

**DEGREE/PROGRAM CHANGE
FORM C
Form Number: C1670**

Fields marked with * are required

Name of Initiator: Elizabeth Greer **Email:** ejgreer@unm.edu **Phone Number:** 505 272-5254 **Date:** 09-23-2015

Associated Forms exist? Yes Initiator's Title Lecturer III: Radiology Department
Faculty Contact Elizabeth Greer Administrative Contact Stevee McIntyre
Department Radiologic Sciences Radiology Admin Email StMcIntyre@salud.unm.edu
Branch SOM Admin Phone 505-275254

Proposed effective term

Semester Fall Year 2016

Course Information

Select Appropriate Program Undergraduate Degree Program
Name of New or Existing Program CERT Nuclear Medicine Imaging
Select Category Certificate Degree Type
Select Action Revision

Exact Title and Requirements as they should appear in the catalog. If there is a change, upload current and proposed requirements.

See current catalog for format within the respective college (upload a doc/pdf file)

[Nuclear Medicine Master Plan 2015.docx](#)

Does this change affect other departmental program/branch campuses? If yes, indicate below.

Reason(s) for Request (enter text below or upload a doc/pdf file)

We are making this request to meet new accreditation standards. We are requesting to add the existing four courses RADS 378, 398, 405, and 406 to the Nuclear Medicine Certificate Curriculum as required courses for the Nuclear Medicine Certificate. We are compelled to do this because these four courses are newly required to meet the curriculum standards for programmatic accreditation by the Joint Review Committee on Education in Nuclear Medicine Technology.

[Certificate in Nuclear Medicine Imaging SBS-Old Curriculum New Curriculum.docx](#)

Upload a document that includes justification for the program, impact on long-range planning, detailed budget analysis and faculty workload implications.(upload a doc/pdf file)

Are you proposing a new undergraduate degree or new undergraduate certificate? If yes, upload the following documents.

Upload a two-page Executive Summary authorized by Associate Provost. (upload a doc/pdf file)

Upload memo from Associate Provost authorizing go-ahead to full proposal. (upload a doc/pdf file)

Patient care lab	RADS 331
Medical Terminology	RADS 381
Radiation Safety	NUCM 315

- **Learning experiences and schedules:**

- Patient care:

The didactic portion of patient care is 2 credit hours and is provided online. This course acquaints the student with procedures and techniques emphasizing the role of the diagnostic imager as a member of the health care team. Topics include: professional roles, patient transport and transfer, infection control, patient assessment, medications, and acute situations. The students are expected to be prepared for online weekly discussion by completing all required tasks and actively contributing discussion topics.

- Patient care lab:

This course covers the laboratory activities associated with 330. This course is 1 credit hour and is web enhanced with hands on experience with patient care techniques. Students complete required modules online for specific topics pertaining to:

- b) OSHA
- c) HIPAA
- d) Preventing Sexual Harassment
- e) Basic Annual Safety Training
- f) Phlebotomy
- g) Vital Signs
- h) ECG
- i) CPR

Hands on patient care labs are designed to give the students an opportunity to perform patient care procedures in a simulated and realistic setting when possible. Specific techniques handling patients are demonstrated with each students receiving an opportunity to perform and demonstrate proficiency with required skills. Required labs include:

- j) Phlebotomy (TBD)
- k) BLS/CPR (TBD)
- l) Patient Transport and Transfer
- m) CPR

- Medical terminology:

This course is online and provides an introduction to medical terminology, with a focus on body systems. This self-study course reviews the major systems of the human body, using a programmed textbook/workbook. The workbook format is combined with simple, non-technical explanations of medical terms and descriptions of anatomy, physiology, and pathology. Students are given weekly assignments that must be completed on time. This is a fast pace, rigorous course is paired with a course textbook to further explain and enhance the students understanding of the material. The foundation and components of medical terminology are presented in modules that correspond to the chapters in the text book.

- **Radiation Safety:**
Radiation safety is a web enhanced course that meets 1.5 hours once a week for live instruction with required assignments given online for required in class discussion. An introduction to radiation protection topics which are common to Radiography and Nuclear Medicine. Topics to be covered include, radiation units, radioactivity, radiation sources, background radiation, biological effects of radiation, dose limits, radiation shielding, methods of dose reduction, regulations and Department of transportation requirements. The information and skills enable each of the students to understand the principles of radiation safety while working in and around radioactive patients, laboratories and equipment. The students are expected to be prepared for class discussion by utilizing homework assignments. iClicker questions, quizzes, and exams are also used as assessment tools.

