

## Course Description

<b>I. General Education</b>	<b>30 credits</b>
<i>Humanities &amp; Social</i>	<b>11 credits</b>
<b>MUGE 101 General Education for Human Development</b>	<b>2(1-2-3)</b>
The meaning, significance, and relation of General Education to other vocational/ specific subjects; the relation between behavior and mentality; critical thinking; the qualifications of ideal graduates; analysis of causes and consequences of events/ situations/problems; synthesis of solutions to, precautions against, or improvements in those events/situations to benefit individuals and their community; and the application of knowledge to solve the problems.	
<b>SHSS 135 Health Economics</b>	<b>2(2-0-4)</b>
Philosophy/evolution of health economics, comprehensive knowledge based in economics, economic tools applied to health services system, health care production, efficiency, equity/equally distribution in health services allocation.	
<b>SHHU 103 Art Appreciation</b>	<b>2(2-0-4)</b>
Meaning and types of fine arts; value of arts in human life; appreciation of painting, sculpture and architectural masterpieces both in Thailand and abroad.	
<b>SHHU 116 Comparative Culture</b>	<b>2(2-0-4)</b>
Comparison of material, cognitive, and normative dimensions between Thai, Western and other related cultures with emphasis on cross cultural understanding and appreciation of cultural diversity.	
<b>SHHU 102 Comparative Religion</b>	<b>2(2-0-4)</b>
Modern approaches to religious studies; roles of religion in life and society; basic teaching in Buddhism, Christianity, and Islam; comparison of Buddhist, Christian, and Islamic views on the world and the universe, human nature and destiny, happiness and suffering, and life after death.	
<b>MSMS 107 Film Appreciation</b>	<b>2(2-0-4)</b>
The definitions, role & functions of Films. Survey into genres, film styles, history of films, and development in both Eastern-Western Cinematographic worlds as well as films in Thailand. Elements of film creation. Films exploration. Principles of aesthetic evaluation in Films.	
<b>MSID 101 Music Appreciations</b>	<b>2(2-0-4)</b>
The understanding of the evolution of western and global music cultures, considering both their forms and their social and economic foundations, which will lead to the better understandings of other music cultures as well as the comparison and futures of Thailand's music cultures.	
<i>Language</i>	<b>9 credits</b>
<b>LATH 100 Art of Using Thai Language in Communication</b>	<b>3(2-2-5)</b>
Art of using Thai language and of speaking, listening, reading, writing, and thinking skills for accurate and appropriate communication.	
<b>LAEN 103 English Level 1</b>	<b>3(2-2-5)</b>

English structure, grammar and vocabulary in the context of daily language use, dealing with integration in four basic skills (listening, speaking, reading, and writing); reading strategies, sentence writing, listening for the gist, pronunciation and classroom communication.

**LAEN 104 English Level 2****3(2-2-5)**

Vocabulary, expressions, grammar, and contextualized social language; essential communicative skills in small groups; writing practice at a paragraph level; and reading strategies.

**LAEN 105 English Level 3****3(2-2-5)**

Reading passages and writing at sentence and paragraph levels about proportion, frequency and probability, shape, measurement, comparison and contrast, definition and classification; coherence, unity and transition; listening comprehension; listening for the main idea; listening for specific details; and making inferences.

**LAEN 106 English Level 4****3(2-2-5)**

Reading passages and writing at sentence and paragraph levels about sequence of events and process, function, purpose, method and means, cause and effect, and conditional reasoning; academic English paragraph writing and introduction to essay writing; listening comprehension; listening for the main idea; listening for specific details; and making inferences.

***Science & Mathematics*****8 credits****ENGE 100 The Earth and Nature****3(3-0-6)**

Principle of Environment. Ecology and dynamic system. Balance of natural resource conservation. Human community related to their environment and human activities that directly impact on environment and natural resources which including water resource soil. Land forest. Minerals. Energy. Noise. Air. Solid waste and hazardous water Current environment situation and crisis in our country and other countries in the world. Ways of environmental management as a means for sustainable development.

