein Thrombosis)
April 28th	Review
May 5th	**Final Exam** (Comprehensive) Monday, May 5th 5:00 am to 9:00 pm

*Quizzes will be on Thursdays and will be available via WebCT 5:00 am to 9:00 pm.
Discussions: Your response will be due on or before Wednesday at 4:00 pm. Your response to your classmates' discussions will be due after Wednesday at 4:00 pm and before Friday at 5:00 pm. Discussions outside of these times will not be accepted for credit.

Course Policies:

Class Participation: Class participation is required during discussions. Points are awarded based on ACTIVE participation.

Missed Tests/Examinations: There will be no make-up tests or examinations given unless extenuating circumstances exist. The content of the make-up test or examination is at the course instructor's discretion. Proof of extenuating circumstances must be presented to the course instructor.

Academic Dishonesty: Ferris State University's policy on academic dishonesty will be followed. The policy may be referred to on the FSU website.

Professionalism: Students are expected to behave in a professional manner. Professionalism includes respect for the course instructor, respect for peers, behavior that is acceptable in a clinical setting, etc. Unprofessional behavior will result in a written warning. A second offense will result in disciplinary procedures which may include suspension and/or dismissal from the program.

Support Services: The Academic Skill Center serves all students who need assistance. Appointments may be made with the course instructor for individual assistance. Take advantage of office hours.

Communication with Instructor: Please be aware that the course instructor will respond to your emails (best method) and telephone messages in a timely fashion. She will not, however, answer messages in the evenings or on weekends. The instructor has set office hours and will respond during these times if possible. Hours outside of office hours are spent in the classroom, in the laboratory, or in performing administrative responsibilities. If there is an emergency during the day, please contact the Department Secretary at 231 591-2261.

Grading:

Discussions	"Your response"	Six @ 5 points each	30 points
	"Second response"	Six @ 5 points each	30 points
Quizzes		Six @ 10 points each	60 points
Final Examination		One @ 30 points	30 points
Total			150 points

Grading Scale:

A	150 – 143 points
A-	142 – 135 points
B+	134 – 131 points
B	130 – 125 points
B-	124 – 120 points
C+	119 - 116 points
C	115 – 110 points
C-	109 – 105 points
D+	104 – 101 points
D	100 – 95 points
D-	94 – 90 points
F	89 points and below

Appendix C: Administrative Program Review

Administrative Program Review Program **Nuclear Medicine - AAS**
12/15/2005

Purpose of Administrative Program Review

1. to facilitate a process led by the deans and department heads/chairs to assess and evaluate programs under their supervision
2. to facilitate long term planning and recommendations to the VPAA
3. to collect and analyze information that will be useful in the University's accreditation efforts; Academic Program Review deliberation; and assessment.

Instructions: Please prepare a report following the outline below.

I. Summary of Modifications since last report:

Please provide a brief summary of the changes that have taken place in the program since the last report.

No major programmatic changes have occurred since the last report.

II. Program Assessment/Assessment of Student Learning

a) What are the program's learning outcomes?

The Nuclear Medicine Technology Program is a competency based program.
The student is to be presented with a structured, monitored, and education oriented practical experience in which actual patient contact occurs.
This curriculum is designed to familiarize the student with the routine procedures in nuclear medicine which would be performed by entry-level technologists: nuclear instrumentation use and quality control (QC); radiopharmaceutical preparation and QC; quantitation and administration of radiopharmaceutical doses; radiation safety and protection; static, dynamic, and tomographic imaging; in vivo non-imaging; in vitro procedures; patient care and preparation for nuclear medicine examinations; basic administrative and management procedures associated with maintenance of the nuclear medicine department; computer applications; and therapeutic use of radiopharmaceuticals.

The clinical education is presented in progressive competency levels. The instruction and progression of the student will vary with different procedures. Levels of competency are as follows:

Entry Level: Observation
At this level, the student will rotate through the entire facility, becoming familiar with the tasks expected to be accomplished at higher levels. The student should participate in patient transportation, filing, drawing blood samples, and attending conferences and interpretation sessions. The student should also become familiar with the procedures which are performed at his/her station of rotation.
Level I: Performed with Assistance
This level of performance is expected during the demonstration portion of the clinical instruction. At this level, the student aids the clinical instructor. In some areas, this level overlaps with entry level activities.
After some practice, the student should perform procedures step by step as the technologist gives direction and assistance. During this phase, the role of instructor diminishes as the proficiency of the student increases.
Level II: Performance Evaluation
At this level, the student will be evaluated on a procedure. The student must achieve a performance level of 90% or above to proceed to Level III. If 90% or below is scored on the

performance evaluation, the student returns to Level I for instruction. A student MAY NOT perform a study alone (Level III) until the performance evaluation for that particular study has been mastered (90% or above).

Level III: Performed Alone

At this level, the student has mastered the procedure and is able to perform the study under supervision. Studies may be re-evaluated as necessary to maintain mastery.

b) What assessment measures are used, both direct and indirect?

Direct

- **Registry exams: Achieve a minimum pass rate of 70% or higher**
- **Lab / Clinical competency ratings (Clinical Masters) – Must pass all**

Indirect

- **Surveys (Students, Alumni, Employers, ACI, Advisory Committee, Faculty)**
- **Job Placement Data**
- **Retention rates**
- **Program Accreditation**

c) What is the assessment cycle for the program?

Assessment of all Direct Measures occurs on an annual basis, along with Retention rates from the indirect measures category. Job placement is anecdotal each year. Assessment of Indirect Measures occurs with the APR cycle and with the Accreditation cycles, both of which are 5 years in length. Surveys are conducted for these reporting cycles to capture a better sampling of graduates.

d) What assessment data were collected in the past year?

Board Pass rates for 2004 graduates was: 100% ARRT boards; 96% NMTCB (Students may write one or both of these certification exams) The 2005 graduate data is not yet available from the certifying agencies.

Retention Rates for graduates of 2005:

- **40 students admitted in F03; 35 graduates for W05 projecting a 12.5 % attrition rate**

Job Placement:

100% for graduates of 2005 that sought job placement.

Four graduates are pursuing a BS degree at Ferris and are not employed by choice.

e) How have assessment data been used for programmatic or curricular change?