- **How the components integrate with one another:**

- The components of the first summer session course material is designed to prepare the students to enter a Nuclear Medicine clinical site with the necessary practical skills that are required for patient care and radiation safety. The medical terminology course allows the students to understand medical terminology and instruction.

All aspects of the summer course material work together to build a foundation of nuclear medicine so students are ready to enter the clinical site in the fall semester. At the end of the first summer semester students should be prepared to assist technologists with patient care and formulate and understand the use of medical terminology. The radiation safety course should prepare them to understand the components required to safely handle radioactive materials so they may work safely in the nuclear medicine setting.

II. FALL SEMESTER

- **Overview**

The programs instructional plan for the fall semester is designed to give instruction to the students in Cross Sectional Pathology, Radiopharmacy, Nuclear Medicine Mathematical Applications, and Nuclear Physics/Instrumentation. All course material is provided to enhance the students understanding concurrently as they are introduced with the hands on experience in clinic rotations. The breakdown of the course material is as follows:

Course material:

Cross Sectional Pathology	NUCM 380
Radiopharmacy	NUCM 354
Math and imaging instrumentation	NUCM 360
Nuclear Physics and Instrumentation	NUCM 375
Nuclear Medicine Clinic I	NUCM 320

- **Learning experiences and schedules:**

- **Cross Sectional Pathology:**

Cross Sectional Pathology is a web enhanced course that meets 1.5 hours once a week for in class instruction with required assignments given online for in class discussion. The course examines three- and four-dimensional relationships of the skull, brain, CNS, thorax, abdomen, pelvis and extremities correlating this information with nuclear medicine imaging modality as well as CT and MRI. The class is designed to teach the student how to identify and discuss cross sectional anatomy, and recognize Nuclear Medicine Pathologies on images in CT, MRI and Nuclear Medicine. In addition, there is a required expectation of class participation to resolve any ambiguity over material as well as participate in class discussion.

- Radiopharmacy:

Radiopharmacy is a web enhanced course that meets 2.5 hours once a week for in class instruction with required assignments given online for in class discussion. The class involves the review of basic chemistry, principles of radiopharmacy/radiochemistry including radiopharmaceutical preparation, dose calculation, and quality control and federal/state regulations. The class is designed to prepare the students for their radiopharmacy rotations. The course work also re-introduces anatomy and physiology in its relation to radiopharmaceuticals and the bio-distribution. It is the first opportunity the students have to start recognizing various forms of uptake on images. In addition, there is a required expectation of class participation to resolve any ambiguity over material as well as participate in class discussion.

- Math and imaging instrumentation:

The Math and imaging instrumentation is a web enhanced course that meets for 2.5 hours once a week for in class instruction with required assignments given for in class discussion and problem solving examples. In Nuclear Medicine the students are faced with various forms of mathematical equations. It involves the study of the physical properties of nuclear medicine and the spectroscopy and instrumentation utilized in tomographic imaging. Emphasis on instrumentation for radiation detection and measurement in a nuclear pharmacy or nuclear medicine environment. This course is designed to give instruction with the various mathematical computations the students may encounter with instrumentation, patient injections, radiopharmaceutical and pharmaceutical injections and radiation safety. The students are expected to come prepared to class by completing required reading and completing assignments. In addition, there is a required expectation of class participation to resolve any ambiguity over material as well as participate in class discussion.

- Nuclear Physics and Instrumentation:

The Nuclear Physics and Instrumentation is a web enhanced course that meets for 2.5 hours once a week with required assignments given online for in class discussion. This course is designed to familiarize the students with aspects of radiation physics pertaining to nuclear medicine including principles of nuclear physics, ionization chambers, G-M tubes, scintillation and solid state detectors, associated electronics and quality control procedures. This class serves as an introduction to instrumentation which will allow the students to become familiar with the various instruments they will encounter in clinic. The students are expected to come prepared to class by completing required reading and completing assignments. In addition, there is a required expectation of class participation to resolve any ambiguity over material as well as participate in class discussion.