**LAFE 144 Critical Thinking and Analysis****3(3-0-6)**

Principles and rules in good reasoning; application of principles and rules in thinking and analytical processes; various forms of expression of thought to avoid mistakes.

**SCBI 115 Basic of Life****2(0.5-1-****3.5)**

Biodiversity; comparative study of reproduction and development in animals; comparative physiology of organ system, receptor and motor system, digestive system, endocrine system, gas exchange and excretory system, circulatory system and immune system; and basic biology laboratories.

***Health & Recreation*****2 credits****SPGE 120 Bike Rider for Health****2(0-2-3)**

Applied sport science principles, physical and mental fitness preparation for bike rider benefits, basic principles bike skills safety, rules and regulations and manner in riding in bike lane, tour around MU by bike for recreation and health.

**SPGE 121 Mind and Body****2(0-2-3)**

Applied sport science principles, physical and mental fitness preparation for mind and body exercise benefits and basic principles of mind and body training. Skills and safety, Mind and Body activities such as Yoga, Tai Chi, Pilates, and Fit Ball.

**SPGE 122 Group Exercise**

**2(0-2-3)**

Applied sport science principles, physical and mental fitness preparation for group exercise, benefits and basic principles of group exercise training, skills and safety, group exercise activities such as Bosu Ball, Punch Kick, jump, jump rope, Boot Camp, Indoor Bike, Trampoline, and Aqua Aerobic.

**SPGE 123 Track Athletics**

**2(0-2-3)**

History, usefulness, applied sport science principles, physical and mental fitness preparation for player, basic skills; steps, set position of start running and movement for various distance of competition. Sports facilities, judging, rules, regulations, injuries and safety, equipment and maintenance.

**SPGE 124 Sepak Takraw**

**2(0-2-3)**

History, usefulness, applied sport science principles, physical and mental fitness preparation for player, basic skills such as basic movement, variety of kicking, heading, serving, volley, back kick, attack and defense techniques, team playing, rule, regulations, injuries and safety, equipment and maintenance.

**SPGE 125 Petanque**

**2(0-2-3)**

History, benefits, applied sport science principles, physical and mental fitness preparation for player, Petanque court and equipment. Rules and regulation. Petanque basic skills such as handing, throwing, standing, balancing, pointing, hitting. Individual double and team completion. Equipment maintenance and safety.

**SPGE 126 Synchronized Swimming**

**2(0-2-3)**

History, benefits, application of sports science principles in synchronized swimming, physical and mental fitness preparation for synchronised swimmer, safety, rules and regulations, uniforms. Basic skill such as floating, breathing, scolling movements, bullet leg, flamingo and eggbeater. Synchronized swimming style such as basic routine, team routine.

**SPGE 127 Aerobic for Health**

**2(0-2-3)**

Sport science principles and their application to Aerobic for Health. Aerobic exercise significance, benefits and basic principles of aerobic dance training. Skills of aerobic dance movements, safety, and Aerobic activities such as Water Aerobics, Martial Art with music, Step Aerobic, New Body and Boot Camp.

**SPGE 128 Yoga for Health**

**2(0-2-3)**

Sport science principles and their application to Yoga for Health. History, meaning, training locations and equipment, and benefits of Yoga. Body preparation, joint and muscle stretching, techniques of muscle contraction and relaxation. Practice of Asana (body position/posture), breathing control, Pranayama, deep relaxation and Yoga training safety.

**SPGE 129 Tennis**

**2(0-2-3)**

Sport science principles and their application to Lawn Tennis. History, benefits, equipment, rules and regulations, physical fitness . Basic skills such as forehand, backhand, volley, serve and strategies for singles and doubles. Injuries and safety, sports science of tennis.

