2 Theory = 2 credits	Radiation Biology	RAD 221
المتطلب السابق: **Human Anatomy and Physiology (1)** **HRS 112** **Introduction to Radiation Physics** **RAD 211**	This course covers the interactions of radiation with cells, tissues and the body as a whole. It also covers the resultant biophysical events, the theories and principles of radiosensitivity and response and the biological principles of radiation therapy At the end of the course, the student should be able to: Explain the principles of radiation biology and compare these with the principles of cellular biology. Distinguish between units of radiation quantities and radiobiological measures and demonstrate correct usage. Compare and contrast somatic and genetic effects of radiation. Describe radiolysis of water related to target theory and radiation-induced intracellular chemical reactions. Apply the principles of radiobiology to tumor cell biology and evaluate radiation effects anticipated in the clinical practice of radiation therapy. Explain the relationship of time, dose, fractionation, volume and site and radiation effects. Explain and interpret factors affecting RBE, cell cycle and cell death. Categorize the systemic responses to radiation with respect to varying tolerance of differing organs and systems including hematological system and skin. Describe in detail the 4R's of radiobiology and the concept of LD 50/30.	

2 Theory + 1 practical = 3 credits	Computed Tomography	RAD 222
المتطلب السابق: **Introduction Radiological Modalities** **RAD 212** **Introduction to Radiation Physics** **RAD 211**	This course introduces CT instrumentation and operation, components- the x-ray system, detectors and computer, scanning, image processing and display, scanning parameters and their effects– kVp, mA, time, table speed, beam width and reconstructed slice width, filtrations and their effect, CT image quality - contrast sensitivity, high and low contrast resolution, noise and artifact, basic imaging techniques and principles, radiation safety for patient and operator, image optimization. Summary of the main learning outcomes for students enrolled in the course. - Understanding of evolution of computed tomography - Physical principles and instrumentation involved in computed tomography - Physic topics; the characteristics of x-radiation, CT beam attenuation, linear attenuation coefficients - Tissue characteristics and Hounsfield attenuation numbers application, data acquisition and manipulation, image reconstruction algorithms, such as filtered back-projection and transform - Components of C T scanner; Gantry assembly (patient aperture, rotating frame, x-ray tube, collimator, and detectors), Patient table, Operator console, CT computer and Workstations - Operation of Scan console and Display console to demonstrate various functions.	

2 Theory = 2 credits	Pathology	RAD 223
المتطلب السابق: **Human Anatomy and Physiology (1)** **HRS 112**	The course is designed to provide the students with extensive knowledge about disease processes in relation to etiology, and the pathophysiology disorders that compromise healthy systems, with emphasis on radiographic manifestations, procedural and technical considerations as well as advantages and disadvantages of various imaging modalities Describe the various pathologic conditions affecting each body system including, etiology pathogenesis, .manifestations, complications and prognosis Define basic terms related to pathology. Summarize the process of tissue disruption, repair, and .healing Categorize specific diseases into systemic classifications	

2 Theory + 1 Practical = 3 credits	Introduction to Radiation Physics	RAD 211
المتطلب السابق: **Biology for Health programs** **HFSB 101–1**	This course introduces the structure of atom and radiation – concept, nature nd production. Topics include electromagnetic spectrum, radioactivity and half-life, x-ray production – characteristics and the interaction of radiation with matter, dosimetry, radiation safty Summary of the main learning outcomes for students enrolled in the course. Radiations principles, behaviours, and interactions. The atom structure, binding energy, excitation, ionization and non-ionization and atomic radiation. Radioactivity decay law and half-life. Radiation interaction with matter.	