- **Nuclear Medicine Clinic I:**

Nuclear Medicine Clinic I is the introduction course for clinical training. The class is web enhanced. The students are required to rotate through the four major affiliates on Monday, Tuesday, Wednesday, and Friday's for 8 hours each day. Students may be dismissed from clinic for class instruction, testing and special training as needed. The class provides practical experience in the performance of clinical nuclear medicine studies under direct supervision of certified technologists. The class incorporates competency examinations, patient care assessment, radiopharmaceutical reconstitution, and oral exams. Faculty site visits for student clinic observations are conducted by faculty at least once a week with weekly log documentations.

At each location, students are under the supervision of a certified technologist for instructional training in instrumentation, radiopharmacy, medical informatics, radiation safety, patient care and patient diagnostic imaging. Each student's clinic performance is monitored electronically with a handheld device to record attendance (timeclock), student progression, exam competencies and feedback from the technologist. The expectation of each student at the beginner level is to practice injections and take detailed notes on all aspects of imaging and processing. The expectation of the progression of the student's work in clinic is to become confident with patient injections, build interview skills, and become familiar with the equipment while performing scans under the direction of a certified technologist.

- **How the components integrate with one another:**

The course components of the fall semester along with the clinic rotations are designed to work together to help students build a firm understanding of radiopharmacy, introduction instrumentation, and patient imaging with hands on experience. This approach has been helpful to solidify the understanding of the material as it encompasses several forms of learning methods.

The concepts of radiopharmacy are reintroduced with hands on experience during the clinical rotations which allow the students to practice concepts introduced in class. The students begin the initial image analysis with the anatomy and physiology received in radiopharmacy and can recognize pertinent anatomy on various modalities with their understanding of cross sectional anatomy. The hands on instrumentation procedures conducted in clinic allow the students to provide meaningful discussion with the ability to relate and provide examples from experiences in the clinic. The mathematical course work helps the students understand and master mathematical computations they encounter during clinic rotations along with problem solving skills and approaches. The clinic hands on experience for all didactic courses allows the students to provide meaningful discussions and gives a frame of reference for the subject matter on lecture material.

III. SPRING SEMESTER

- **Overview**

The programs instructional plan for the spring semester is designed to complete instruction for instrumentation and the most common imaging studies conducted in Nuclear Medicine. To achieve this

goal the components of in-vitro/in-vivo studies are presented along with Essentials of Nuclear Medicine I which focuses on pertinent pathology, protocols, and a re-visitation of pertinent anatomy. Instrumentation II completes course material required for board certification in addition to mathematical statistics and their use in nuclear medicine. Nuclear Medicine Clinic II is designated as the intermediate phase of clinical rotations and is designed to allow students to perfect their techniques conducting the most common studies seen in nuclear medicine and familiarize themselves with the less familiar. In addition, they will perfect their instrumentation quality control procedures throughout the semester as the final didactic information is presented.

To solidify the students understanding of the material they are required to prepare case studies encompassing all aspects of assigned nuclear medicine studies in the Pathology class. The case studies are presented to their fellow classmates in PowerPoint form along with pertinent hand outs and required images from various modalities.

In-vitro Nuclear Medicine	NUCM 390
Essentials of Nuclear Medicine I	NUCM 396
Nuclear Medicine Instrumentation II	NUCM 385
Nuclear Medicine Pathology	NUCM 392
Nuclear Medicine Clinic II	NUCM 365

- **Learning experiences and schedules:**

- In-vitro Nuclear Medicine:

The In-vitro Nuclear Medicine course is a web enhanced course that meets for 1.5 hours once a week. It introduces the students to principles and practical aspects of performing radioimmunoassay and competitive protein-binding assays, blood volumes, RBC survival, G.I. blood loss and Schilling's studies. The in-vitro studies associated with this course involve subjects of the endocrine, blood, urea studies and specific neoplasm studies. In addition, the material focuses on the immune system and its relation to the lymphatic system and antibodies. The detailed discussion in these areas are designed to give the students a clear understanding of the methods and terminology discussed during their clinic activities. They are expected to incorporate all class material in the clinical setting. The students are expected to come prepared to class by completing required reading and completing assignments. In addition, there is a required expectation of class participation to resolve any ambiguity over material as well as participate in class discussion.