**SPGE 130 Soccer****2(0-2-3)**

Sport science principles and their application to Soccer. Brief history of soccer encompassing; benefit, equipment, rule and regulations, physical fitness. Basic skills of kicking, passing, heading, dribbling, throwing and team play. Equipment keeping, risks injuries and safety. Soccer for exercise, health and recreation.

**SPGE 131 Swimming****2(0-2-3)**

Sport science principles and their application to Swimming. Significance, benefits, safety, rules and regulations, uniforms. Basic skill such as breathing, floating, leg movements. Styles of swimming such as Freestyle, Back stroke and Breast stroke.

**SPGE 132 Basketball****2(0-2-3)**

Sport science principles and their application to Basketball. Benefits, rules and regulations, uniforms and safety. Basic skills such as foot movement, body position, ball handling, shooting and dribbling. Various team tactics and strategies.

**SPGE 133 Volleyball****2(0-2-3)**

Sport science principles and their application to Volleyball. Benefits, rules and regulation, uniforms and safety. Basic skill such as foot movement, body position, serving, volley, bumping, individual attack and defense techniques.

**SPGE 134 Social Dance****2(0-2-3)**

Sport science principles and their application to Social Dance. Cultural significance, benefits, rules and regulations, safety and uniforms. Basic skill of waltz, Cuban-rumba and cha cha cha and Jive.

**SPGE 135 Table Tennis****2(0-2-3)**

Sport science principles and their application to Table Tennis. Benefits, rules and regulations, uniforms and safety. Basic skills such as foot-work, control, forehand stroke, backhand stroke, service and top spin. Competition event in single and doubles in Table tennis.

**SPGE 136 Arts Self-defense****2(0-2-3)**

Sport science principles and their application to Arts Self-defense. Usefulness, definition, safety, Basic skills, such as rolls and somersaults, kick, punch, immobilization, attacks and self-defense.

**SPGE 141 Swimming for Health and Recreation****2(0-2-3)**

Sport science principles and their application to swimming for health and recreation. Significance, benefits, safety, rules and regulations, uniforms. Basic skill such as breathing, floating, leg movements. Styles of swimming such as Freestyle, Back stroke and Breast stroke. Self-help in water accident.

**SPGE 142 Aerobic for Health and Recreation****2(0-2-3)**

Sport science principles and their application to aerobic for health and recreation. Aerobic exercise significance, benefits and basic principles of aerobic training. Skills of aerobic exercise movements, safety, and aerobic activities such as aquarobic, martial arts with music, step aerobic, new body, boot camp, and aerobic dance.

**SPGE 143 Yoga for Health and Recreation****2(0-2-3)**



Sport science principles and their application to yoga for health and recreation. History, meaning, training locations and equipment, and benefits of yoga. Body preparation, joint and muscle stretching, techniques of muscle contraction and relaxation, Asanas (body position/posture), breathing control, Pranayama, deep relaxation and yoga training safety.

**SPGE 144 Social Dance for Health and Recreation** **2(0-2-3)**

Sport science principles and their application to social dance for health and recreation. Significance, benefits, rules and regulations, safety and uniforms. Basic skill of waltz, Cuban-rumba and cha cha cha.

**SPGE 145 Arts of Self - defense for Health and Recreation** **2(0-2-3)**

Sport science principles and their application to arts of self-defense for health and recreation. Usefulness, definition, safety, basic skills, such as rolls and somersaults, punch, immobilization, attacks and self-defense.

**SPGE 146 Table Tennis for Health and Recreation** **2(0-2-3)**

Sport science principles and their application to table tennis for health and recreation. Benefits, rules and regulations, uniforms and safety. Basic skills such as foot-work, control, forehand stroke, backhand stroke, service and top spin. Competition event in single and doubles in table tennis.

**II. Special Education** **109 credits**

***Basic Science*** **33 credits**

**SCCH 102 General Chemistry** **3(3-0-6)**

Atomic structure, chemical bonding, gases, liquids, solids, solutions, colloids, chemical thermodynamics, chemical kinetics, chemical equilibria, ionic equilibria, electrochemistry, the periodic table.

