B.Sc. - Nuclear Medicine Technology

Programme Outcomes (POs)

PO1. Develop understanding of human anatomy and physiology as it relates to health and disease

PO2. Demonstrate knowledge of clinical procedures and diagnostic testing in various healthcare settings

PO3. Acquire competency in medical terminology and documentation

PO4. Communicate effectively with patients and healthcare professionals

PO5. Demonstrate understanding of ethical and legal issues related to healthcare delivery

PO6. Familiarize with healthcare management and healthcare delivery systems

PO7. Critically analyze healthcare research and evidence-based practice

PO8. Showcase competency in interprofessional collaboration and teamwork

PO9. Develop lifelong learning and professional development to adapt to changing healthcare environments.

Programme Specific Outcomes (PSOs)

PSO1. Perform nuclear medicine procedures and exams using appropriate instrumentation and protocols.

PSO2. Understand the recent developments in nuclear medicine imaging and therapy along with potential benefits and limitations of new radiopharmaceuticals and imaging modalities.

PSO3. Understand the principles of radiopharmacy, radiochemistry, and quality control in the production of radiopharmaceuticals.

PSO4. Practice radiation safety procedures and protocols to protect patients, themselves, and others from unnecessary radiation exposure.

PSO5. Use radiation detectors and imaging systems to acquire and analyse medical images.

PSO6. Apply image processing techniques to enhance and extract useful information from nuclear medicine images.

PSO7. Demonstrate knowledge of regulatory requirements and safety procedures for nuclear medicine practice.

PSO8. Apply critical thinking and problem-solving skills to analyze and resolve issues related to nuclear medicine technology.

PSO9. Demonstrate professionalism, ethical behaviour, and a commitment to continuing education and professional development.

Course Outcomes

2021-2023

Semester	Subject Code	Subject	Course Outcomes
1	21BASNM1C02	COMPUTERS AND IMAGE PROCESSING TECHNIQUES IN NUCLEAR MEDICINE I	CO1: Understanding of computer hardware components and their functions, including CPU, memory, storage, and input/output devices. CO2: Knowledge of the basic principles of computer software, including OS, applications, and system software. CO3: Ability to use a computer and common software applications in nuclear medicine. CO4: Infuse the knowledge of computer networks and the Internet, including the basic topologies and the WWW. CO5: Evaluate the social and ethical implications of computer use, including privacy, security, and intellectual property rights.
1	21BASNM1C03	BASIC PHYSICS & NUCLEAR MEDICINE PHYSICS I	CO1: Understanding of the basic structure of atoms, including the electron configuration and energy levels. CO2: Understanding of fundamental principles of physics, including mechanics, thermodynamics, electromagnetism, and optics CO3: Knowledge of the interaction of atoms with electromagnetic radiation, including the absorption and emission spectra. CO4: To understand Radiography, image quality, patient exposure, and common X-ray modalities (e.g. plain film, computed tomography (CT), fluoroscopy).

Semester	Subject Code	Subject	Course Outcomes
1	21BASNM1D01	RECENT ADVANCES IN NUCLEAR MEDICINE TECHNIQUES I	CO1: Understanding of the principles of nuclear medicine, including the use of radioactive isotopes in medical imaging and therapy. CO2: Knowledge of the current trends and developments in medical imaging, including new imaging modalities and techniques. CO3: Knowledge of the current trends and developments in nuclear medicine therapy, dosimetry and instrumentation. CO4: Study of the clinical applications of nuclear medicine techniques, including the diagnosis and management of various diseases, such as cancer, cardiovascular disease, and neurodegenerative disorders.
1	21MENVIOVE2	ENGLISH I	CO1: Demonstrate a coherent and systematic knowledge of the field of English literature showing an understanding of current theoretical and literary developments in relation to the specific field of English studies. CO2: Demonstrate a set of basic skills in literary communication and explication of literary practices and process with clarity
1	21MENVIOVE2	ENVIRONMENTAL STUDIES	CO1: Demonstrate a basic understanding of the principles of environmental science, including key environmental issues, impact of human activities on the environment and the strategies for promoting sustainability. CO2: To apply critical thinking and analytical skills to evaluate environmental problems based solutions. CO3: understand environmental laws and regulations, as well as the legal frameworks for addressing environmental problems CO4: to assess the role of environmental movements in shaping environmental policy and practice in India, and propose strategies for advancing environmental justice and sustainability in the country CO5: To evaluate and address ethical and logistical challenges associated with conducting fieldwork in environmental studies and propose strategies for improving scientific integrity and social responsibility in environmental research.

Semester	Subject Code	Subject	Course Outcomes
1	**21BASNM1C01**	**Anatomy & Physiology I**	CO1: Understanding the interrelationships and interactions between different organ systems and their coordination to maintain homeostasis. CO2: Knowledge of the terminologies and concepts used to describe the human body and its functions. CO3: Understanding the structure and function of the human body at the macroscopic and microscopic levels. CO4: Familiarity with the different organ systems of the body, including the musculoskeletal, cardiovascular, respiratory, and digestive systems. CO5: Acquiring an appreciation of the role of anatomy and physiology in medicine and health sciences.

