

# NUCLEAR MEDICINE TECHNOLOGY (NMED)

## NMED-1020 Nuclear Medicine Computers, Math, and Statistics 1 Credit

Examines the mathematics associated with the field of nuclear medicine including formulas and calculations involving radioactive decay, radiations safety, quality control, clinical procedures, statistical analysis, and kit and dose preparation. Also covers study of computer systems in the field of nuclear medicine. Topics include the gamma camera computer system interface, data acquisition, image processing software and techniques, quality control, tomography, radiopharmacy record keeping, teleradiography, and medical informatics.

*Lecture: 1.5 hour. Laboratory: 1 hour*

*Prerequisite(s): Departmental approval: admission to program.*

## NMED-1200 Radiation Safety & Biology 2 Credits

Potential effects of ionizing radiation on biological systems, especially humans including known high dose effects and theories of low dose effects. Radiation risks and applicable quantities and units. Estimating absorbed doses from internally administered radioactive materials. Safe handling of radioactive materials and the disposal of radioactive waste. Radiation safety regulations and safety guidelines including personnel monitoring and accurate record keeping.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval: admission to program.*

## NMED-1302 Nuclear Medicine Procedures I 2 Credits

Methods of performing patient organ visualization procedures in nuclear medicine. Review of anatomy, physiology and pathology of the various organs, radiopharmaceuticals, applicable instrumentation, methodologies, and techniques utilized, including radiation safety techniques, patient care, patient preparation, and patient imaging for nuclear studies.

*Lecture: 2 hours*

*Prerequisite(s): Concurrent enrollment in NMED-130L Nuclear Medicine Laboratory I and departmental approval: admission to program.*

## NMED-130L Nuclear Medicine Laboratory I 1 Credit

Introduction to and application of lab practices of a Nuclear Medicine Technologist including radiopharmaceutical and instrumentation principles. Emphasis on radiation safety, practicing quality assurance, and instrumentation controls.

*Laboratory: 2 hours*

*Prerequisite(s): Concurrent enrollment in NMED-1301 Nuclear Medicine Procedures I and departmental approval: admission to program.*

## NMED-1401 Patient Care for Nuclear Medicine 1 Credit

Practice of advanced patient care skills, essential to providing high-quality patient care. Includes patient positioning skills, patient safety, communication, age-specific needs, and emergency care. Respect for individuals from different cultures, beliefs, gender orientations, and socioeconomic backgrounds are discussed. Legal and compliance issues, scopes of practice, and patients' rights are addressed. Includes certification in cardiopulmonary resuscitation.

*Laboratory: 3 hours*

*Prerequisite(s): NMED-1301 Nuclear Medicine Procedures I, and departmental approval: admission to program.*

## NMED-1501 Radiation Physics 2 Credits

Study of physics as it relates to radiation and medical imaging. Focuses on the principles of radioactivity, effects of radiation on matter, and emerging technologies as they relate to nuclear medicine and advanced molecular imaging. Topics include applicable classical physics concepts, atomic structure, mass-energy relationships, types of radiation, calculations of radioactive decay, production of radionuclides and x-rays, and principles and operation of SPECT, PET, CT, MRI and fusion imaging systems.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval: Admission to the Nuclear Medicine program.*

## NMED-1604 Nuclear Radiopharmacy 2 Credits

Theory and practice of radiopharmacy including non-radioactive interventional drugs and contrast media. Addresses the routes of administration, bio-distribution mechanisms, interfering agents, contraindications, and adverse effects for all administered materials. Preparation and calculation of the dose to be administered, quality control, radiation safety, and applicable regulations are also covered.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval: admission to the program.*

## NMED-1701 Nuclear Medicine Instrumentation 3 Credits

Covers instrumentation use for both non-imaging and imaging including monitoring equipment (surveys), dose calibrators, well counters, uptake probes, laboratory equipment, gamma probe and gamma camera. Reviews imaging components, use, and QC performance and requirements. Explores configuration, function and application of computers and networks used in the reconstruction of images. Includes practical considerations, concepts, data analysis, measurement concerns, and spectroscopy.

*Lecture: 3 hours*

*Prerequisite(s): NMED-1501 Radiation Physics, or concurrent enrollment; and NMED-1603 Nuclear Radiopharmacy and Pharmacology.*

**NMED-1771 Immunology and Pathophysiology for Sectional Imaging**  
**3 Credits**

Introduction to pathophysiology and immunology. Emphasis is on common pathologies found in nuclear medicine, computed tomography, and magnetic resonance imaging and the appearance of these pathologies across multiple planes in various imaging protocols. Includes all commonly-imaged body systems with recognition of abnormal conditions across multiple planes and ability to make the associated imaging changes required to adequately demonstrate the patients pathology.

*Lecture: 3 hours*

*Prerequisite(s): Concurrent enrollment in NMED-1781 Sectional Anatomy for Advanced Molecular Imaging.*

**NMED-1781 Sectional Anatomy for Advanced Molecular Imaging**  
**3 Credits**

Study of human anatomy and its appearance in multiple planes. Includes all commonly imaged body systems and areas as well as discernment of abnormal pathology and how to make the associated imaging changes required to adequately demonstrate the patients anatomy and pathology. Covers imaging planes and anatomy imaged by nuclear medicine, computed tomography, and magnetic resonance imaging.