2 Theory = 2 credits	**Introduction Radiological Modalities**	**RAD 212**
المتطلب السابق: **Biology for Health programs** **HFSB 101–1**	This course is an overview of the diagnostic and therapeutic radiological modalities. Emphasis will be on general operating principles of the modality and its integration into patient diagnosis imaging and radiation therapy. Modalities to be covered are X-ray, CT, MRI, US, Gamma camera, and PET Summary of the main learning outcomes for students enrolled in the course. - Diagnostic and therapeutic radiological modalities within the health care and health industrial framework - Uses purpose of diagnostic imaging and radiation therapy modalities - Impacts assessment of each modality on treatment and diagnosis Managements	

2 Theory + 1 practical = 3 credits	**Human Anatomy and Physiology (2)**	**HRS 113**
المتطلب السابق: **Human Anatomy and Physiology (1)** **HRS 112**	By the end of the course, the student will be expected to be able identifiy and understand the followinh Respiratory system Digestive System Endocrine System Cardiovascular system Body Fluid & Blood Urinary system Reproductive System Lymphatic and immunity system Integumentary system Nervous system	

2 Theory + 1 practical = 3 credits	Emergency life support techniques	HRS 114
المتطلب السابق: **Human Biology** **HFSB 101–1** **Biology for Health programs** **HFSB 102–1**	The course is a 3 unit course of lectures and laboratory which develops the students knowledge on the basic concepts first aid and cardiorispiratory resuscitation. The student will also be learning how to assess emergency situations such as bleeding, fractures , wounds and shock. The student will also be learning how to prevent disease transmition, and isolation concepts. To realize the general concepts and the basis of first aid and perform CPR effectively To deal with and manage common first aid emergencies. To deal with and manage common first aid emergencies. To assess the emergency situation and categorize the patients according to the periorities and degree of illness To communicate with the operator , colleagues and patients relatives effectively based on professional ethics and control protocols	

3 Theory = 3 credits	Society and Health	HRS 115
المتطلب السابق: لايوجد	This course deals with various determinants of health, recent trends in population health, biological, social, political, ethical and psychological dimensions of health and illness as well as health status differences among different communities or cultures. This course also deals with the causal model of the determinants of disease, health function and well being − Recognize how the community affects health − List various determinants of health − Explain recent trends in population health − Compare biological, social, political, ethical and psychological dimensions of health and illness − Explain health status differences among different communities or cultures Illustrate causal model of the determinants of disease, health function and well being	

2 Theory + 1 practical = 3 credits	**Biostatistics**	**HRS 116**
المتطلب السابق: **Human Biology** **HFSB 101–1**	After the introductory course "Introduction to biostatistics".The goal of this course is to learn advanced techniques in data analysis for quantitative and cathegorical variables. In this course, students will perform inference about means, correlation, regression and inference about proportion, using hand calculations and computational support (SPSS) Multiple linear regression Students will learn inference about mean Inference about a proportion Comparing independent means Comparing two proportions Comparing several means –ANOVA- Cross tabulated counts Correlation Stratified 2 by 2 tables Regression Multiple linear regression	

2 Theory + 1 practical = 2 credits	Health administration and informatics	HRS 117
المتطلب السابق: لا يوجد	This course provides the students with basic knowledge and skills pertaining to the current issues in Health administration and informatics. Topics include healthcare, health organizations, management, planning, organizing, leadership, controlling and improving performance, making decisions and solving problems, management information systems as well as improving services with informatics tools − Define management, leadership, planning and health information − List various health systems prototypes − Recognize reasons, structures and processes of groups and teams − Recognize leadership theories, traits, skills and behaviors − Recognize record linkage and data protection − Differentiating management and leadership − Compare methods for making decisions − Discuss barriers to effective decision making − Assess quality of health information Coordinate jobs and positions in a healthcare organization	

2 Theory + 1 Practical = 3 credits	**Human Anatomy and Physiology (1)**	**HRS 112**
المتطلب السابق: **Biology for Health programs** **HFSB 101–1** **Human Biology for Health programs** **HFSB 102–1**	*Summary of the main learning outcomes for students enrolled in the course.* Identify the location of anatomical structures using directional and orientation terms. Describe and identify the anatomical parts of skeletal system and joints on radiographs. Demonstrate the use of topographical landmarks to locate internal structures Acquire knowledge of the functions of the skeletal, joint and muscle systems . *Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)* Regularly solicits feedback from students. Describe the structure and function of a human cell. Discuss tissue types and describe the functions of each type. Define radiographic anatomical terminologies. Describe the anatomic position. Classification of bones according to shape . Describe the basic anatomical structure of bone, bone development and growth.	