In Fall 2003, a SLA was implemented for NUCM 120, which was the semester when the majority of the attrition seemed to occur in the program. This has resulted in a significant drop in program attrition, from 37% to only 12.5%.

Course Outcomes Assessment

a) Do all multi-sectioned courses have common outcomes?

YES - a lead instructor typically teaches most if not all of the lab sections that are part of the course or that faculty member provides oversight for other faculty who may be teaching some of the sections.

b) If not, how do you plan to address discrepancies?

c) How do individual course outcomes meet programmatic goals?

The disciplinary content areas are clearly delineated by the accreditation body so that the collective courses all contribute to the attainment of the program goals. All required areas of content are included in the program.

III. Program Features

1. **Advisory Board**
   a) Does the program have a board/committee? When did it last meet? When were new members last appointed? What is the composition of the committee (how many alumni, workplace representatives, academic representatives, etc.)

The Program Adjunct Clinical Instructors (ACI) group currently serves this purpose for the program, but is homogeneous in composition – all Nuclear Medicine Technologists. The program does enjoy a great deal of support and involvement from the Adjunct Clinical Instructors and this group meets at least 1-2 times per year to provide input regarding the program. These individuals are current clinicians and can provide the perspective of
Meeting dates for AY 05-06: September 2005

This group does change slightly each year, depending on where students are placed for internship, but some members are consistent as sites are utilized each year.

15 of the ACIs who attend this meeting are alumni; 5 are non-alumni. For the Fall 05 meeting, representatives from Human Resources and Administrators from agencies were also invited to join this group.

   b) If no advisory board exists, please explain by what means faculty receive advice from employers and outside professionals to inform decisions within the program.

   c) Has feedback from the Advisory Board affected programmatic or curricular change?

Not this year, but their input is vital to keep the program current with the discipline.

2. **Internships/Cooperative or Experiential Learning**
   a) Is an internship required or recommended?

Yes – 2 full semesters with 40 hours / week are required.

   b) If the internship is only recommended, what percentage of majors elect the internship option?

   c) What challenges does the program face in regard to internships? What is being done to address these concerns?

The program has historically enjoyed the status of being one of two Nuclear Medicine programs in the State, with the other program a Hospital based program which did not compete with FSU for internship sites. However, in the last two years, programs from outside the state have started to seek internship sites at some of the same sites used by the FSU program, creating increased competition for these sites. The internship sites must meet certain criteria in terms of available procedures to allow students to build the skills required for disciplinary competency, so there is a limit to the number of hospitals

that are suitable sites for internship. This is compounded by the fact that in Fall 2003, Ferris increased the quota for the program from 32 to 40 students, which has further impacted the need for quality internship sites.
The program has addressed this concern through efforts on the part of the Clinical Coordinator, who has actively been seeking out new prospective sites to add to the options for students. At this point, there are enough sites for the number of students in the program, but the locations are not always what students would prefer, which can create some level of dissention.
Another issue is the fact that affiliation agreements are becoming increasingly complex to implement, as most agencies now require their own template, which has resulted in a backlog at both the FSU Governmental Relations office level as well as at the agency level to get agreements in place by the time students start their internships.

This is being addressed through a new process being implemented in the College, where all affiliation agreements will be available to all faculty / programs on a central data base and location. We are also working with the Governmental Relations office to increase our skill in evaluating and negotiating these agreements at the program and college levels.

Yearly Administrative Review Program **Nuclear Medicine - AAS**
December 20, 2006

Purpose of Administrative Program Review

4. to facilitate a process led by the deans and department heads/chairs to assess and evaluate programs under their supervision
5. to facilitate long term planning and recommendations to the VPAA
6. to collect and analyze information that will be useful in the University's accreditation efforts; Academic Program Review deliberation; and assessment.

Instructions: Please prepare a report following the outline below.

I. Summary of Modifications since last report:

Please provide a brief summary of the changes that have taken place in the program since the last report.

The addition of a BS degree completion program based at FSU-GR.

IV. Program Assessment/Assessment of Student Learning

f) What are the program's learning outcomes?

The Nuclear Medicine Technology Program is a competency based program.
The student is to be presented with a structured, monitored, and education oriented practical experience in which actual patient contact occurs.

This curriculum is designed to familiarize the student with the routine procedures in nuclear medicine which would be performed by entry-level technologists: nuclear instrumentation use and quality control (QC); radiopharmaceutical preparation and QC; quantitation and administration of radiopharmaceutical doses; radiation safety and protection; static, dynamic, and tomographic imaging; in vivo non-imaging; in vitro procedures; patient care and preparation for nuclear medicine examinations; basic administrative and management procedures associated with maintenance of the nuclear medicine department; computer applications; and therapeutic use of radiopharmaceuticals.

The clinical education is presented in progressive competency levels. The instruction and progression of the student will vary with different procedures. Levels of competency are as follows:

Entry Level: Observation
At this level, the student will rotate through the entire facility, becoming familiar with the tasks expected to be accomplished at higher levels. The student should participate in patient transportation, filing, drawing blood samples, and attending conferences and interpretation sessions. The student should also become familiar with the procedures which are performed at his/her station of rotation.

Level I: Performed with Assistance
This level of performance is expected during the demonstration portion of the clinical instruction. At this level, the student aids the clinical instructor. In some areas, this level overlaps with entry level activities.

After some practice, the student should perform procedures step by step as the technologist gives direction and assistance. During this phase, the role of instructor diminishes as the proficiency of the student increases.

Level II: Performance Evaluation
At this level, the student will be evaluated on a procedure. The student must achieve a performance level of 90% or above to proceed to Level III. If 90% or below is scored on the performance evaluation, the student returns to Level I for instruction. A student MAY NOT perform a study alone (Level III) until the performance evaluation for that particular study has been mastered (90% or above).

Level III: Performed Alone
At this level, the student has mastered the procedure and is able to perform the study under supervision. Studies may be re-evaluated as necessary to maintain mastery.

g) What assessment measures are used, both direct and indirect?