**SCCH 119 Chemistry Laboratory** **1(0-3-1)**

Experiments of general chemistry and basic organic chemistry, e.g., errors, significant numbers, precision and accuracy, preparation of solution, acid-base titration, use of models for stereochemistry of organic substances, chemical equilibria, rate of reaction, redox reaction, solubility classification and reactions of hydrocarbons, reactions of alcohols and phenols, reactions of aldehydes and ketones, reactions of carboxylic Acids and derivatives, reactions of amine.

**SCCH 125 Basic Organic Chemistry** **3(3-0-6)**

Molecular structure and classification of organic compounds, reactions of organic compounds, nomenclature and stereochemistry, syntheses and reactions of alkanes, cycloalkanes, alkenes, alkynes, aromatic hydrocarbons, halides, alcohols, phenols, ethers, aldehydes, ketones, carboxylic acids, carboxylic acid derivatives, amines, carbohydrate, amino acid and lipids.

**SCPY 110 General Physics Laboratory** **1(0-3-1)**

Basic Physics experiments relating to Physics curriculums taught to the first year students in each faculty.

**SCPY 155 Basic Physics for Health Science** **2(2-0-4)**

Mechanics, temperature and heat, fluid, waves, sound and hearing, optics and vision, basic electromagnetism, atomic physics, nuclear physics and radioactivity.

**SCPY 156 Physics for Health Science****3(3-0-6)**

Mechanics: Oscillation motion, system of many particles, motion of rigid bodies,  
 Thermodynamics: Laws of thermodynamics, directions of thermodynamic processes, entropy  
 Physical Optics: Diffraction, interference, polarization.  
 Electromagnetism: Gauss's law, Biot-Savart's law, Ampere's law, Faraday-Henry's induction,  
 electrical circuits containing capacitors and inductors.  
 Quantum mechanics: Black body radiation, photoelectric effect, Compton effect, De Broglie's  
 hypothesis (wave-particle duality), Davisson-Germer's experiment, wave function and  
 probability of finding particles, Schrodinger's equation, application of Schrodinger's equation  
 to simple systems.  
 Atomic physics: Schrodinger's equation for single-electrons atom, possible wave function and  
 energy level of electrons, quantum numbers, angular momentum, electron spins, electron  
 configurations in atoms, periodic table.  
 Nuclear physics: structures and properties of nucleus, binding energy, nuclear model, stability  
 of nucleus and decay, nuclear fission, principles of nuclear reactor control, nuclear fusion.  
 Particle physics: Elementary particles, standard model of elementary particles.

**SCPY 207 Electronics****2(2-0-4)**

Introduction to electronics, inductance and transformers, capacitance, AC circuits, network  
 analysis, semiconductors, operational amplifiers, digital electronics.

**SCMA 111 Calculus****2(2-0-4)**

Functions, limits, continuity, derivatives of algebraic functions, logarithmic functions,  
 exponential functions, and trigonometric functions, implicit differentiation, higher-order  
 derivatives, differentials, applications of differentiation, indeterminate forms and l' Hospital's  
 rule, functions of several variables and partial derivatives, total differentials and total  
 derivatives, antiderivatives and integration, techniques of integration, applications of  
 integration.

**SCMA 160 Ordinary Differential Equations****2(2-0-4)**

Complex variables, introduction to ordinary differential equations, linear first order  
 differential equation, nonlinear first order differential equations, applications of first order  
 equations, linear second order equations, applications of second order equations, high order  
 linear equations.

**SCMA 182 Statistics for Health Science****2(2-0-4)**

Concepts and applications of probability and probability distributions to various events;  
 interpretation of statistical values; descriptive statistics; sampling for good representatives of  
 populations and its use in estimation and hypothesis testing.

**SCMA 260 Differential Equation****2(2-0-4)**

Theory of ordinary differential equations, series solutions to ordinary differential equations,  
 Laplace transforms systems of differential equations, Fourier series, elementary partial  
 differential equations.