3 Theory = 3 credits	**Physics of Radiation Therapy (1)**	**RRT 221**
المتطلب السابق: **Introduction to Radiation Physics** **RAD 211**	1. Radiation Interaction: Attenuation of Photon Beams 2 Beam Quality and Dose: Monoenergetic/ Polyenergetic Bremsstrahlung Beam 3. Production of x-rays, photons, and electrons 4 Radiation Measurement and Calibration: Dose Output Calibration Summary of the main learning outcomes for students enrolled in the course. a) Expand basic knowledge on concepts and theories in the Physics of Radiation Therapy I course b) detailed analysis of the structure of matter and properties of radiation, nuclear transformation, x-ray production, properties and interactions of radiation and electron beams with matter c) Gain knowledge on the principles of operation of external radiation beam therapy.	

2 Theory + 1 Practical = 3 credits	Radiation Therapy (1)	RRT 222
المتطلب السابق: **Introduction to Radiation Physics** **RAD 211**	The course will cover Health Care Profession in Radiation Therapy: Characteristics and Roles Legal and Ethical Issues in Radiation Therapy Biological Characteristics of Different Malignant Cancer Diseases Natural History of Malignancy and their Treatment Radiation Therapy Treatment Modalities Adjuvant Modalities: Surgery and Chemotherapy Prognosis: Host and Tumor Factors that affect them The students will gain understanding on the characteristics and roles of medical practitioners and radiation therapists in clinical oncology practice and the legal issues related to this field. They will gain basic knowledge on the the different treatment and adjuvant modalities At the end of the course, the students will be able to demonstrate the clinical care and provide patients with the best treatment outcomes	

3 Theory = 3 credits	**Treatment Planning (1)**	**RRT 311**
المتطلب السابق: **Physics of Radiation Therapy (1)** **RRT 221** **Radiation Therapy (1)** **RRT 222**	The course objective are listed below 1. Treatment Planning: Concepts and Principles and Terminologies 2. Treatment Planning Team and the Roles of the Members 3. Workplace Safety Procedures 4. Patient Contouring, Positioning, Immobilization and treatment field blocking methods; customizing immobilization devices 5. Verification of Treatment Fields 6. CT simulator Technology Patient Safety Considerations in Treatment Planning Knowledge on basic concepts , principles and terminologies in treatment planning Concept of determining treating volume and sites and the role of image quality, patient contouring Knowledge on the use of immobilization device and simulation in treatment planning Understanding the roles of the members of the treatment planning team and the radiation safety aspects of treatment planning and applying them in clinical practice	

3 Theory = 3 credits	**Physics of Radiation Therapy (2)**	**RRT 312**
المتطلب السابق: **Introduction to Radiation Physics** **RAD 211**	1. Radiation Interaction: Attenuation of Photon Beams 2 Beam Quality and Dose: Monoenergetic/ Polyenergetic Bremsstrahlung Beam 3. Production of x-rays, photons, and electrons 4 Radiation Measurement and Calibration: Dose Output Calibration Summary of the main learning outcomes for students enrolled in the course. a) Expand basic knowledge on concepts and theories in the Physics of Radiation Therapy I course b) detailed analysis of the structure of matter and properties of radiation, nuclear transformation, x-ray production, properties and interactions of radiation and electron beams with matter c) Gain knowledge on the principles of operation of external radiation beam therapy.	