Direct
- **Registry exams: Achieve a minimum pass rate of 70% or higher**
- **Lab / Clinical competency ratings (Clinical Masters) – Must pass all**

Indirect
- **Surveys (Students, Alumni, Employers, ACI, Advisory Committee, Faculty)**
- **Job Placement Data**
- **Retention rates**
- **Program Accreditation**

h) What is the assessment cycle for the program?

Assessment of all Direct Measures occurs on an annual basis, along with Retention rates from the indirect measures category. Job placement is anecdotal each year.

Assessment of Indirect Measures occurs with the APR cycle and with the Accreditation cycles, both of which are 5 years in length. Surveys are conducted for these reporting cycles to capture a better sampling of graduates.

i) What assessment data were collected in the past year?

Board Pass rates for 2005 graduates was: 79% NMTCB
Retention Rates for graduates of 2006:

- **40 students admitted in F04; 31 graduates for W06 with a 77.5 % retention rate**

Job Placement:

100% for graduates of 2006 that sought job placement.

j) How have assessment data been used for programmatic or curricular change?

In Fall 2003, a SLA was implemented for NUCM 120, which was the semester when the majority of the attrition seemed to occur in the program. This has resulted in a significant drop in program attrition to only 02.5% in Fall 2006.

Course Outcomes Assessment

a) Do all multi-sectioned courses have common outcomes?
YES - a lead instructor typically teaches most if not all of the lab sections that are part of the course or that faculty member provides oversight for other faculty who may be teaching some of the sections.

d) If not, how do you plan to address discrepancies?

e) How do individual course outcomes meet programmatic goals?

The disciplinary content areas are clearly delineated by the accreditation body so that the collective courses all contribute to the attainment of the program goals. All required areas of content are included in the program.

V. Program Features

3. Advisory Board

d) Does the program have a board/committee? **YES** When did it last meet? **November 2, 2006** When were new members last appointed? **Fall 2006** What is the composition of the committee (how many alumni, workplace representatives, academic representatives, etc.)

The Program Adjunct Clinical Instructors (ACI) group currently serves this purpose for the program, but is homogeneous in composition – all Nuclear Medicine Technologists. The program does enjoy a great deal of support and involvement from the Adjunct Clinical Instructors and this group meets at least 1-2 times per year to provide input regarding the program. These individuals are current clinicians and can provide the perspective of what is needed in the technical field.

This group does change slightly each year, depending on where students are placed for internship, but some members are consistent as sites are utilized each year.

15 of the ACIs who attend this meeting are alumni; 5 are non-alumni. For the Fall 05 meeting, representatives from Human Resources and Administrators from agencies were also invited to join this group.

e) If no advisory board exists, please explain by what means faculty receive advice from employers and outside professionals to inform decisions within the program.

f) Has feedback from the Advisory Board affected programmatic or curricular change?

Yes, their input was vital in program planning for the BS degree completion program in Grand Rapids.

4. Internships/Cooperative or Experiential Learning

d) Is an internship required or recommended?

Yes – 2 full semesters with 40 hours / week are required.

e) If the internship is only recommended, what percentage of majors elect the internship option?

f) What challenges does the program face in regard to internships? What is being done to address these concerns?

The program has historically enjoyed the status of being one of two Nuclear Medicine programs in the State, with the other program a Hospital based program which did not compete with FSU for internship sites. However, in the last two years, programs from outside the state have started to seek internship sites at some of the same sites used by the FSU program, creating increased competition for these sites. The internship sites must meet certain criteria in terms of available procedures to allow students to build the skills required for disciplinary competency, so there is a limit to the number of hospitals that are suitable sites for internship. This is compounded by the fact that in Fall 2003, Ferris increased the quota for the program from 32 to 40 students, which has further impacted the need for quality internship sites.
The program has addressed this concern through efforts on the part of the Clinical Coordinator, who has actively been seeking out new prospective sites to add to the options for students. At this point, there are enough sites for the number of students in the program, but the locations are not always what students would prefer, which can create some level of dissention.

g) Do you seek feedback from internship supervisors ?

Yes, the Clinical Coordinator for the program is in regular contact with the clinical sites through visits each semester and through the forum of the biannual Adjunct Clinical Instructor (ACI) meetings.

If so, does that feedback affect pedagogical or curricular change?

This relationship with the clinical sites is key to maintaining currency in the program, as frequent visits to clinical affiliates allows the faculty to see what new procedures or equipment are utilized in the clinical practice setting. The curriculum is aligned accordingly.

5. On-Line Courses

a) Please list the web-based courses, both partial internet and fully online, offered last year.

- **NUCM 291 Clinical Internship – web based**
- **NUCM 292 Clinical Internship – web based**

b) What challenges and/or opportunities has web-based instruction created?

None

c) What faculty development opportunities have been encouraged/required in order to enhance web-based learning within the program?

- **The new faculty have participated in WebCT training.**

d) How has student feed-back been used to enhance course delivery?

No problems indicated – students are all off site, so appreciate the convenience of this method of communication with the instructor.

e) Is there any plan to offer this program on-line? If yes, what rationale is there to offer this program online?" (emerging market opportunity?, expand enrollment?, demand for niche program offering?, etc.)

The associate degree program would not lend itself to a total online format at this time unless it became an integrated program where students were hospital based from the beginning of the program and the on-campus laboratory component was eliminated. However, this is what has been identified as the strength of the program.
The BS degree completion program will be totally on-line and its' first course will be taught Spring 2007 semester.

6. Accreditation

a) Is the program accredited or certified?

YES

b) By whom?

Yes, the program is accredited by Joint Review Commission on Nuclear Medicine Technology (JRCNMT). The program underwent a site visit in February 2004, and was granted ongoing accreditation for 5 years. The next visit will be due to occur in 2009.

c) When is the next review? **2009**

d) When is the self-study due? **2008-09 AY**

e) How has the most recent accreditation review affected the program?

The primary area of concern was the need to keep all affiliation agreements up to date, which has been a challenge as noted previously. Otherwise, there were no recommendations of significance for the program.

7. Student/Faculty Recognition

a) Have students within the program received any special recognition or achievement?

None

b) Have faculty within the program received any special recognition or achievement?

Not in the previous academic year.

6. **Student Engagement**

a) Is volunteerism and student engagement a structured part of the program?

