

SPECIALTY: MEDICAL IMAGING TECHNOLOGY (MIT)

PAPER: CASE STUDY

Credit Value: 14

Objective/s of the paper: to assess students' knowledge on case study
Nature of the Exam: written Format of the Exam:

Exam Paper	Option	Different sections of the paper	Duration per section	Mark allocated	Percentage
CASE STUDY	MIT	- Radio anatomy - Image positioning techniques	1h15min	25	25
		- Electronics, ECG, EEG - Nuclear medicine and radiochemistry	1h15min	25	25
		- Physics of ultrasound, MRI, Nuclear medicine - Pharmacology of radiology and contrast media	1h15min	25	25
		- Radiation protection and biological effects of ionizing radiation - Quality control in conventional radiology, environmental management systems and patient protection	1h15min	25	25
			5hrs		
TOTAL MARK				100	100

Contents of the different sections of the paper:

- Radiology Anatomy: 4 appropriations (60 hours); L, T, P, SPW

The course of Radiological anatomy is based on the basic course of human Anatomy Physiology. For each structure described in the basic course, supplements of anatomy description useful for understanding the radiological image, to the positioning of the patient or to the execution of specific maneuvers are made. Throughout these presentations, a particular effort is devoted to the understanding of the spatial configuration of the organs and structures described. Few marks of anatomy palpatoire are explained, so as to allow the correct positioning of the patient during the radiological examinations. These marks are shown concretely through exercise sessions of anatomy palpatoire, during which the students practice the a on the other the identification of structures accessible to the palpitation. For each body and structure, the image obtained in conventional radiology according to the implications of the most traditional is described. Each time there is a place, the images recorded by means of other techniques (ultrasound, angiography, NMR, scintigraphy,...) are also explained. The iconographic documents are viewed, so static or dynamic sequences depending on the case, in the course of practical exercises conducted on computer screen. After examination by the students themselves, clichés and sequences are projected on the big screen and are discussed under the direction of professor.

MIT232 : Radiation- Protection and biological effects of ionizing radiation, Computer science applied to the imaging I

- Radiation and biological effects of ionizing radiation: 2 credits (30 hours); L, T, P, SPW

1. Introduction to the dangers of ionizing radiation and to the protection against ionizing radiation
 2. The quantities and units used in radiation protection
 3. The Radio external exposure
 4. The radio internal exposure
 5. The detection of ionizing radiation
2. The Biological Effects of Ionizing Radiation
 3. The inventory of human exposures
 1. The legislation

Electronic : 4 appropriations (60 hours); L, T, P, SPW

Electronic : 4 appropriations (60 hours); L, T, P, SPW

First part: General electronics

1. The signals and forms of waves encountered in electronics

2. The filters
3. The oscilloscope
4. The semi-conductors
5. The Diodes
6. The transistors
7. Integrated circuits
8. The operational amplifiers 9. Digital techniques

First part: applied to the imaging

1. The sensors in medical imaging,
2. The treatment of the analog signal
3. Digital Signal Processing
4. Two-dimensional signals
5. Application

Techniques of positioning and training of images I: 6 credits (90 hours); L, T, P, SPW

- Ultrasound and Doppler, gyneco (IM2TECDOGY)
- Emergencies, chest, ends (IM2 TUrThEx)
- Abdomen, Uro-Hepato, Gastro, cardio, Brain - Neck (IM2TAUHGCC)
- 1. Ultrasound imaging and Doppler
- 2. Theoretical bases on the acquisition of information and the training of the image accompanied by illustrations
- 3. Emergency action to be taken by the technologist in Imaging respond to emergencies: Supported adapted to the patient, realization of the balance sheet imaging with speed and efficiency, monitoring of vital signs, choice of supervisor, limits of its actions on the ground and commitment of its responsibility
- 4. UroHepato strategies of exams Rx us - CT and MR in the urologic pathology and hepatic, illustrated by the most common illnesses in these areas gastrotechniques, products of contrast and drugs used for the achievement of the conventional radiology of hypo pharynx, esophagus, stomach, duodenum, of the small intestine, and Colon
- 5. Application of basic pathologies
- 6. Gyneco HysteroSalpingographie, radiological examination consisting of the opacification of the genital tract women (uterus and fallopian tubes) - Breast Health or breast imaging:
- 7. Achievement of a standard review of mammography. After a few words on the breast cancer, its factors and risk, its clinical presentation, a description of the clinical examination, reminder of the indications of the mammographic examination, the modalities of the achievement of this review are described in insisting on the technical requirements and the quality criteria