2 Theory + 1 Practical = 3 credits	Radiation Therapy (2)	RRT 313
المتطلب السابق: Radiation Therapy (1) RRT 222	The course will cover Health Care Profession in Radiation Therapy: Characteristics and Roles Legal and Ethical Issues in Radiation Therapy Biological Characteristics of Different Malignant Cancer Diseases Natural History of Malignancy and their Treatment Radiation Therapy Treatment Modalities Adjuvant Modalities: Surgery and Chemotherapy Prognosis: Host and Tumor Factors that affect them The students will gain understanding on the characteristics and roles of medical practitioners and radiation therapists in clinical oncology practice and the legal issues related to this field. They will gain basic knowledge on the the different treatment and adjuvant modalities At the end of the course, the students will be able to demonstrate the clinical care and provide patients with the best treatment outcomes	

2 Theory + 1 clinical = 3 credits	Clinical Oncology (1)□	RRT 314
المتطلب السابق: **Radiation Therapy (1)** **RRT 222** **Pathology** **RAD 223**	This course covers the medical, biological and pathological aspects of cancer; the understanding of different management tools for cancer and giving the students broad ideas about Surgical Oncology, Medical Oncology, Gene Therapy, Immunotherapy, Radioactive Isotopic Therapy and their sequel. Summary of the main learning outcomes for students enrolled in the course. At the end of the course, the student should be able to: Describe each of the factors taken into consideration prior to recommending the treatment modality. Understand the epidemiology, etiology, detection, diagnosis, patient condition, treatment, and prognosis of neoplastic disease. Present, discuss and evaluate the disease in relationship to histology, anatomical site, and patterns of spread. Explain verbally and in writing the relationship between various anatomic tumor sites and treatment modality selection. Justify a recommendation to withhold treatment due to a change in the patient's physical condition. Describe Surgical Oncology, Medical Oncology, Gene Therapy, Immunotherapy, Radioactive Isotopic Therapy principles and practice.	

2 Theory + 1 practical = 3 credits	Imaging Technology CT/MRI	RRT 315
المتطلب السابق: **Radiation Therapy (1)** **RRT 222** **Introduction to Radiation Physics** **RAD 211**	Radiologic technologists are essential members of the health care team who perform diagnostic tests such as mammograms, Magnetic Resonance Imaging (MRI) scans, and Computed Tomography (CT) scans for patients with a variety of illnesses and injuries, from concussion, to osteoporosis, to cancer. They provide images of bones, tissues and organs to help radiologists and other physicians determine the best course of care for patients Magnetic resonance imaging and CT technologists are highly skilled professionals who use powerful magnets to obtain detailed images of the various structures in the human body. This course introduces CT instrumentation and operation, components- the x-ray system, detectors and computer, scanning, image processing and display, scanning parameters and their effects– kVp, mA, time, table speed, beam width and reconstructed slice width, filtrations and their effect, CT image quality - contrast sensitivity, high and low contrast resolution, noise and artifact, basic imaging techniques and principles, radiation safety for patient and operator, image optimization.in addition it is intend to develop entry-level Magnetic Resonance and Computed Tomography technologists whose expertise will meet the needs of the community they serve, and whose academic education and clinical experience will provide a foundation for lifelong learning Summary of the main learning outcomes for students enrolled in the course. 1. The student will acquire and develop the education and skills necessary to perform as an entry-level magnetic resonance or .computed tomography technologist 2. The student will develop learning habits that will demonstrate a commitment to professional and personal growth by participation in professional activities and continuing education The student will understand and apply methods for effective .problem solving, critical thinking, and communication skill 3. The course will graduate entry-level magnetic resonance or .computed tomography technologists	

2 Theory + 1 practical = 3 credits	Treatment Planning (2)□	RRT 322
المتطلب السابق: Treatment Planning (1) RRT 311	The course objective are listed below the students will gain the concept of Quality Assurance in Treatment Planning: Concepts and Principles Quality Assurance Program in Treatment Planning : Establishment and Implementation in radiation Therapy Quality Control Tests of Treatment Planning System Quality Control Test of Treatment Planning Ancillary Equipment Imaging Modalities: Roles and Importance in Treatment Planning Imaging Modalities: Roles and Importance in Treatment Planning Treatment plan Imaging Modalities : Principles and QC Image Quality as a Tool for Treatment Planning The students will gain basic knowledge on quality assurance and applications of treatment planning in radiation therapy Analysis and critical thinking on the appropriate use of techniques for treatment in the plan for proper delivery is developed Students will be afforded the use of the ICRU protocols on quality assurance in treatment planning using modern and state-of-the- art treatment planning systems and workstations and different ancillary and imaging .equipment	