Not as a program requirement, but students who participate in the Ferris Nuclear Medicine Association often engage in volunteer and community service projects.

b) Does the program utilize service learning in the curriculum?

Students participate in blood drives.

c) Does the program participate in the American Democracy Project?

Yes as part of NCUM 120 during the fall semester and the student professional association, FNMA, activities are included in the RSO list of activities for the University. Sheila MacEachron, the program coordinator is a member of the American Democracy Project Task Force / Committee.

IV. Academic Program Review Recommendations:

Please indicate the recommendations (enhancements or changes) made by APRC in the most recent review of the program by the APRC council. What actions have been taken in response to these recommendations? Actions listed in **Bold** following each recommendation.
The last APR occurred in 2002. The following four recommendations were made:

1. The NMT program needs to implement and maintain an improved system for surveying graduates and employers. **Management plan adopted and tracking mechanism in place.**
2. The NMT program needs to utilize the new advisory committee for program planning. **Ongoing and relevant information received.**
3. The BS degree curriculum needs revision to reflect the needs of the NMT community. **Decision/Approval to sunset BS degree occurred in 03-04.**
4. The NMT program should continue to actively seek donations of equipment and supplies. **Program maintains active relationship with hospitals and clinical affiliates and continues to receive donations. i.e. 2005- radionuclide generators from Cardinal Health and radiopharmacy kits form affiliate sites.**

Areas of Strength:

- **Highly qualified and dedicated Faculty**
- **State of the Industry Laboratory facilities**
- **100% job placement**
- **Consistently high demand for the program**
- **Pass rate on the national certification/licensure exam that are consistently in the 90th percentile range or higher**
- **High demand for student interns across the state**
- **Program is fully accredited**

Areas of Concern (and proposed actions to address them)

- **Revenue generation that would provide incentive funds for areas such as faculty development needs to be addressed through the offering of certificates or CE.**
- **Laboratory equipment is in need of replacement: two of the gamma scintillation cameras are currently unusable for students due to the fact that one is obsolete and one presents a safety hazard and is in need of repair. Due to the high cost and unavailability of replacement parts, this repair is not a feasible option.**
- **With an increase in the student enrollment from 32 to 40 over the last two years, both faculty have had to assume overloads to meet the needs of the additional lab sections; additional faculty in the future would help to address the increased teaching load in the program as well as to develop certificates and continuing education opportunities for the nuclear medicine community.**
- **The increase in student numbers has resulted in the need for more clinical internship sites. Internship sites must meet certain criteria and there is increased competition for these sites, even from out of state programs.**
- **As the only university based program in the State, the program should be the leader in nuclear medicine technology with a greater presence at the state and national levels. However, this is difficult with such a small faculty and the desire to increase student numbers in view of the demand for the program.**

Future Goals:

2006-2007

Pillar 1- Learning University

Goals:

1. Develop a plan for program enhancement / expansion that is consistent with the needs of the discipline.
2. Manage enrollment numbers to retain program quota while maintaining interest of pending (wait list) students.
3. Maintain current status of program outcome assessment parameters

Pillar 2-Work Together

Goals:

1. Program faculty will attain reputation as discipline experts at the state and national levels
2. Faculty will maintain professional credentials as required for certification and faculty appointment
3. All faculty will be current in the areas of instructional technology

Pillar 3- Engaged Campus

Goals:

1. Attain in-kind donations from clinical agencies / vendors
2. Attain student scholarships from prospective employers / clinical agencies
3. Establish stronger alumni relations to promote program initiatives

Other Recommendations:

Consider addition of a tenure track faculty position to support program growth and to support current faculty overload.

Appendix D: JRC Relevant Task List

ESSENTIAL IV CURRICULUM
Curriculum content shall provide the student with a comprehensive body of knowledge and the necessary skills expected of a competent program graduate.

IV.A Description of the Program
All faculty, instructors and students shall be provided with a clear description of the program and its content, which includes written course syllabi (academic and clinical) with appropriate learning objectives and performance criteria for satisfactory achievement. This description must be consistent with the mission of the program and appropriate for the degree or certificate awarded. The degree or certificate must be conferred on the basis of assessed and documented educational achievement and must conform to commonly accepted standards for the certificate or degree involved. The sponsoring institution may present required educational experiences through time frames and methodologies appropriate to its mission and objectives.

IV.B Instructional Plan
The master instructional plan must describe learning experiences, curriculum sequencing, and integration of clinical assignments to develop the necessary competencies for graduation. The curriculum shall include:

IV.B.1 Learning opportunities for students to develop personal and professional attributes and values relevant to practice.

Guideline A nuclear medicine technologist education program should foster:
1. the development of skills in problem-solving, critical-thinking, and decision-making; in oral and written communication; in human relations; patient services; and some familiarity of applicable medical law and ethics;
2. a commitment to make a significant contribution to the healthcare team;
3. an appreciation and respect for cultural diversity;
4. a holistic caregiver's perspective;
5. an understanding of departmental organization and function in relation to the healthcare delivery system as a whole; and
6. an understanding of the value and responsibilities entailed in being a professional.

IV.B.2 Education in health and basic sciences that will provide cognitive learning experiences as a foundation to understanding and performing clinical responsibilities.

IV.B.2.a Postsecondary education in human anatomy and physiology, physics, algebra, medical terminology,computer applications, oral and written communications, and general chemistry shall have been completed or be provided as part of the education program. Students may demonstrate competency in postsecondary requisites as appropriate by institutional policy. Institutions such as accredited junior colleges, universities, postsecondary technical institutes and hospital programs may be used to provide education in these requisites prior to or concurrent with specific courses in nuclear medicine.

IV.B.3 Academic instruction for the professional nuclear medicine technology curriculum shall include as a minimum the following content areas:
1. methods of patient care,
2. statistics,
3. nuclear medicine physics and radiation physics,
8. positron emission tomography (PET),
9. computer applications for nuclear medicine,
10. diagnostic nuclear medicine imaging and non-imaging in vivo and in vitro procedures,

4. radiation biology,
5. radiation safety and protection,
6. radionuclide chemistry and radiopharmacy,
7. nuclear instrumentation
11. immunology as related to nuclear medicine,
12. radionuclide therapy, and
13. quality control and quality assurance.