**SCAN 101 Basic Anatomy****3(2-3-5)**

The basic concepts of living cells, organs and systems of human body. The relationship of human structures and functions is emphasized. The human skeleton and cadavers are utilized in the laboratory study.

### **SCBC 203 Basic Biochemistry**

**3(3-0-6)**

Structures and functions of 4 biomolecules, carbohydrate, lipid, protein and nucleic acid, metabolic processes and regulation of metabolic pathways of 4 biomolecules, flow of genetic information and gene regulation, DNA technology, role of biomolecules in normal physiological systems with some medical applications.

### **SCBC 204 Basic Biochemistry Laboratory**

**1(0-3-1)**

Basic biochemistry laboratory comprising 8 experiments, the preparation of acid-base solution and buffering system, using a basic instrument in analyzing biomolecules, determination of a physical and chemical properties of all 4 biomolecules and the study of a metabolic process, that are related to the course of Basic Biochemistry (SCBC 203)

### **SCPS 202 Basic Physiology**

**3(2-3-5)**

Basic concepts and principles of the cell function, mechanism, and functions of different organ systems such as the nervous, muscular, cardiovascular, respiratory, renal, gastrointestinal tract, endocrine and reproductive systems. The combined mechanisms of the organ system integration and adaptations in order to keep the body in a homeostatic state.

### ***Profession Education***

#### **MTRD 201 Radiation Physics**

**2(2-0-4)**

Mechanism of the radiation emission, physical properties and factors affecting radiation beam quality, interactions of various radiations with matters associated with medicine, applying the physical properties of radiation to radiodiagnosis, including physical and statistical principles of the resultant quality analysis.

#### **MTRD 202 Instrumentation in Diagnostic Radiology**

**1(1-0-2)**

Equipment in the diagnostic radiology, installation standards and safety, features of diagnostic radiology equipment such as x-rays, mammography, fluoroscopy, ultrasound, computed tomography and magnetic resonance imaging and preventive maintenance of radiology equipment.

#### **MTRD 203 Introduction to Radiation Protection**

**1(1-0-2)**

Basic principles of radiation protection (ALARA) and basic safety standards for protecting against the ionizing radiation and radiation sources, effects of radiation, radiation units and quantities, limitation of radiation dose for the radiation workers and the public, principles of radiation detection and monitoring instruments.

#### **MTRD 205 Radiation Dosimetry**

**2(2-0-4)**

Radiation physical properties of photons, electrons and other particles, radiation units, definitions and recommendations for radiation quantities and dose calculation, radiation dosimeters and methods of measuring radiation doses.

#### **MTRD 209 Digital Electronics for Radiological Technologist** 1(1-0-2)

Digital electronics circuit analysis, analog and digital signals, digital electronics components design and testing, circuit simulation software, programming microcontroller, basic maintenance in radiology instruments.

**MTRD 210 Transformative Learning for Radiological Technologist 2(2-0-4)**

Self-reflection, rational discourse on causes and effects of events/situations/ problems and information technology, skills to live with others in harmony, mutual recognition in diversity, ethical rules for radiological technologists and their application to daily life.

**MTRD 221 Information and Communication Technology for Radiological Technologists 3(3-0-6)**

Computer and Information technologies in radiological technology, computer hardware and peripheral devices, basic data communication, telecommunication technology, computer network, internet technology, computer network devices, DICOM standard, picture archiving and communication system, computer security, related ethic and law in information technology.

**MTRD 222 Radiographic Photography and Exposure Technique 2(1-3-3)**

Principles of radiographic imaging and exposure techniques, factors affecting the image quality and patient dose, the basis of patient dose measurement and calculation, practice in radiographic photography of phantom.

**MTRD 223 Quality Control in Diagnostic Radiology 2(1-2-3)**

Quality control in diagnostic radiology according to the role of radiological technologists in various imaging machines, such as, x-ray machine and imaging equipment, ultrasound machine, computed tomography, and magnetic resonance imaging.