2 Theory + 1 practical = 3 credits	Cross-Sectional Anatomy For Medical Imaging	RRT 323
المتطلب السابق: **Human Anatomy and Physiology (1)** **HRS 112** **Human Anatomy and Physiology (2)** **HRS 113** **Imaging Technology CT/MRI** **RRT 315**	Sectional anatomy of brain with correlation primarily to CT images without I.V. contrast.(1(Sectional anatomy of brain with correlation primarily to CT images with I.V. contrast.(2(Sectional anatomy of brain with correlation primarily to MR images. Comparison of appearance of anatomical structures on T1 and T2 MR weighted images of brain. Correlation of selected images of brain PET and SPECT to CT and MR images Sectional anatomy of head and neck (PNS, petrous bone) with correlation to CT and MR images. Sectional anatomy of head and neck (orbit, sella turcica) with correlation to CT and MR images Sectional anatomy of spine (cervical, dorsal and lumbo-sacral) with correlation primarily to CT and MR images Vascular anatomy of the head and neck and the correlation with CT and MR angiography. Common pathologies found in CT and MRI of the CNS and their appearance with various imaging protocols of CT and MRI Common pathologies found in CT and MRI of the head and neck and their appearance with various imaging protocols of CT and MRI Summary of the main learning outcomes for students enrolled in the course. This course begins with a review of gross anatomy of the human head, neck and central nervous system. It is designed to build the knowledge of sectional anatomy of human brain and central nervous system (CNS) regions from a three dimensional perspective. During this course student will learn the identification of gross anatomical structures in axial (transverse), sagittal, coronal and orthogonal (oblique) planes and the clinical application of this knowledge to imaging modalities of CT and Magnetic Resonance images. Also characteristic appearance of each anatomical structure on post contrast images of CT and MR images will be stressed. Focus will cover the common pathologies found in CT MRI and their appearance with various imaging protocols of CT and MRI..	

2 Theory + 1 practical = 3 credits	Radiation Dose Calculations	RRT 324
المتطلب السابق: **Physics of Radiation Therapy (1)** **RRT 221** **Physics of Radiation Therapy (2)** **RRT 312**	1. Principles of dosimetry of radiation fields: Percent depth dose, tissue .air ratio, scatter/air ratio, tissue/phantom ratio. 2. Principles of dosimetry of radiation fields: backscatter and scatter/air ratio, isodose curves and rotational therapy 3. Clinical considerations in electron beam therapy: Dose specifications and reporting, bolus-electron range modifier, small field sizes, isodose curves, field shaping, irregular surface correction, inhomogeneity corrections, electron beam combinations, electron arc therapy 4. Central axis depth dose disruptions in water: General shape of depsth dose curve, electron interactions with absorbing medium, inverse square law (virtual position source), range concept (csda), buildup region dose distribution beyond Zmax Summary of the main learning outcomes for students enrolled in the course. a) Gain basic knowledge on concepts, theories and practical principles on dose calculations b) Knowledge of the factors affecting doses in radiation tehrapy c) Familiarization with the terminologies used in dose calculations	

2 Theory + 1 clinical = 3 credits	Clinical Oncology (2)	RRT 325
المتطلب السابق: Clinical Oncology (1) RRT 314	This course covers the Radiation Therapist's responsibilities in the management of malignant diseases. It includes patient condition the epidemiology, etiology, detection, diagnosis, treatment and prognosis of malignant diseases and their relationships to histology, anatomical sites and patterns of spread At the end of the course, the student should be able to: Describe the role and scope of surgical, medical and radiation oncology, and immunotherapy in the management of malignant diseases. Apply critical thinking and ethical decision making to synthesize and evaluate therapeutic techniques and methods used by the multidisciplinary team to manage malignant diseases. Evaluate the rationale of Radiation Therapy use from a radiobiologic perspective. Examine and apply concepts of dose limiting structures and route of spread for each anatomic site. Compare detection and diagnostic mechanisms used to classify the malignant diseases associated with each anatomic site. Employ the scientific process and data as a basis to develop, implement and evaluate the principles and practice of simulation and treatment as they apply to malignant diseases associated with different anatomic sites. Select the parameters of treatment field design and arrangement used to treat malignant diseases associated with each anatomic site based on the application of biological science. Interpret patients' acute and chronic side effects and/or complications encountered during and after a course of therapy to create a management strategy that fosters healing and comfort for malignant diseases associated with different anatomic sites. Examine treatment regimens and fractionalization schemes used in palliative disease management. Analyze the role and scope of Radiation Therapy used in palliative disease management to ensure quality of life for patients. Differentiate the synDr.omes encountered in emergency scenarios that involve the use of radiation therapy in their management.	