IV.B.4 Supervised clinical education, experience and discussions shall include the following:
1. patient care and patient recordkeeping,
2. radiation safety techniques that will minimize radiation exposure to the patient, public, fellow workers and self,
3. participation in a quality control program,
4. preparation, calculation, identification, administration (where permitted), and disposal of radiopharmaceuticals and the performance of all radionuclide quality control procedures,
5. performance of an appropriate number and variety of procedures to achieve desired clinical competencies, and
6.clinical correlation of nuclear medicine procedures.

Guideline
After completing the program, each student should have attained a level of knowledge and skill to be capable of performing the various tasks as detailed.

I. Patient Care
A. A nuclear medicine technologist provides patient care by:
1. acquiring adequate knowledge of the patient's medical history to understand and relate to the patient's illness and the pending diagnostic or therapeutic procedures;
2. providing for proper comfort and care of the patient before, during and after a procedure including, but not limited to, the monitoring of intravenous lines, oxygen supplies, drains and the status of patients who are under sedation;
3. recognizing surgical and disease factors that may create artifacts or variants on all nuclear medicine images including PET images, and thus require modifications in the data acquisition or data processing protocol;
4. establishing and maintaining good communication with each patient (e.g., making introductions, explaining the procedures, answering questions);
5. providing functionally safe and sanitary conditions for the patient in compliance with standard precaution policies;
6. recognizing and responding to an emergency condition by;
a. initiating a call for assistance,
b. monitoring and recording physiologic data (e.g., ECG, pulse rate, respiratory rate),
c. administering cardiopulmonary resuscitation when necessary, and
d. maintaining intravenous fluids, oxygen, and other life-support assistance until an emergency code team arrives.

B. A nuclear medicine technologist prepares the patient for an examination by:
1. reviewing written orders for the procedure, verifying patient identification and determining pregnancy status as well as breast feeding status, if applicable;
2. obtaining a pertinent history and checking for contraindications;
3. measuring peripheral blood glucose level prior to PET imaging;
4. ensuring that informed consent has been obtained when necessary;
5. explaining the procedure to the patient or family and, where applicable, to the parents or legal guardian including, but not limited to, the procedure, patient involvement, length of study, and basic radiation safety;

6. ensuring that any preprocedural preparation has been completed including, but not limited to, fasting, hydration, taking of thyroid blocking compounds, voiding, bowel cleansing, and suspension of interfering medications;
7. waiting an appropriate length of time after the administration of a radiopharmaceutical to begin the procedure;
8. checking patient clothing and linen for objects that may cause artifacts in the images or the proposed measurements.

C. A nuclear medicine technologist performs administrative procedures by:
1. maintaining an appropriate inventory of medical/surgical supplies, radiopharmaceuticals, storage media, and other items to ensure that a patient procedure can be performed whenever necessary;
2. scheduling patient procedures;
3. determining the appropriate sequence for executing multiple procedures;
4. maintaining appropriate records of administered radioactivity quality control procedures, patient reports, and other required records;
5. revising, developing, or collaborating on procedures for reporting or recording incidents required by regulatory agencies;
6. revising and developing policies and procedures in accordance with applicable regulations and administrative requirements;
8. participating in the quality control program.

II. Radiation Safety
A. A nuclear medicine technologist, under supervision of an authorized user or radiation safety officer, maintains compliance with local, state and federal regulations in radiation safety practices by:
1. using personnel monitoring devices (e.g., dosimeters, film badges, TLD's, etc.);
a. reviewing on at least a quarterly basis personnel exposure records in regard to maximum permissible dose limits,
b. taking appropriate measures to follow the ALARA principle, and
c. notifying proper authorities of excessive exposure upon occurrence.
2. notifying appropriate authorities when changes occur in the radiation safety program;
3. assisting in the preparation of license amendments when necessary;
4. maintaining required records;
5. posting appropriate signs in designated areas;
6. following federal, state and institutional regulations regarding receipt and disposition of all radionuclides;
7. carrying out a program to follow regulations regarding therapeutic dosages and follow-up procedures;
8. recommending purchase of protective equipment to meet regulations;
9. packaging radioactive material according to regulations and keeping accurate records of transfer.

B. A nuclear medicine technologist follows appropriate protection procedures thereby limiting the radiation exposure of the patient, public, fellow workers, and self to as low a level as reasonably achievable (ALARA) by:
1. selecting and using proper shielding to reduce radiation exposure;
2. using proper methods for storage and disposal of radioactive materials;
3. identifying and using proper procedures for those radionuclides that pose special hazards (e.g., Sr-89, I-131, 511 keV radiotracers);
4. performing a bioassay as per state and/or federal regulations;

5. using appropriate modifications of radiation protection techniques when dealing with 511 keV PET radiotracers.

C. A nuclear medicine technologist performs radiation surveys by:
1. ensuring that instruments are calibrated at regular intervals, after a repair, and as required by regulations;
2. setting frequency and locations for surveys and following schedules;
3. using appropriate survey meters for each type and level of activity;
4. following regulations regarding personnel surveys and reporting to the designated physician or radiation safety officer;
5. performing constancy checks on survey meters;
6. performing wipe tests where applicable;
7. performing leak tests on sealed sources, when so authorized;
8. recording data in standard format.

D. A nuclear medicine technologist performs decontamination procedures by:
1. wearing appropriate clothing and foot covering as necessary;
2. blocking access to a contaminated area and confining a spill;
3. removing contamination or reducing the activity to acceptable levels;
4. monitoring the area and personnel involved and repeating decontamination procedures until activity levels are acceptable;
5. closing off all areas of fixed contamination that are above acceptable levels;
6. identifying, storing, or disposing of contaminated material in accordance with regulations;
7. maintaining adequate records concerning cleanup;
8. notifying appropriate authority (i.e., Radiation Safety Officer) in the event of possible overexposure or other violations of regulations;
9. performing appropriate follow-up monitoring after any necessary decontamination procedures.

E. A nuclear medicine technologist disposes of radioactive waste and maintains appropriate records according to license conditions.

F. A nuclear medicine technologist participates in a hospital's in-service education program to instruct other personnel regarding radiation and principles of radiation protection.