**MTRD 224 Medical Image Processing 2(1-3-3)**

Basic medical image processing and related mathematics, image enhancement, image restoration, filtering in spatial domain and frequency domain, morphological image processing, image reconstruction, three-dimensional visualization, geometric transformation, image registration, and image fusion.

**MTRD 301 Diagnostic Radiographic Technique I 2(1-3-3)**

Relationship among anatomy, surface anatomy, and nomenclature related to standard radiographic positioning. Basic patient preparation and communication, routine radio-graphic positioning techniques, image evaluation criteria, and normal radiographic anatomy of upper and lower extremities.

**MTRD 302 Diagnostic Radiographic Technique II 2(1-3-3)**

Relationship among anatomy, surface anatomy, and nomenclature related to standard radiographic positioning. Basic patient preparation and communication, routine radio-graphic positioning techniques, image evaluation criteria, and normal radiographic anatomy of upper and lower extremities.

**MTRD 303 Diagnostic Radiographic Technique III 2(1-3-3)**

Relationship among anatomy, surface anatomy, and physiology, patient preparation, routine radiographic positioning techniques, image evaluation criteria, and normal radiographic anatomy of pelvis, hip, abdomen, KUB, portable, pediatric, orthopedic, and dental imaging.



Radiopathology and image interpretation of musculoskeletal (MSK) system, chest, cardiac, abdominal, and KUB radiography.

**MTRD 304 Clinical Practice in Diagnostic Radiology I** **3(0-12-3)**  
Clinical practicum in general radiographic techniques in the assigned radiology department in the hospital.

**MTRD 305 Patient Care and Radiological Service Management** **2(1-2-3)**  
Vital sign assessment, emergency patient care, etiquette and communication with patients, safety patient transfer, infection control, patients' right, techniques of sterilization and disinfection, health care team, radiological service management.

**MTRD 321 Pathology** **3(2-2-5)**  
Basic pathology of diseases and common systemic pathology

**MTRD 322 Sectional Radiological Imaging** **2(2-0-4)**  
The relationship between anatomy and sectional images in the transverse, sagittal, and coronal planes of head, neck, thorax, abdomen, pelvis and extremities on standard procedures in computed tomography, magnetic resonance imaging and ultrasound.

**MTRD 323 Contrast Radiological Procedures** **2(2-0-4)**  
Instrumentation and tools for special radiological procedures, contrast media and adverse effects, patient preparation and care, techniques in fluoroscopic procedures, diagnostic and therapeutic angiography, cardiac catheterization, and quality administration.

**MTRD 324 Introduction to Medical Mammography and Ultrasonography** **1(1-0-2)**  
Basic physics and instrumentation of mammography and ultrasonography. Anatomy of the breast and pathology, imaging techniques, ultrasonography and MRI of the breast. Imaging methods and scanning techniques in abdominal imaging, breast and thyroid, reproductive organs, obstetric ultrasonography, vascular ultrasound, musculoskeletal ultrasound.

**MTRD 325 Computed Tomography for Radiological Technologist** **2(2-0-4)**  
Basic physics concepts, instrumentation, data acquisition, image reconstruction, post-processing, imaging procedures and imaging protocols in head and neck, spine and musculoskeletal system, abdomen, pelvis and other special applications, pathologic correlation.

**MTRD 326 Magnetic Resonance Imaging for Radiological Technologist** **2(2-0-4)**  
Basic physics concepts, instrumentation, data acquisition, image reconstruction techniques, post-processing, imaging procedures, and imaging protocols in head and neck, spine and musculoskeletal system, abdomen, pelvis and other special applications, pathologic correlation.