2 Theory = 2 credits	**Research Project (1)**	**RRT 411**
المتطلب السابق: **Biostatistics** **HRS 116**	The course inculses lectures and practical exercises on reseach methodologies. It covers the following topics: Research definition, concepts and types : qualitative and quantitative; Definition of terms: methods, techniques, domain, literature review; Methods of research; Research design: Qualitative and quantitative research; Hypothesis formulation and testing, sampling, measurement and variability; Statistical tools, data evaluation; Writing a research proposal; Research ethics Gain the basic knowledge on the concepts and techniques for conducting research. Examine trends and patterns in using different research methods. Gain knowledge and appreciation on research writing.	

2 Theory + 1 clinical = 3 credits	Instrumentation and Quality Control	RRT 412
المتطلب السابق: **Physics of Radiation Therapy (2)** **RRT 312** **Radiation Therapy (1)** **RRT222**	1. c) Gain knowledge on basic quality control policies and procedures for Radiation Therapy Equipment and develop skill in operating radiotherapy equipment and performing quality control tests 2 QA Foundation in Equipment Specification, Acceptance Testing and Commissioning 3 Practical QA for Brachytherapy QA for Linac Based Stereotactic Radiosurgery Departmental Support for a Quality Assurance Program . ; QA : Technologists' Point of View Summary of the main learning outcomes for students enrolled in the course. a) Gain basic knowledge on concepts, theories and principle of operation of radiation therapy equipment and treatment planning system b) Be introduced to the design of radiation therapy equipment and radiological imaging physical processes c) Gain knowledge on basic quality control policies and procedures for Radiation Therapy Equipment and develop skill in operating radiotherapy equipment and performing quality control tests	

1 Theory + 2 clinical = 3 credits	Clinical Practicum (1)☐	RRT 413
المتطلب السابق: Clinical Oncology (1) RRT 314 Clinical Oncology (2) RRT 325	This course has been designed to sharpen the student skills with the Radiotherapy Department. This basic clinical practice includes rotational rounds to the different services in the department (treatment unit, simulation, mould room and specialized techniques like IMRT,Rapidarch, Stereotaxy, TBI, TSI and Brachytherapy. The student will have an opportunity to acquire the practical skills in the different radiotherapy techniques, 2D simulation, 3D simulation, mould room and high technology radiation therapy At the end of the clinical practice, the student should be able to: Explain the different roles and responsibilities of the different health care team members treating cancer patients. Perform the various activities necessary for patient care in situations likely to be encountered in radiotherapy / oncology practice. Assess the physical condition of the patient before, during, and after treatment delivery. Apply the principles of patient safety especially during transfer procedures. Demonstrate and apply the principles of infection control. Recognize commonly used Drugs/medications and explain their actions/side effects. Recognize and evaluate a patient having an adverse reaction to medication. Demonstrate a clear understanding of professional attitudes, and ethical and legal responsibilities, of health care team members. Demonstrate knowledge of the components and operation of radiographic equipment, Computed Tomography (CT) unit, Magnetic Resonance Imaging (MR.I) unit, and Radionuclide Imaging (RNI) units. Explain the basic principles of image formation in general radiography, CT and MR.I. Demonstrate knowledge of radiographic appearances of different body tissues. Identify on radiographs abnormalities that suggest neoplasia. State the clinical applications of MR.I, especially in relation to Oncology. Discuss the safety and protection principles used in MR.I. List the information given to patients and participate in patient counselling prior to commencement of a procedure. Assess patient's condition and provide the necessary patient care. Explain fully a procedure to the patient prior to its implementation and reassure the patient. Identify materials used in the mould room and explain their use; potential hazards and precautions taken to minimise them. Identify equipment used in the mould room, relevant quality assurance (QA) and precautions taken when using it. Switch ON / OFF radiotherapy machines and operate them safely and accurately. Carry out correctly DAILY / WEEKLY QA to radiation therapy machines. Identify, locate and safely use radiation protection features incorporated in the units and operating areas. Correctly identify the patient and assist the patient safely on the couch of radiotherapy machines.	