III Nuclear Instrumentation - Quality Control
A. A nuclear medicine technologist evaluates the performance of scintillation cameras by:
1. assessing camera uniformity;
a. selecting a radionuclide source of appropriate type, size, (if necessary), quantity and energy,
b. selecting an appropriate pulse height analyzer (PHA) photopeak and window,
c. obtaining uniformity images using standardized imaging parameters,
d. evaluating the images qualitatively and, if possible, quantitatively in comparison to the manufacturer's specification,
e. identifying the source of any non-uniformity (i.e., checking collimator, PHA peak setting), and
f. initiating corrective action when necessary.
2. performing a detector spatial linearity evaluation;
a. selecting a radionuclide, a spatial linearity phantom and obtaining images,
b. identifying any nonlinearity in the image and, where possible, determining the

source,
c. initiating corrective action when necessary.
3. performing spatial resolution checks;
a. selecting an appropriate radionuclide,
b. choosing a phantom that is compatible with the specified resolution of the camera,
c. analyzing the resulting images for degradation of resolution, and
d. initiating corrective action when necessary.
4. conducting sensitivity checks;
a. selecting a source with an appropriate level of activity and half-life, and
b. assuring identical geometry, source placement and measurement parameters for repetitive checks.
5. performing SPECT quality control procedures;
a. obtaining a high count uniformity flood,
b. obtaining a center of rotation correction,
c. evaluating energy corrections and spatial coordinates,
d. verifying multi-head detector alignment,
e. evaluating reconstruction results of a phantom acquisition, and
f. initiating corrective action when necessary.
6. checking computer parameter and data interface settings and verifying accuracy of ECG gating and quality of ECG tracing;
7. assessing and, when appropriate, maintaining imaging or data recording device(s);
8. maintaining the required records for the quality control program.

B. A nuclear medicine technologist evaluates the performance of a PET or PET/CT scanner by:
1. assessing detector array uniformity;
2. acquiring applicable calibration data prior to clinical imaging (as applicable: blank scan, normalization, coincidence timing, well counter, etc.);
3. testing transmission imaging systems;
4. checking alignment of emission and transmission images.

C. A nuclear medicine technologist evaluates the performance of NaI (Tl) scintillation probes and well counters by:
1. calibrating a spectrometer with a long half-life radionuclide source;
2. determining energy resolution;
3. performing constancy measurements and determining proper operation;
4. conducting sensitivity measurements at appropriate energies;
5. checking background and determining the cause for levels greater than established normal levels;
6. performing a chi-square test and interpreting results;
7. maintaining required records for quality control programs.

D. A nuclear medicine technologist operates survey meters by:
1. ensuring calibration is completed by an approved agent;
2. performing a reference check-source test and comparing with previous results;
3. maintaining required records for quality control program.

E. A nuclear medicine technologist evaluates the operation of a dose calibrator by:
1. performing a constancy test and determining proper operation;
2. performing accuracy measurements with a National Institute of Standards and Technology (NIST) source;
3. ascertaining linearity over the entire range of radionuclide activity to be measured;

4. testing for significant geometric variation in activity measured as a function of sample volume or configuration and determining correction factors.

F. A nuclear medicine technologist operates and maintains film processors by:
1. monitoring and recording sensitometry and temperature of water and dryer daily;
2. maintaining required records for quality control program.

IV. Radiopharmaceuticals
A. A nuclear medicine technologist initiates purchases of radiopharmaceutical products and adjunct supplies by:
1. anticipating and procuring a sufficient supply of radioactive drugs for an appropriate time period in accordance with anticipated need and license possession limits;
2. storing drugs and supplies in a manner consistent with labeled product safeguards and with radiation safety considerations;
3. performing and documenting radiation wipe tests and surveys upon receipt of radioactive materials;
4. recording receipt of radioactive materials;
5. following Department of Transportation (DOT) and radiation safety guidelines in the transport, receipt and shipment of radioactivity.

B. A nuclear medicine technologist prepares and verifies quality of radiopharmaceuticals under the direction of an authorized user by:
1. employing aseptic technique for manipulation of injectable products;
2. eluting radionuclide generators according to manufacturer's specification;
3. verifying radionuclide purity of generator eluates;
4. selecting and preparing radiopharmaceuticals in accordance with manufacturer's specification;
5. calculating and measuring activity of the radionuclide with a dose calibrator;
6. confirming the quality of a radiopharmaceutical in accordance with accepted techniques and official guidelines;
7. preparing labeled blood cells in accordance with established protocols;
8 recording use and/or disposition of all radioactive materials.

C. A nuclear medicine technologist is responsible for the identification and labeling of all radiopharmaceutical preparations by:
1. labeling the container with the radiopharmaceutical, hour, date, expiration time, and radiation symbol;
2. recording radiopharmaceutical and medication information on a patient's administration form and preparation records;
3.labeling and segregating radioactive waste and recording this information.

D. A nuclear medicine technologist prepares individual dosages under the direction of an authorized user by:
1. applying radioactive decay calculations to determine required volume or unit form necessary to deliver the prescribed radioactive dosage;
2. selecting and preparing prescribed dosages and entering this information on a patient's administration form and other records;
3. labeling the dosage for administration;
4. checking the dosage activity prior to administration in a dose calibrator and comparing this measurement against the identification label of the dose's immediate container.

V. Diagnostic Procedures

A. A nuclear medicine technologist performs imaging procedures by:

1. selecting imaging parameters;

a. selecting and preparing the instrument for the procedure,

b. selecting appropriate parameters for image data acquisition, and

c. recognizing artifacts on static, dynamic, gated, SPECT and PET images that are due to instrumentation malfunction and initiating appropriate action.

2. administering radiopharmaceuticals and/or pharmaceuticals using standard precaution techniques as authorized by the institution;

a. verifying patient identity prior to the administration of medication or radiopharmaceuticals,

b. determining route of administration according to established protocol (e.g., subcutaneous, intramuscular, intravenous, inhalant, oral and intravesical),

c. establishing and/or verifying venipuncture access using aseptic techniques,

d. using and maintaining established venous access routes (e.g. heparin infusion, IMED),

e. establishing patterned breathing when introducing radiopharmaceuticals by inhalation,

f. administering oral radiopharmaceuticals,

g. documenting medication and/or radiopharmaceutical administrations on a patient's permanent record, as appropriate, and

h. preparing, determining dosage, and administering non-radioactive pharmaceuticals under medical direction, where permitted.