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Semester	Subject Code	Subject	Course Outcomes
2	**21BASNM2C03**	**BASIC PHYSICS & NUCLEAR MEDICINE PHYSICS II**	CO1: Introduction to medical imaging: definition, history, and current trends in medical imaging. CO2: Knowledge of the structure of atoms and their interactions with electromagnetic radiation, including the principles of radioactive decay. CO3: Knowledge of the physics of medical imaging, including magnetic resonance imaging (MRI) and ultrasonography. CO4: Knowledge of the basic instrumentation used in nuclear medicine, including gamma cameras and dose calibrators.

Semester	Subject Code	Subject	Course Outcomes
2	21BASNM2D01	RADIATION BIOLOGY & RADIATION SAFETY IN NUCLEAR MEDICINE – I	CO1: Understand the basic principles of radiation safety and protection, including the concept of effective dose and dose equivalent. CO2: Study the effects of IRs on normal cells, including cell division and DNA damage. CO3: Examine the radiobiology of cancer cells, including the mechanisms of radiation-induced cell death and the concept of radioresistance. CO4: Radiation-Induced DNA Damage: Study of the molecular mechanisms of radiation-induced DNA damage, including double-strand breaks and oxidative stress.
2	21BASNM2C02	COMPUTERS AND IMAGE PROCESSING TECHNIQUES IN NUCLEAR MEDICINE – II	CO1: Understanding of the basic principles of image formation, including signal-to-noise ratios, contrast, and spatial resolution. CO2: Knowledge of the fundamental principles of image processing, including image enhancement, restoration, and segmentation. CO3: To be able to apply the applications of image processing techniques in nuclear medicine. CO4: Ability to apply the principles of medical imaging to real-world problems, such as image quality improvement and artefact reduction. CO5: Ability to analyse and fuse medical images produced by various imaging modalities.
2	21BASNM2C01	ANATOMY & PHYSIOLOGY – II	CO1: Understanding how the body responds to changes in internal and external environments, including the mechanisms involved in homeostasis and disease. CO2: Understanding the mechanisms and processes involved in the regulation of body functions, such as neural and hormonal control of physiological processes. CO3: Familiarity with the different organ systems of the body, including the reticule-endothelial, alimentary, reproductive, endocrine, and nervous systems. CO4: Developing a deeper understanding and appreciation for the complexity and beauty of the human body and its functions.

Semester	Subject Code	Subject	Course Outcomes
2	21ENG2L02	ENGLISH – II	CO1: Display knowledge to cultivate a better understanding of values – both literary values that aid us in literary judgment and also values of life at all stages. CO2: Cultivate ability to look at and evaluate literary texts as a field of study and as part of the wider network of local and global culture.
2	21BASNM2C02L	PRACTICAL COMPUTERS AND IMAGE PROCESSING TECHNIQUES IN NUCLEAR MEDICINE	CO1: Understand the basic principles of computers and image processing techniques used in nuclear medicine. CO2: Use appropriate software tools and programming languages to manipulate and process nuclear medicine images. CO3: Apply image processing techniques to enhance and extract useful information from nuclear medicine images.
2	21BASNM2C03L	PRACTICAL BASIC PHYSICS & NUCLEAR MEDICINE PHYSICS	CO1: Understand the principles of radioactivity, radiation protection, and radiation measurement. CO2: Understand the principles of radiation detection and measurement, and use appropriate equipment to measure radiation dose. CO3: Apply critical thinking and problem-solving skills to analyze and resolve issues related to instruments used in nuclear medicine.
2	21BASNM2C01L	PRACTICAL ANATOMY & PHYSIOLOGY II	CO1: Understanding the mechanisms and processes involved in the regulation of body functions, such as neural and hormonal control of physiological processes. CO2: Developing an understanding of the principles and techniques used in physiological measurements, such as blood pressure, heart rate, and respiratory rate. CO3: Acquiring the ability to apply anatomical and physiological knowledge to clinical settings and to understand the implications of abnormal physiological functions.

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Semester	Subject Code	Subject	Course Outcomes
3	21BASNM3C01	PHYSICS OF NUCLEAR MEDICINE TECHNOLOGY I	CO1: Understanding of the physical principles underlying nuclear medicine and interaction of radiation with matter. CO2: Knowledge of the basic instrumentation used in medical physics eg; gamma camera, SPECT, imaging detectors. CO3: Knowledge of the principles and applications of PET and PET/CT imaging. CO4: Assess the efficiency of the nuclear medicine system and provide the utmost support to the nuclear medicine department.
3	21BASNM3C02	RADIOCHEMISTRY & RADIO PHARMACY I	CO1: Understand the principles of nuclear medicine and use of radioactive isotopes in medical imaging and therapy. CO2: Understand the pharmacokinetics of radiopharmaceuticals, their administration, distribution, and elimination from the body. CO3: Analyse the principles and applications of radiotracers and image analysis. CO4: Learn the properties and characteristics of radiopharmaceuticals used in nuclear medicine.
3	21BASNM3D03	RECENT ADVANCES IN NUCLEAR MEDICINE TECHNIQUES II	CO1: Overview of hybrid imaging techniques, including the combination of SPECT and PET imaging, and their applications in nuclear medicine. CO2: Knowledge of the current trends and developments in NMT, including new radiopharmaceuticals and imaging techniques. CO3: Overview of recent advances and developments in nuclear medicine techniques, including the use of radiolabelled nanoparticles and molecular imaging.