*Lecture: 3 hours*

*Prerequisite(s): NMED-1302 Nuclear Medicine Procedures I; and concurrent enrollment in NMED-1771 Immunology and Pathophysiology for Sectional Imaging; and departmental approval: admission to program.*

**NMED-2302 Nuclear Medicine Procedures II**  
**2 Credits**

Study of diagnostic nuclear medicine procedures relating to the central nervous, genitourinary, and cardiovascular systems as well as tumor imaging. This course includes anatomy and physiology, pathophysiology, and protocols for routine and non-routine nuclear medicine procedures.

*Lecture: 2 hours*

*Prerequisite(s): NMED-1302 Nuclear Medicine Procedures I, NMED-1604 Nuclear Radiopharmacy, NMED 2601 Molecular & Fusion Imaging with Pharmacology, and NMED-1501 Radiation Physics.*

**NMED-230L Nuclear Medicine Laboratory II**  
**1 Credit**

Continued application of lab practices of a Nuclear Medicine Technologist including experimentation with radiopharmaceutical and instrumentation principles. Emphasis on radiation safety, practicing quality assurance, and instrumentation.

*Laboratory: 2 hours*

*Prerequisite(s): NMED-1301 Nuclear Medicine Procedures I and NMED-130L Nuclear Medicine Laboratory I and NMED-1501 Radiation Physics and NMED-1603 Nuclear Radiopharmacy and Pharmacology; and concurrent enrollment in NMED-2301 Nuclear Medicine Procedures II.*

**NMED-2601 Molecular and Fusion Imaging with Pharmacology**  
**3 Credits**

Examines the methodology of advanced molecular imaging and fusion imaging in the field of nuclear medicine and analyzes current trends and advances in the field. Focus is on patient preparation, pharmaceutical and contrast preparation, imaging protocols, radiation safety, and special considerations for fusion nuclear medicine studies with computed tomography and magnetic resonance imaging.

*Lecture: 3 hours*

*Prerequisite(s): NMED-1501 Radiation Physics and NMED-1701 Nuclear Medicine Instrumentation.*

**NMED-2660 Nuclear Medicine Therapy**  
**1 Credit**

Study the principles and practices of nuclear medicine therapies including palliation, cancer treatment, theranaustics, radioimmunotherapies with monoclonal antibodies, and regulations for therapy. Examines special considerations in regards to patient preparation, radiation safety, dose determination for various therapies, and radionuclides used in therapy including characteristics and production. Emerging technologies and clinical trials will be explored.

*Lecture: 1 hours*

*Prerequisite(s): NMED-1200 Radiation Safety & Biology.*

**NMED-2700 Nuclear Medicine Research Methods**  
**1 Credit**

Basic types of scientific and clinical research, research methods, and the components of a research study. Requires the research, review, discussion, and analysis of current research related to the field of nuclear medicine and advanced molecular imaging.

*Lecture: 1 hours*

*Prerequisite(s): NMED-2600 Molecular and Fusion Imaging and NMED-2660 Nuclear Medicine Therapy.*

**NMED-2940 Nuclear Medicine Field Experience I**  
**3 Credits**

Clinical experience in the nuclear medicine department under the direct supervision of qualified personnel. Participation in variety of nuclear medicine procedures emphasizing application of theory related to nuclear imaging protocols, patient care, radiopharmaceutical preparation, quality control, survey and wipe techniques, instrumentation, radiation accident prevention and radiation safety to include clinical projects and case studies. Clinical rotations through variety of specialty areas including nuclear medicine studies of various patient age groups (pediatrics/geriatric) and pathologies.

*Lecture: 1 hour*

*Other Required Hours: Field Experience: 400 hours experience at a clinical site per semester (average of 40 hours per week).*

*Prerequisite(s): NMED-2302 Nuclear Medicine Procedures II, or departmental approval.*

**NMED-2950 Nuclear Medicine Field Experience II**  
**4 Credits**

Supervised sessions in nuclear medicine department with specific assignments and case studies to include math problems and instrumentation. Clinical rotations through variety of specialty areas including nuclear medicine studies of various patient age groups (pediatrics/geriatric) and pathologies.

*Lecture: 1 hour*

*Other Required Hours: Field Experience: 640 hours of experience at a clinical site per semester (average of 40 hours per week).*

*Prerequisite(s): NMED-2940 Nuclear Medicine Field Experience I or departmental approval.*

**NMED-2960 Nuclear Medicine Field Experience III**

**4 Credits**

Capstone course in nuclear medicine. Supervised sessions emphasizing team approach to daily operation of a nuclear medicine department. Includes patient care, procedures, radiation safety, quality control, equipment manipulation and patient positioning. Clinical rotations through a variety of specialty areas including nuclear medicine studies of various patient age groups (pediatrics/geriatric) and pathologies. Preparation for employment in nuclear medicine and for the American Registry of Radiologic Technologists' examination in Nuclear Medicine to include mock examinations.

*Lecture: 1 hour*

*Other Required Hours: Field Experience: 640 hours of experience at a clinical site per semester (average of 40 hours per week).*

*Prerequisite(s): NMED-2950 Nuclear Medicine Field Experience II or departmental approval.*