- Essentials of Nuclear Medicine I:

The Essentials of Nuclear Medicine course is a web enhanced course that meets for 2.5 hours once a week with required assignments given online for in class discussion. The class will incorporate basic anatomy and pathophysiology, methods of localization, radiopharmaceuticals, nuclear instrumentation, and imaging techniques. The course will also prepare the students to recognize and recall all aspects of the most common studies they will encounter in the clinical setting including the skeletal system, neoplasm imaging, inflammation and infection, genitourinary, cardiovascular system, respiratory system, gastrointestinal system. Students are expected to incorporate all class material in the clinical setting. The students are expected to come prepared to class by completing

required reading and homework assignments. In addition, there is a required expectation of class participation to resolve any ambiguity over material as well as participate in class discussion.

Nuclear Medicine Instrumentation II:

The Nuclear Medicine Instrumentation II course is a web enhanced course that meets for 2.5 hours once a week with required assignments given online for in class discussion. The course material is the second series of instrumentation and incorporates statistics, foundations of single photon emission computed tomography (SPECT), magnetic resonance imaging (MRI), positron emission tomography (PET), and magnetic source imaging (MSI). This is the final instruction for instrumentation and students are expected to have a full understanding of instrumentation procedures, quality control as they conduct these studies in the clinical setting. In addition, all students should be able to discuss PET and SPECT imaging. The students are expected to come prepared to class by completing required reading and completing assignments. In addition, there is a required expectation of class participation to resolve any ambiguity over material as well as participate in class discussion.

Nuclear Medicine Pathology:

The Pathology course is a web enhanced course that meets for 3 hours once a week with required assignments given online for in class discussion and presentations. The class involves interactive interdisciplinary case study seminar in film interpretation integrating x-ray, CT, MRI, sonography and nuclear medicine. In addition, students are assigned three, one-on-one reading sessions with a nuclear medicine radiologist and/or nuclear medicine medical director.

All students are required to prepare and present a detailed PowerPoint case study presentation covering all aspects of a particular nuclear medicine study including a list of required elements including radiopharmacy, pathology, protocols, other modalities, anatomy and physiology, and images. The class examines the students understanding of all required elements involved in Nuclear Medicine imaging.

The CT portion of this class is instructed by a certified CT technologist with didactic in class material covering the required elements provided by ARRT and NMTCB. The CT portion is covered over 4 weeks out of a 16 week semester. One-on-one reading sessions with the nuclear medicine radiologist and/or nuclear medicine medical director are designed to give the students and understanding of the complete process from imaging to the final reading of those images from a Radiologist perspective. These sessions are designed to help the students understand important imaging techniques and imaging views for a variety of indications. Students are also given formal medical informatics training at Presbyterian Hospital to assist them in their case study research. Students are trained on how to research case study material using the available hospital electronic recording systems relating but not limited to images, labs, patient dosage, modality comparisons and patient history. In the process they are held to strict HIPAA requirements during the research and during presentations in regard to patient and private information.

Nuclear Medicine Clinic II:

Nuclear Medicine Clinic II is a continuation course for clinical training. The class is web enhanced. The students are required to rotate through the four major affiliates on Monday, Tuesday, Wednesday, and Friday's for 8 hours each day. Students may be dismissed from clinic for class instruction, testing and special training as needed. Faculty site visits for student clinic observations are conducted by faculty at least once a week with weekly log documentations.

At each location, students are under the supervision of a certified technologist for instructional training in instrumentation, radiopharmacy, medical informatics, radiation safety, patient care and patient diagnostic imaging. Each student's clinic performance is monitored electronically with a handheld device to record attendance (timeclock), student progression, exam competencies and feedback from the technologist. The expectation of the student at the intermediate level is to incorporate aspects of class material to clinic. Students should become more proficient in imaging the most prominent studies. This proficiency should involve aspects from interviewing the patient, performing the scan and processing the images for the nuclear medicine radiologist. The assistance from the supervising technologist during studies should be minimal for familiar studies and with more instruction on rare studies.