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3	21BASNM3S02	BASIC RADIATION PROTECTION	CO1: Understanding of the basic principles of ionizing radiation, including its sources, properties, and interactions with matter. CO2: Understanding of the basic principles of shielding and radiation attenuation, including the use of lead, concrete, and other materials. CO3: To apply knowledge of radioactive material transportation and radioactive waste material management in work-life. CO4: Knowledge of the current regulations and guidelines for radiation protection, including those set by national and international organizations such as ICRP and NCRP.
3	21CENG3A02	COMMUNICATIVE ENGLISH	CO 1: To enhance the understanding of LSRW skills and various approaches to language. CO 2: Providing an in-depth academic exposure about various forms of communication to enable students to be better speakers and users language. CO 3: Demonstrate a coherent and systematic knowledge of the field of communication through understanding of current linguistic and literary developments. CO 4: Demonstrate a set of basic skills in literary communication and explication of literary practices and process with clarity CO 5: Write analytically in a variety of formats, including essays, speeches, and reflective writings.
3	21ENTPDG01	ENTREPRENEURSHIP DEVELOPMENT PROGRAM	CO1: Outline the function of the entrepreneur in the successful, commercial application of innovations and recall the different opportunities and successful growth stories. CO2: Learn how to start an enterprise and design business plans that are suitable for funding by considering all dimensions of business. CO3: Prioritize personal attributes that enable best use of entrepreneurial opportunities CO4: Examine Economic conditions with higher level knowledge and understanding of contemporary trends in e-commerce and business finance. CO5: Explore entrepreneurial leadership and management style.

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4	**RADIOCHEMISTRY & RADIO PHARMACY II**	CO1: Basic understanding of the regulatory framework for radiopharmaceuticals, approval process for new radiopharmaceuticals and the oversight of its production. CO2: Knowledge of the latest advances in radiopharmaceutical synthesis and labelling, including the use of new radioisotopes and innovative targeting strategies. CO3: Study of the QC methods used in radiopharmacy eg; measurement of radiochemical purity and stability, assessment of radiopharmaceutical integrity. CO4: Study of the techniques and methods used in the preparation and administration of radiopharmaceuticals, including dose calculation and patient dosing. CO5: Overview of the recent advances and future directions in radiopharmacy, imaging techniques, and therapeutic strategies.
4	**Physics of Nuclear Medicine Technology-II**	CO1: Understand the SPECT imaging, including the principles of operation, instrumentation, and imaging techniques. CO2: Design and analyze different types of collimators (Parallel-hole, pin-hole, Diverging and Converging). CO3: Analyze and interpret medical images produced by NMT, including SPECT and PET. CO4: Apply the principles of physics to real-world problems in the field of nuclear medicine, such as image quality and artefact reduction.
4	**Radiation Biology & Radiation Safety in Nuclear Medicine - II**	CO1: Knowledge of Radiation-Induced Tissue Injury: effects of IR on tissues, tissue damage and the mechanisms of tissue repair. CO2: To remember principles of radiation protection and dosimetry, including the use of radiation shielding, dose limits guidelines, and radiation dose measurement techniques. CO3: Understanding of the principles of radiation safety and protection in various settings, including medical facilities, nuclear power plants, and research laboratories. CO4: Ability to apply the principles of radiation protection to real-world problems, such as emergency response and radiation exposure control.
4	**Database Management System**	CO1: To provide the knowledge of Hospital Management system CO2: To determine the ability to archive data, manage and retrieve the necessary Hospital Management data CO3: To create different visual representation of data CO4: To acquire knowledge of front end and back end of internet CO5: Apply programming fundamentals using programming tools.

Semester	Subject	Course Outcomes
4	**Indian Constitution**	CO1: To learn and understand the Indian constitution and follow as a citizen CO2: To remember , understand and apply the Indian constitution and also citizens following the constitution within the framework. CO3 : To understand the concept of CM and state governor, PM and president, appointment of supreme court, high court and consumer court judge's CO4 : To understand the existing houses and the functioning system of it.
4	**Practical Physics of Nuclear Medicine Technology**	CO1: To develop practical skills and knowledge in the field of nuclear medicine. CO2: To demonstrate competency in applying theoretical concepts to practical tasks. C03: To use relevant tools, equipment, and techniques to perform practical tasks.
4	**Practical Radiochemistry & Radiopharmacy**	CO1: Developing the skills to prepare and analyze radioactive compounds, including labelling, quality control, and purity testing. CO2: Understanding the fundamental principles and techniques of radiochemistry and radiopharmacy. CO3: Understanding the regulations and guidelines for working with radioactive materials, and being able to apply them in a practical setting.