- 8. Realization of additional shots made in mammography with description of the technical realization of these different incidence (snapshot rolled, profile, expansion, compressive centered, etc.)
- 9. The interest of the other reviews senologiques (ultrasound, scanner and Magnetic Resonance Imaging)
- 10. Adaptation of the examination to some special clinical circumstances, requiring dose modifications, the realization of clichés individuels (within inflammatory, follow-up after treatment of breast cancer, followed after establishment of prostheses, exploration in humans)
- 11. In Interventional breast health with a description of the different modalities,

MIT231: Radio pharmacology and product of contrast, nuclear medicine and Radiochemistry

information on the equipment, the technical realization under ultrasound control or mammography and the technical realization under ultrasound control or mammography and the indications (cytoponction to the fine needle, gaseous kystographie, micro-biopsy, macro-biopsy, cutaneous Levy, scrapping and punch biopsy, tracking galactographie pre-surgical, x-ray and ultrasound of exhibit operative)

- 12. Technical chest of the x-ray and thoracic standard. Indications for the achievement of the standard radiography of the thorax. Notions of chest pathology

MIT361: Angiography and Interventional Radio and Endoscopy

□ Angiography and Interventional Radio: 5 credits (75 hours); L, T, SPW

1. Introduction radiological anatomy (Reminders), vascular pathology
2. Vascular Radiology
3. Vascular interventional radiology
4. Cardiology
5. Electrophysiology and manipulations
6. Interventional Neuroradiology
7. Interventional radiology non vascular
8. General Conclusions

9. Prospects for the future and critical analysis and invasive imaging noninvasive, progress in non-invasive imaging of the Heart Future of interventional radiology

☐ Pharmacology radio and product of contrast: 2 credits (30 hours); L, T, P, SPW

1. Basic Concepts of Pharmacology; 2. Pharmacology;
3. Pharmacokinetics and toxicology;
4. Products of X-ray contrast, US, NMR;
5. Pharmacy radio: Radioactive kinetic, interactions matter and living, radiobiology, radio toxicology, radiochemistry, radio pharmacy and special general including insurance and quality control.

Nuclear Medicine and Radiochemistry : 3 credits (45 hours); L, T, P, SPW 1st part:

Apparatus in Nuclear Medicine

2nd part: The tracers in Nuclear Medicine

3rd part: Musculoskeletal System

4. The tracers
5. Digestive System
6. Anatomy cardio-vascular
7. Respiratory System
8. Central Nervous System

MIT244: Quality control in conventional radiology (ISO 9001)
Environmental management system (ISO 14001) and the patient protection

☐ Quality Control: 4 appropriations (60 hours); L, T, P, SPW

1. Quality control to the patients:
 - ☐ H. Michel
 - ☐ Introduction to a quality approach;
 - ☐ What is the quality;
 - ☐ TQM/quality assurance;
 - ☐ Home and patient satisfaction;
 - ☐ Inquiry;
 - ☐ Standards of home;
 - ☐ Introduction to Quality Control: (quality of the treatment and safety of the patient)(ISO 9001), ☐ In radiotherapy; ☐ In radiology.
2. Quality control In radiotherapy
 - ☐ S. Vynckier;
 - ☐ Importance;
 - ☐ Recommendations;
 - ☐ Quality control of devices of treatment;
 - ☐ Quality controls; Mechanical

- ☐ Controls of dosimetric qualities;
- ☐ Quality control systems for the planning;
- ☐ Quality control of scanners for use in radiotherapy; - dosimetry in vivo.
- 3. Quality control radiology
 - ☐ J. Causing;
 - ☐ Evaluation of doses to the patient;
 - ☐ Medical exposures;
 - ☐ The quantities used in patient dosimetry;
 - ☐ Measurement and Calculation of patient doses;
 - ☐ Ct scan;
 - ☐ Barium enema;
 - ☐ Interventional chest;
 - ☐ Optimization of the dose to the patient;
 - ☐ Reference level;
 - ☐ Factors of optimization;
 - ☐ Optimization of the dose and the quality of the image; ☐ Quality control.
- 4. The quality assurance
- 5. Legal aspect of quality control
- 6. Quality control in mammography
- 7. Criteria of Quality of image,
- 8. Criteria for acceptability of facilities
- 9. Environmental management system (ISO 14001)
- 10. The patient protection

MIT115: Physical radiation of magnetic resonance of the Ultrasound and nuclear physics, General anatomy and physiology

- ☐ Physical radiation of magnetic resonance of the Ultrasound and nuclear physics: 3 credits (45 hours); L, T, P, SPW
 1. Introduction on the ionizing radiation
 2. The X-RAYS
 3. The radiation ionizations in Nuclear Medicine
 4. Interactions of ionizing radiation with matter
 5. Ultrasound
 6. Nuclear magnetic resonance or Magnetic Resonance Imaging (MRI)
- ☐ Anatomy and Physiology general: 2 credits (30 hours); L, T, P, SPW
 1. Osteology and arthrology
 2. Neuro-anatomy and neurophysiology
 3. Myology
 4. Heart and blood vessels