- **How the components integrate with one another:**

At the completion of the spring semester the students will have obtained full didactic information on instrumentation, common Nuclear Medicine studies including in-vitro studies and should be more proficient with all aspects of imaging from interview to image processing. The information in class will be used by the student in the clinical setting to become proficient and knowledgeable. The students should be able to conduct quality control protocols on instrumentation with little to no assistance on daily and weekly quality control assignments and minimal on less common instrumentation tasks. The pathology case studies help to enhance the student's organizational, communication, and technical skills for required imaging. The students' knowledge in CT and PET imaging allow them to conduct studies with an understanding of the technical components of the instruments. The one-on-one interaction with the nuclear medicine radiologist and/or nuclear medicine medical director works together with the clinical rotations and class instruction to give the students a better understanding of their expectations of required imaging elements from a nuclear medicine radiologist stand point.

SECOND SUMMER SEMESTER:

Overview

The programs instructional plan for the final remaining portion of the Nuclear Medicine course work is presented in Radiation Biology, Essentials of Nuclear Medicine III, and Clinical III. The majority of the Nuclear Medicine components required for certification examinations and clinical instruction are completed at this point in the program and the students will begin preparation for certification examinations in the didactic portion of the Clinical III class. The Clinical III class is the advanced level of clinical rotations, the students are expected to perform examinations with no assistance (only over sight) from a certified technologist for most exams with assistance only on rare studies. Radiation Biology is introduced at this time so that the effects of radiation are fresh in the minds of the students for the certification exams. The breakdown of classes for this semester are as follows:

Essentials of Nuclear Medicine II	NUCM 415
Nuclear Medicine Clinic III	NUCM 400
Nuclear Radiation Biology	NUCM 412

- **Learning experiences and schedules:**

Essentials of Nuclear Medicine II:

The Essentials of Nuclear Medicine II course is a web enhanced course that meets for 2.5 hours once a week with required assignments given online for in class discussion. This class serves as a continuation of NUCM 396. The material in this course is designed to complete the didactic portion of the required nuclear medicine studies encountered in clinic and certification exams including the Brain, Cerebral Spinal Fluid Imaging, PET (FDG) Brain imaging, PET Cardiac Imaging, PET Bone Imaging, Cardiac, Infection, Neoplasm imaging, Lymphoscintigraphy. Students are expected to incorporate all class material in the clinical setting. The students are expected to come prepared to class by completing required reading and homework assignments. In addition, there is a required expectation of class participation to resolve any ambiguity over material as well as participate in class discussion.

Nuclear Medicine Clinic III:

Nuclear Medicine Clinic III is a continuation course for clinical training. The class is web enhanced. The students are required to rotate through the four major affiliates with an optional one day observation at other nuclear medicine facilities in Albuquerque and one week rotation at Presbyterian Heart Group if desired. Students are required to meet 2 hours per class, three times per week for practice review exams and review presentations. Faculty site visits for student clinic observations are conducted by faculty at least once a week with weekly log documentations. Students in class are expected to prepare a review presentation covering an assigned topic covering material introduced over the school year. Students also prepare a quiz for their classmates to take after each presentation. In addition, one practice certification exam is given weekly. After the exam students are to reference all missed problems and submit the correct answers to the instructor as a homework assignment. The didactic portion is designed to help the students recall and locate area of weakness in all subjects of material over the course of the year.

At each location, students are under the supervision of a certified technologist for instructional training in instrumentation, radiopharmacy, medical informatics, radiation safety, patient care and patient diagnostic imaging. Each student's clinic performance is monitored electronically with a handheld device to record attendance (timeclock), student progression, exam competencies and feedback from the technologist. The expectation at the advanced level is that each student is proficient and held to the standard of a working technologist conducting all aspects of work encountered in a nuclear medicine department. The students are expected to perform patient examinations with no assistance (only over sight) from the technologist for most exams with assistance only on rare studies. (Students are strongly encouraged to be prepared for rare exams with protocols, technique and dosing protocols as if they were to be conducting them alone).

Nuclear Radiation Biology:

The didactic portion of Nuclear Radiation Biology is provided online for 6 weeks with 2 weeks being live (face-to-face). Face-to-face interactions are held for the introduction and expectations for the course and one class is held at the end of semester for the final exam. The class topics are the interactions of alpha, beta, electromagnetic and high LET particle radiations from nuclear interactions and disintegrations with biologic material. Portions of the course material covers the effects of radiation on the human embryo/fetus and identifies the factors affecting radiation induced carcinogenesis. The students are expected to be prepared for weekly online discussions by completing required reading and homework assignments. In addition, there is a required expectation of online participation to resolve any ambiguity over material as well as participate in class discussion.