**MTRD 327 Clinical Practice in Diagnostic Radiology II** **3(0-12-3)**  
Clinical practicum in special radiographic techniques in the assigned radiology department in the hospital, special techniques in contrasted procedures, computed tomography, observation of special techniques in interventional radiology, mammography, ultrasonography and magnetic resonance imaging

**MTRD 341 Instrumentation in Nuclear Medicine** **3(2-2-5)**

Overviews of radiation physics, components and principles of radiation detectors, radionuclide counting and nuclear medicine imaging systems, three dimensional image reconstructions, Monte Carlo simulation in nuclear medicine, PACS in nuclear medicine.

**MTRD 342 Nuclear Medicine**

**3(3-0-6)**

Radiopharmaceuticals and radionuclide production, radiochemical impurity, clinical nuclear medicine, radiation safety and radioactive waste management in nuclear medicine.

**MTRD 343 Imaging Technique and Quality Control of Instrumentation in Nuclear Medicine**

**3(2-2-5)**

Patient positioning and imaging technique, imaging protocols, image manipulation such as zoom, image addition and subtraction etc., quantitative analysis for diagnosis, quality control of instrumentation.

**MTRD 344 Clinical Practice in Nuclear Medicine I**

**3(0-12-3)**

Clinical practice in general nuclear medicine such as patient positioning, imaging protocols, quantitative analysis, image display etc. for gamma camera, SPECT, SPECT/CT and basic imaging technique for PET/CT.

**MTRD 359 Term Paper I**

**1(1-0-2)**

Introduction to research methodology, searching, literature reviews, statistical analysis, research ethics in human beings, and plagiarism.

**MTRD 401 Radiobiology**

**2(2-0-4)**

Basic cell biology, interactions of radiation on living organisms, cellular and molecular response ionizing radiation, reaction of radiation to cells, tissues and organs, acute and late reactions of radiation, radiation effect on genetics and major organs, radiation effects of embryo and fetus, tumor and cancer biology and the application of radiation biology in medicine.

**MTRD 402 Instrumentation in Radiotherapy**

**2(2-0-4)**

Types, components and functions of radiotherapy machines such as kilovoltage and megavoltage equipment, particle beam therapy units, brachytherapy units, simulators, integrated treatment devices, computerized treatment planning system, beam modifiers, patient positioning and immobilization devices, radiotherapy imaging and application, image guided radiation therapy, and the role of the radiation therapists in the quality assurance in radiotherapy.

**MTRD 403 Radiation Dosimetry and Treatment Technique in Radiotherapy**

**3(2-2-5)**

Basic principles of the radiation dosimetry, recommendations for radiation quantities, radiation dosimeters, method of radiation measurements, principle of treatment planning and patient dose calculation, dose distribution in patients with brachytherapy, and external beam therapy for photons, electrons and other particles, and radiation protection in radiotherapy.

**MTRD 404 Radiotherapeutic Technique and Clinical application for Upper Body**

**2(2-0-4)**

Types and staging of cancers, pathology, epidemiology, signs and symptoms, incidence and risk factors, diagnostic and treatment of cancer by radiation, advantage, disadvantage and complications from radiotherapy treatment, patient positioning and immobilization, simulation

techniques, treatment planning techniques, delivery techniques, patient care and advice given to patients and people involved during the radiotherapy treatment of central nervous system malignancies, head and neck cancer, lung cancer, breast cancer and upper gastrointestinal cancer.

**MTRD 405 Radiotherapeutic Technique and Clinical application for Lower Body** **2(2-0-4)**

Types and staging of cancers, pathology, epidemiology, signs and symptoms, incidence and risk factors, diagnostic and treatment of cancer by radiation, advantage, disadvantage and complications from radiotherapy treatment, patient positioning and immobilization, simulation techniques, treatment planning techniques, delivery techniques, patient care and advice given to patients and people involved during the radiotherapy treatment of lower abdomen cancer, sarcoma, pediatric malignancies, haematological malignancies, emergency conditions and other kinds of cancer.