3. positioning the patient and obtaining images;

a. recording image data according to established protocols and acquiring additional views when needed to optimize information content,

b. placing the patient in correct position using supportive materials and immobilizers as necessary,

c. exercising independent judgment in positioning a patient or detector unit to best demonstrate pathology,

d. indicating appropriate anatomic landmarks for each view of the procedure, and

e. reviewing images to assure that correct information is supplied.

4. assisting the physician or practitioner in cardiac stress testing when performed in conjunction with nuclear medicine procedures;

a. preparing patient's skin and placing ECG leads appropriately,

b. recognizing and being responsive to any changes that may occur on either a resting or stress ECG, and

c. recognizing the parameters that should terminate a cardiac stress study.

5. performing data collection, processing and analysis;

a. performing data collection, processing and analysis in accordance with established protocols,

b. exercising independent judgment in selecting appropriate images for processing,

c. selecting appropriate filter, filter parameters, and attenuation correction when reconstructing SPECT images,

d. applying corrections to PET images for attenuation, random events, scatters, etc.

e. defining regions of interest (ROI's) with reproducible results and correctly applying background subtraction,

f. performing time activity curve generation and additional manipulation (e.g T1/2),

g. labeling processed images to reflect anatomical position, ROI's, etc.,

h. archiving and retrieving data from storage media, and

i. performing image fusion of PET and SPECT with CT and MRI, when available.

B. A nuclear medicine technologist performs non-imaging in-vivo studies by:

1. operating laboratory equipment and checking accuracy, precision, and operation of pipetting devices;

2. preparing dosage according to standards;

a. quantitating dosage by,

1) determining decay factor and calculating remaining activity,

2) determining volume necessary to deliver activity for the prescribed dosage,
3) drawing dosage into syringe using appropriate techniques and materials,
4) dispensing appropriate quantity of liquid or capsules for the prescribed dosage,
5) confirming calculated activity by using a dose calibrator.
b. preparing standard by,
1) choosing appropriate volumetric or gravimetric techniques to dilute standard,
2) adding radioactive material identical to that given the patient q.s. (quantity sufficient) to appropriate volume, and
3) diluting capsule in appropriate solvent, if necessary, for preparing a standard.
3. collecting the appropriate specimens for procedures using standard precautions;
a. collecting blood samples by,
1) selecting proper supplies (e.g., needles, syringes, evacuated tubes, anticoagulants, etc.),
2) labeling patient information on collection containers,
3) performing venipunctures at appropriate time intervals using aseptic technique,
4) adding hemolyzing compounds to samples when necessary,
5) centrifuging blood and separating blood components, as required, and
6) storing aliquot of serum, plasma, or whole blood according to protocol.
b. collecting and processing urine samples by,
1) instructing patient and nursing staff as to correct method and time of urine collection,
2) preparing aliquots of urine sample and measuring total urine volume,
3) measuring specific gravity of urine, if required,
4) recognizing and documenting all technical circumstances which would produce invalid results, and
5) labeling patient information on collection containers.
4. performing calculations;
a. subtracting room or patient background from appropriate samples,
b. applying appropriate formulas, including conversion and dilution factors,
c. calculating results according to procedure used, and
d. reporting both patient values and normal range of specific procedures used.
5. managing bio-hazardous, chemical, and radioactive waste in accordance with applicable regulations and specific facility policies.

VI. Radionuclide Therapy

A. The nuclear medicine technologist assists an authorized user in the preparation and application of therapeutic radionuclides by:
1. assuring the correct radiopharmaceutical and dosage are prepared;
2. having the authorized user and the technologist verify the dosage;
3. assuring the patient is correctly identified by the technologist and authorized user according to the quality management program in effect at the particular institution;
4. preparing and/or coordinating environmental preparations (i.e., decontamination supplies);
5. observing prescribed radiation safety procedures during the preparation and the administration of such treatment;
6. assisting the authorized user in supplying proper patient care instructions to hospital staff, patient, and/or caregivers;
7. conducting and documenting radiation surveys of designated patient areas, when indicated; and
8. supplying hospital staff, patient, and/or caregivers with proper instructions on handling and disposal of all contaminated supplies when necessary.

To: Members of Program Review Committee

From: Theresa A. Raglin, Department Head

Date: August 13, 2008

Re: Nuclear Medicine Technology Program

Relationship to Mission

The Nuclear Medicine Technology Program continues to meet the mission of FSU. The program provides innovative career-oriented education.

Program Visibility and Distinctiveness

As the only university based nuclear medicine technology program in the state, it is very visible. The majority of nuclear medicine technologists in Michigan received their degree from Ferris. The program maintains clinical affiliations with twenty-five hospitals throughout Michigan.

The program provides a distinct educational experience. Students spend six semesters on campus refining their clinical skills prior to two semesters of internship at a clinical affiliate. This is a unique model when compared with other programs in the country. Graduate surveys continue to support and reflect the strength of the on-campus laboratory experience. Employer surveys reflect the high level of clinical skills achieved by the graduates.

Program Value

As previously stated, as the only university based program in the state it is very beneficial to not only Ferris but employers and students.

The NMT program is meeting the needs of these employers. Graduates are in demand and employers consistently rank them high. The Bureau of Labor Statistics projects an increased consumer demand for nuclear medicine technologists as advanced modalities such as molecular and fusion imaging become routine diagnostic exams relevant for the entry level technologist.

Enrollment

Enrollment is steady in Nuclear Medicine Technology Program. The program received 117 applications from students seeking admission into the professional sequence of courses. In response, the program is starting a cohort of students on the Grand Rapids campus this Fall to meet the needs and demands of students and employers. We will continue to accept 32 students on the Big Rapids campus.

Characteristics, Quality and Employment

The quality of students entering the Nuclear Medicine Technology program remains excellent. The students have above average GPA and ACT scores upon admission. Registry exam rates are consistently above the national average for the graduates. Graduates continue to experience a one hundred percent employability rate especially if they are willing to relocate.