- **How the components integrate with one another:**

In the program's final semester faculty are preparing the students to enter the Nuclear Medicine setting and preparing them for the ARRT and NMTCB certification exams. The clinical training is designed to test a student's ability to grasp all concepts of work as a working technologist. At this point the students have received enough practice on studies to become proficient. The students should be comfortable scanning common studies and understanding how to approach rare studies. Although students are still required to have technologist present and observing during the exam, the technologist should not need to intervene unless patient safety is compromised.

In the classroom, the students are in preparation for the ARRT and NMTCB certification exams. Each student is assigned a project which (s) he must present to fellow classmates over an assigned topic covering material encountered over the year. During the presentation students are required to share examples from clinical experience.

Once a week the students are given practice certification exams. Knowledge from past material and clinical experience should help the students relate and clarify problems and scenarios given. The expectation is that the scores on the certification exam should be higher as the semester comes to a close with the introduction of Radiation Biology and Essentials of Nuclear Medicine II. These two courses combined with the review material should close any gaps of unintroduced or ambiguous material.

One strong aspect of the review material is to assign students topics that they are weakest in and showed poor performance throughout the year. The preparation for this presentation and the delivery of the information will help the student to identify where (s) he has any confusion or lack of knowledge. This in return helps to resolve those weak areas.

Certificate in Nuclear Medicine Imaging (Old Curriculum)

Program Curriculum*

	Credit Hours
Summer Term	
NUCM 315 Radiation Safety	2
RADS 330 Patient Care	2
RADS 331 Patient Care Lab	1
RADS 381 Medical Language Systems Review	1
	6
Fall Semester	
NUCM 320 Clinical Nuclear Technology I	4
NUCM 354 Clinical Radiopharmacy	3
NUCM 375 Nuclear Physics and Instrumentation	3
NUCM 360 Imaging Instrumentation I	3
NUCM 380 Nuclear Medicine Cross Sectional Anatomy (2nd 8 weeks)	2
NUCM 412 Nuclear Radiation Biology (1st 8 weeks)	2
	17
Spring Semester	
NUCM 365 Clinical Nuclear Technology II	4
NUCM 385 Imaging Instrumentation II	3
NUCM 390 In Vitro Nuclear Medicine	2
NUCM 392 Pathology Seminar	4
NUCM 396 Essentials of Nuclear Medicine Imaging I	3
	16
Summer Term	
NUCM 400 Clinical Nuclear Technology III	4
NUCM 415 Essentials of Nuclear Medicine Imaging II	2
	6

Certificate in Nuclear Medicine Imaging (New Curriculum – Additional required courses highlighted)

Program Curriculum*

	Credit Hours
Fall Semester	
RADS 378 Current Problems I	3
RADS 405 Medical Imaging Theory II	3
	6
Spring Semester	
RADS 406 Medical Imaging Theory III	3
RADS 398 Current Problems II	3
	6
Summer Semester	
NUCM 315 Radiation Safety	2
RADS 330 Patient Care	2
RADS 331 Patient Care Lab	1
RADS 381 Medical Language Systems Review	1
	6
Fall Semester	
NUCM 320 Clinical Nuclear Technology I	4
NUCM 354 Clinical Radiopharmacy	3
NUCM 375 Nuclear Physics and Instrumentation	3
NUCM 360 Imaging Instrumentation I	3
NUCM 380 Nuclear Medicine Cross Sectional Anatomy (2nd 8 weeks)	2
NUCM 412 Nuclear Radiation Biology (1st 8 weeks)	2
	17
Spring Semester	
NUCM 365 Clinical Nuclear Technology II	4
NUCM 385 Imaging Instrumentation II	3
NUCM 390 In Vitro Nuclear Medicine	2
NUCM 392 Pathology Seminar	4
NUCM 396 Essentials of Nuclear Medicine Imaging I	3
	16
Summer Term	
NUCM 400 Clinical Nuclear Technology III	4
NUCM 415 Essentials of Nuclear Medicine Imaging II	2
	6