**MTRD 406 Clinical Practice in Radiotherapy I** **3(0-12-3)**

Clinical practice in radiation therapy, the process of radiotherapy treatment from patient positioning, immobilization, simulation, basic treatment planning, clinical treatment by external beam therapy and brachytherapy units, care of the patients during the radiation treatment, radiation protection, quality assurance in radiotherapy machines in the role of a radiation technologist.

**MTRD 451 Law for Radiological Technologist** **1(1-0-2)**

The Act of Parliament, the Law of medicine and public health, the Compliance risk, the Code of Ethics.

**MTRD 452 Moral and Code of Ethics in Radiological Technology** **1(1-0-2)**

Compassion, caring, empathy, sympathy, respect and the uses of the Code of Ethics based on the virtue and ethical standards.

**MTRD 453 Medical Radiation Protection** **2(2-0-4)**

Protection against ionizing and non-ionizing radiation used in medicine, biological consequences of human radiation exposure, protection and safety of the radiation worker, patient and public concerned, radiation protection related to exposure in pregnancy, recommendation and regulation in the radiation protection, instruments and detection devices in the radiation protection, personal radiation monitoring, emergency planning and preparation for accidents in radiation, radiation safety acts and regulation, national and international agency regulations in the radiation protection.

**MTRD 459 Term Paper II** **1(0-6-1)**

Basic methodology of interesting research, literature reviews, data collection, method, data analysis and conclusion, writing term papers and presentations.

**III. Free Elective** **6 credits**

**MTRD 225 Innovation in Radiology** **2(2-0-4)**

Description of innovation and innovator, innovation management, related conceptual frameworks in innovation development, current innovation trend, innovations and related technologies in radiological technology, innovation project in the radiological technology.

**MTRD 226 Basic Molecular Technique and Its Application in Radiological Technology 1(1-0-2)**

Basic molecular techniques, understanding of fundamental molecular mechanism and interaction as well as applications related to radiological technology.

**MTRD 306 Professional Communication 1(0-2-1)**

Practice of listening and speaking skills in foreign languages for communicating in the profession work.

**MTRD 307 Advanced Techniques in Medical Image Processing 1(1-0-2)**

Advanced techniques in medical image processing, three-dimensional visualization, image segmentation, image analysis, feature extraction, and feature recognition.

**MTRD 454 Clinical Practice in Diagnostic Radiology III 3(0-12-3)**

Clinical practicum in special radiographic techniques selected by the student in the assigned diagnostic radiology department, ultrasonography, computed tomography, magnetic resonance imaging, and interventional radiology.

**MTRD 455 Clinical Practice in Nuclear Medicine II 3(0-12-3)**

Clinical practice in general nuclear medicine, SPECT/CT and PET/CT professional skills for problem solving and clinical application in nuclear medicine.

**MTRD 456 Clinical Practice in Radiotherapy II 3(0-12-3)**

Clinical practice in radiation therapy; Principle of advanced radiation techniques: image guided radiotherapy, total body irradiation with photon beams, total body skin irradiation with electron beams, intensity modulated radiotherapy, volumetric arc therapy, stereotactic radiosurgery, stereotactic radiotherapy, stereotactic body radiotherapy, critical organ delineation in radiation treatment planning image and dose calculation by using computerized treatment planning system.

**MTRD 457 Computer Applications in Radiological Technology 1(1-0-2)**

Application software, current application software in radiological technology, data, information and application of information, information system development concept, flowchart, data type and operation, flow control and repetition.

**MTRD 458 Current Topics in Database Technology for Radiological Technologists 2(2-0-4)**

Basic data processing concept, appropriate data collection, universal data source, current database technology, basic database system, database design, database implementation, data representation, report generation, data filtering

**MTRD 460 Molecular Technology and Applications in Medical Imaging and Radiation Therapy**

**3(2-2-5)**

Concept of molecular technology, such as molecular nanotechnology, application of molecular nanotechnology in medical imaging, application of molecular nanotechnology in combination with radiation for therapy, other related technologies in imaging and therapy.