1 Theory + 2 clinical = 3 credits	Treatment Planning (3)□	RRT 414
المتطلب السابق: Treatment Planning (2) RRT 322	The students will gain basic knowledge on clinical applications of dosimetry and concepts of treatment planning in teletherapy and brachytherapy Analysis and critical thinking on the appropriate use of techniques for optimal treatment plan for teletherapy and brachytherapy Students will develop skills in mathematical computation in dosimetry and treatment planning The Students will gain basic knowledge on clinical applications of dosimetry Understanding the Concepts of treatment planning in teletherapy and brachytherapy Analysis s and critical thinking on the appropriate use of techniques	

2 Theory + 1 clinical = 3 credits	Dosimetric Quality Assurance□	RRT 415
المتطلب السابق: Radiation Dose Calculations RRT 324	1 Basic Principles of treatment planning quality assurance 2 Treatment plan verification and approval 3 Special procedures quality assurance 4. Different types of in-vivo dosimetry . Special procedures quality assurance Summary of the main learning outcomes for students enrolled in the course. a) Gain basic knowledge on the principles of dosimetry quality assurance and the standards b) Familiarization with the different procedures for the dosimetric quality assurance c) Knowledge of QA improvement process, treatment plan verifications and in- vivo dosimetry	

2 Theory + 1 clinical = 3 credits	Radiation Protection	RRT 416
المتطلب السابق: **Physics of Radiation Therapy (1)** **RRT 221** **Physics of Radiation Therapy (2)** **RRT 312**	The course is given using both lecures and demonstration with some practical applications using laboratory exercises. The course provides : basic knowledge and concepts on the nature of the atoms and radioactivity; interaction of radiaton with matter; radiation detection and messurements with the associated internal and external dosimetry for patients and staff; radionuclides used inr adiation therapy; biological effects of ionizing radiaton with the associated patient risks in radiaton therapy; radiation protection standards and principles; radiation protection in teletherapy and brachytherapy; radiation emergencies and radioactive waste management. To the basic knowledge on radiation and radioactivity, biological effects of radiation, and principles and practices on safety in radiation therapy. To apply the safe practices in radiation therapy	

2 Theory + 1 clinical = 3 credits	Brachytherapy for Medical Dosimetrists	RRT 421
المتطلب السابق: **Dosimetric Quality Assurance** **RRT 415** **Radiation Dose Calculations** **RRT 324**	1 Design features and radiation sources 2 Radiobiology 3 Low Dose Rate Brachytherapy 4. High Dose Rate Brachytehrapy Technique, implant system Radiation Protection Summary of the main learning outcomes for students enrolled in the course. a) Gain basic of the types of isotopes and their uses in therapy b) Knowledge of the sunsts and terminology c) Familiarization with the implant systems and dosimetry hand calculaitons	

2 Theory = 2 credits	Research Project (2)	RRT 422
المتطلب السابق: **Research Project (1)** **RRT 411**	The course includes lectures and practical exercises on reseach design and conduct and writing of research project with a submission of the fianl research report. It covers the following topics: • Research design • Research proposal: submission and approval • Conduct of research • Evaluation of research projects Research writing • Gain the basic knowledge on writing a research design. • Write and submit a research proposal. • Conduct a specific research project.	