Quality of Curriculum and Instruction

The faculty completed a analysis and revision of their curriculum last year in anticipation of the Bachelor of Science degree. All course outcomes are consistent with the relevant tasks identified by the Joint Review Committee on Educational Programs in Nuclear Medicine Technology and the Society of Nuclear Medicine Technology. Substantial changes and improvement in the curriculum and instruction will occur with the implementation of the Bachelor of Science degree program this Fall.

Program faculty need to be more systematic in their collection of assessment data. They have numerous methods of collecting their assessment data and have excellent programmatic assessment but need to be timelier with the process.

Composition and Quality of Faculty

The faculty members in the NMT program are highly qualified and credentialed nuclear medicine technologists. Student and graduate surveys express satisfaction with the quality of faculty. The faculty continues to demonstrate dedication to this program through their commitment to student success.

A recent report from Joint Review Committee on Educational Programs in Nuclear Medicine Technology noted the following strengths of the program: program coordinator, clinical coordinator, clinical affiliate personnel and physician support.

Adequacy of Resources

Resources are adequate to support and meet the current needs of the program, faculty and students. Departmental and college funds are available to support faculty travel and continuing education. The program currently does not have the ability to earn incentive dollars that often support the extras needed. Equipment is aging and newer technology is now available. A highly anticipated equipment donation is expected this Fall that will offset some of these equipment issues.

FERRIS STATE UNIVERSITY

COLLEGE OF ALLIED HEALTH SCIENCES

August 13, 2008

TO: Members of the Academic Program Review Council

FROM: Ellen Haneline, Dean-College of Allied Health Sciences

RE: Nuclear Medicine Technology Program

The nuclear medicine program is currently in a change state. In the fall semester 2008, the program will enroll its final class of associate degree seeking students along with the first class of its newly revised bachelor's degree students. During the transition time (2008-2010), the program will be in a state of flux as formerly offered courses are discontinued and the newly created courses are taught for the first time. The program faculty and the departmental administration are committed to the change and have formulated plans to assure that the transition will be smooth. In addition to the change caused by the discontinuance of the 2-year curriculum, the program will begin offering courses in Grand Rapids during the fall, 2008. Demand for the program is strong with more than the maximum number of students applying for admission.

The number of faculty, amount of space and budget allocated to the program is adequate to meet the needs of the program as it is currently configured. The addition of a full-time faculty member to teach courses in Grand Rapids relieved pressure on the faculty and expanded the exposure of students to different teaching styles. In the future, as the baccalaureate program is fully implemented, it will become necessary to increase the number of adjunct faculty within the program. Space in the on-campus laboratory is sufficient to meet the needs of the program. Construction of a dedicated laboratory in Grand Rapids will be a great asset to the program, relieving pressure on the existing facilities. As noted by the program review committee, the cost of cameras is of concern. However, through their relationships with hospital nuclear medicine departments, faculty members have been successful in obtaining donations of equipment to meet program needs.

The program's major goal within the next several years is to fully implement an ongoing, systematic assessment plan that will produce data upon which decisions can be made.

The nuclear medicine program is in congruence with the mission of Ferris State University. The program prepares students for a career in a rapidly growing segment of the health care industry—nuclear imaging. Graduates of the program are highly sought after and are able to obtain employment in Michigan and throughout the United States. Pay rates for graduates are among the highest in the College. In addition to preparing graduates for successful careers, the program stresses the importance of student participation in both the local community and the greater professional community thus preparing them for responsible citizenship. Through its BS completion offering, the program offers

opportunities for practitioners to gain additional knowledge and skill to meet their needs for life-long learning opportunities.

The nuclear medicine program is highly visible in the state as evidenced by the fact that the majority of practicing nuclear medicine technologists within Michigan are graduates of the Ferris program. As the only university based nuclear medicine program in the state of Michigan, the program is very distinct in its offerings. Additionally, it is distinctive because of the BS completion track within the bachelor's degree. The completion track offers practicing nuclear medicine technologists the opportunity to earn a bachelor's degree to enable them to apply for and gain employment in more advanced modalities and in the management of nuclear medicine departments.

The nuclear medicine program is valuable to the students, the college of allied health sciences, the university, the state of Michigan and the nuclear medicine profession. As previously stated, the program prepares students for career entry positions in a fast growing field. Graduates are prepared to practice in their chosen profession upon graduation. The program enhances the offerings within the college of allied health sciences and provides an opportunity for enrollment growth through the BS completion track that will begin in fall, 2008. Michigan benefits from the program through the program's provision of highly educated nuclear medicine technologists. Graduates of the program are primarily employed within the state and are contributing members of their communities as well as adding to the tax base of the state. Finally, graduates, through their involvement in the professional associations contribute to the profession through their willingness to participate in the education of future practitioners as well as through their participation on legislative committees and other groups whose mission it is to enhance patient care.

As previously stated, students are able to find employment upon graduation. Of some concern, however, is the performance of graduates on the national certification examination. Although Ferris graduates passed the examination at a rate higher than the national pass rate in 3 of the 5 years under review, their average scores were lower than the national average score in 4 of the 5 years. This may indicate deficiencies in the curricular content vis a vis the content of the examination. It will be a subject for the ongoing assessment project previously mentioned.

Curriculum for the nuclear medicine technology program has been recently revised to include emergent modalities. The quality of the curriculum in the associate degree program was found, by the accreditation site team at their visit in June, to fulfill the requirements of the accreditation agency. However, student performance on the national certification examination raises questions regarding curricular content. As evaluated by students within the program, instruction meets student needs. Further support for the quality of instruction comes from the satisfaction with student performance that is expressed by clinical supervisors and employers.

Faculty within the nuclear medicine technology program possess the necessary education and professional certification to provide instruction within the program. One of the faculty members has recent (within the past year) clinical experience, one has clinical experience within the past four years and one of the faculty members has not had clinical experience for many years. Student comments indicate that faculty members are well respected. Of concern is the apparent polarization of the faculty. Although communication and cooperation between faculty members appears to be improving, my concern is for the future success of the implementation of the revised curriculum, the external program in Grand Rapids and the integrating of an ongoing assessment program.