2 Theory + 1 clinical = 3 credits	Care of Oncology Patients	RRT 423
المتطلب السابق: Clinical Oncology (1) RRT 314 Clinical Oncology (2) RRT 325	This course is designed to provide the student with foundation concepts and competencies in managing patients within a highly technical environment. It covers the responsibilities of the radiation therapist; the concepts of health and safety, and infection, and the principles and procedures of basic life support. It also covers the management of patients with various intubations, and the study of Dr.ugs / medication. It will provide the student with knowledge about health-related behaviour, the technologist-patient relationship, stress and stress management. It also covers psychological needs for patients and factors affecting treatment outcomes. At the end of the course, the student should be able to: • Explain the roles and responsibilities of the different health care team members treating cancer patients. • Perform the various activities necessary for patient care in situations likely to be encountered in radiotherapy clinical practice. • Assess the physical condition of the patient before, during and after treatment delivery. • Demonstrate the principles of infection control and apply the principles of patient safety and transfer • Recognize and evaluate a patient with an adverse reaction to medication. • Select and present appropriate patient education material. • Understand the different psychological effects of dying and death. • Explain the dynamics of communicating with the cancer patient and family. Demonstrate a clear understanding of professional attitudes, ethical and legal responsibilities	

1 Theory + 2 clinical = 3 credits	Clinical Practicum (2)☐	RRT 424
المتطلب السابق: Clinical Practicum (1) RRT 413	This course has been designed to sharpen the student skills with the Radiotherapy Department. This basic clinical practice includes rotational rounds to the different services in the department (treatment unit, simulation, mould room and specialized techniques like IMRT,Rapidarch, Stereotaxy, TBI, TSI and Brachytherapy. The student will have an opportunity to acquire the practical skills in the different radiotherapy techniques, 2D simulation, 3D simulation, mould room and high technology radiation therapy. Identify accessory and immobilising devices and use them correctly and safely. Position the patient anatomically correct for the appropriate procedure using the correct immobilizing devices when required. Assist in carrying out radiotherapy procedures, including the use of the computer system under supervision of a qualified Radiation Therapist. Identify, locate and safely use equipment for emergency procedures e.g. Oxygen cylinder. Apply current legislation to ensure safety of patients, self and colleagues. Compare and contrast photon isodose curves for clinically relevant photon beams. Construct composite isodose curves for different isocentric beam arrangements. Identify vital structures that must be considered during treatment planning. Construct patient contours and input the external contour, critical structures and other internal structures into the treatment planning computer. Generate photon treatment plans using patient-related and beam data. Determine Gross Target Volume (GTV); Clinical Target Volume (CTV) and Planning Target Volume (PTV) in appropriate clinical applications. Apply isodose correction methods for tissue in homogeneities to obtain an optimum dose distribution. Participate actively as a team leader in carrying out radiotherapy procedures, ensuring safety of patient, self and colleagues and providing appropriate aftercare. Interpret and evaluate radiographs, calculate and make necessary changes, label and code radiographs correctly. Write up treatment sheets correctly, input treatment data correctly onto the computer system and verify patient treatment data already on the system from other departmental sections. Check patient treatment data and documents and accessories prior to commencement of treatment / whenever required. Use the console correctly and safely. Carry out portal imaging, evaluate label and code radiographs. Use the appointment system on the treatment unit for new patients, patients already on treatment and for any subsidiary procedures, like blood tests. Carry out treatment calculations using both manual and computer methods in external photon beam treatment for single field, two parallel opposed fields (fixed FSD and isocentric) and multiple fields (isocentric). Calculate for a wedge, wedge angle, hinge angle, wedge transmission and wedge profile. Calculate absorbed dose to points of interest for varying compensation Interpret dose histograms Calculate the ‘rule of thumb’ percentage depth dose for 10%, 50% and, 90% lines for various electron energies. Perform manual and computer-assisted electron beam calculations at non-standard distances. Prepare treatment plans with single electron beam (with / without a compensator), multiple adjacent beams and mixed beams and analyze the distribution.	