5. Blood
6. Respiratory System
7. Digestive System
8. Immune System
9. Endocrine glands
10. Urinary system
11. The genital system (male and female)
12. Pregnancy
13. Growth
14. Senescence

MIT244: Quality control in conventional radiology (ISO 9001)

Environmental management system (ISO 14001) and the patient protection

☐ Quality Control: 4 appropriations (60 hours); L, T, P, SPW

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 - ☐ What is the quality;
 - ☐ TQM/quality assurance;
 - ☐ Home and patient satisfaction;
 - ☐ Inquiry;
 - ☐ Standards of home;
 - ☐ Introduction to Quality Control: (quality of the treatment and safety of the patient)(ISO 9001), ☐ In radiotherapy; ☐ In radiology.
2. Quality control In radiotherapy
 - ☐ S. Vynckier;
 - ☐ Importance;
 - ☐ Recommendations;
 - ☐ Quality control of devices of treatment;
 - ☐ Quality controls; Mechanical
 - ☐ Controls of dosimetric qualities;
 - ☐ Quality control systems for the planning;
 - ☐ Quality control of scanners for use in radiotherapy; - dosimetry in vivo.
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PAPER: PHYSICS AND TECHNIQUES OF MEDICAL IMAGING

Credit Value: 5

Objective/s of the paper: TO ACCESS THE STUDENT'S KNOWLEDGE ON THE UNDERSTANDING ON PHYSICS AND TECHNIQUES OF MEDICAL IMAGING

Nature of the Exam: WRITTEN

Format of the Exam:

Exam Paper	Option	Different sections of the paper	Duration per section	Mark allocated	Percentage
PHYSICS AND TECHNIQUES OF MEDICAL IMAGING	MIT	Physics of ultrasound, MRI, Radiation nuclear medicine	1h30	50	50
		- Positioning and imaging technique - Angiography, interventional radio and endoscopy	45	25	25
		- Nuclear medicine and radiochemistry - Pharmacology of radiology and contrast media	45	25	25
3hrs					
TOTAL MARK				100	100

□ General physics: 2 credits (30 hours); L, T, P, SPW

First part: Mechanical

1. Introduction
2. Static: body at rest
3. Kinematics: movement of a hardware point
4. Dynamic: relationship between movement and cause of the Movement
5. Work and energy

Second part: Electromagnetics

1. Electrostatic
2. Electrical Circuits in continuous current
3. Magnetism
4. Electrical Circuits in alternating currents

Waves

Third Part:

1. Definition
2. Spread of the wave
3. The properties of the waves

Fourth part: geometrical optics

1. Introduction
2. Reflection

MIT231: Radio pharmacology and product of contrast, nuclear medicine and Radiochemistry

3. Refraction
4. Optical Instruments

MIT115: Physical radiation of magnetic resonance of the Ultrasound and nuclear physics

- Physical radiation of magnetic resonance of the Ultrasound and nuclear physics: 3 credits (45 hours); L, T, P, SPW

1. Introduction on the ionizing radiation
2. The X-RAYS
3. The radiation ionizations in Nuclear Medicine
4. Interactions of ionizing radiation with matter
5. Ultrasound
6. Nuclear magnetic resonance or Magnetic Resonance Imaging (MRI)

Techniques of positioning and training of images I: 6 credits (90 hours); L, T, P, SPW

- Ultrasound and Doppler, gyneco (IM2TECDOGY)
- Emergencies, chest, ends (IM2 TUrThEx)
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MIT361:Angiography and Interventional Radio and Endoscopy

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- 12. Vascular interventional radiology
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- 15. Interventional Neuroradiology
- 16. Interventional radiology non vascular
- 17. General Conclusions
- 18. Prospects for the future and critical analysis and invasive imaging noninvasive, progress in non-invasive imaging of the Heart Future of interventional radiology

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- ☐ Nuclear Medicine and Radiochemistry : 3 credits (45 hours); L, T, P, SPW 1st part:
Apparatus in Nuclear Medicine
2nd part: The tracers in Nuclear Medicine
3rd part: Musculoskeletal System
9. The tracers
 10. Digestive System
 11. Anatomy cardio-vascular
 12. Respiratory System
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PAPER: QUALITY CONTROL IN MEDICAL IMAGING

Credit Value: 5

Objective/s of the paper: TO TEST THE STUDENT'S KNOWLEDGE ON THE UNDERTSANDING

ON QUALITY CONTROL IN MEDICAL IMAGING IMAGNG DOSIMETRY

Nature of the Exam: WRITTEN

Format of the Exam:

Exam Paper	Option	Different sections of the paper	Duration per section	Mark allocated	Percentage
QUALITY CONTROL IN MEDICAL IMAGING	MIT	- Quality control in conventional radiology, environmental management systems and patient protection - Recording techniques, processing and printing of images Ergonomics, general description of devices and technology	2hrs15min	75	75
		- Computer science applied to medical imaging -Pediatric imaging dosimetry	45min	25	25
3hrs					
TOTAL MARK				100	100

Contents of the different sections of the paper:

MIT244:Quality control in conventional radiology (ISO 9001)

Environemental management system (ISO 14001) and the patient protection

☐ Quality Control: 4 appropriations (60 hours); L, T, P, SPW

1. Quality control to the patients:

- ☐ H. Michel
- ☐ Introduction to a quality approach;
- ☐ What is the quality;

- ☐ TQM/quality assurance;
 - ☐ Home and patient satisfaction;
 - ☐ Inquiry;
 - ☐ Standards of home;
 - ☐ Introduction to Quality Control: (quality of the treatment and safety of the patient)(ISO 9001), ☐ In radiotherapy; ☐ In radiology.
2. Quality control In radiotherapy
 - ☐ S. Vynckier;
 - ☐ Importance;
 - ☐ Recommendations;
 - ☐ Quality control of devices of treatment;
 - ☐ Quality controls; Mechanical
 - ☐ Controls of dosimetric qualities;
 - ☐ Quality control systems for the planning;
 - ☐ Quality control of scanners for use in radiotherapy; - dosimetry in vivo.
 3. Quality control radiology
 - ☐ J. Causing;
 - ☐ Evaluation of doses to the patient;
 - ☐ Medical exposures;
 - ☐ The quantities used in patient dosimetry;
 - ☐ Measurement and Calculation of patient doses;
 - ☐ Ct scan;
 - ☐ Barium enema;
 - ☐ Interventional chest;
 - ☐ Optimization of the dose to the patient;
 - ☐ Reference level;
 - ☐ Factors of optimization;
 - ☐ Optimization of the dose and the quality of the image; ☐ Quality control.
 4. The quality assurance
 5. Legal aspect of quality control
 6. Quality control in mammography
 7. Criteria of Quality of image,
 8. Criteria for acceptability of facilities
 9. Environmental management system (ISO 14001)
 10. The patient protection

MIT124:Ergonomics, General description of the devices and technology

☐☐ Ergonomics: 3 credits (45 hours); L, T, P,

SPW • First part:

1. The manual taken;
2. The positions of the patient;
3. The maneuvers of handling;
4. Flipping and side to side movement;
5. Enhancement, transfer: "Wheelchair stretcher";
6. The chronology of the maneuvers of handling;
7. The material aid.
 - Second part:

☐ ☐ General description of the devices and technology: 2 credits (30 hours); L, T, P, SPW

1. Part 1: Techniques using ionizing radiation (Rx, gamma radiation).
2. Part 2: Techniques without ionizing radiation (MRI).

MIT234:Recording techniques, processing and printing of images1
(IM2TRTLM1)

Treatment of Image 1: theoretical and practical aspects: 2 credits (30 hours); L, T, P, SPW

1- Photometry

- ☐ Definition of the different quantities photometric: luminous power, light intensity, luminance, illumination and exposure; - difference and links between these sizes; - use of each magnitude.

2- Principle of photography by Radius X

3- The characteristics of the films contrast and gamma, grain and granularity, sharpness and acutance, resolution and curve MTF (Modulation Transfer Function), sensitivity and sensitometric curve

4- Composition of films for RX. Relationship between the composition of the film and its characteristics

5- The different stages of development of the films for RX. The role of different parameters of development: temperature of the baths, duration of development, etc.

6- Sensitometric curve : sailing, characteristics of an emulsion under- or overexposed

7- The intensifying screens

8- The different types of screen-film combination

What torque to choose for what use? (Lung radios, the trunk, extremities, etc.).

The practical part consists of:

- ☐ The use of a software image manipulation (GIMP);
- ☐ The implementation in practice of the concepts studied in the first part.

- Treatment of Image 2: theoretical and practical aspects: 2 credits (30 hours); L, T, P, SPW

1- The models of colors

- The RGB (Red Green Blue);
- CMY (cyan magenta yellow); □ YcbCr; □ HSV.

2- The image formats: BMP

- Description of the model;
- Structure of a file; □ Compression.
- 3- RLE: GIF
- Description of the model;
- Compression Algorithm, and LZW decompression;
- Structure of a GIF file;
- JPEG;
- Principle of the Encoding sampling and model of colors; □ cosinetransform discreet; □ Quantification.
- 4- Coding of Huffman: PNG
- Description of the model;
- Algorithm for compression and decompression LZ77: comparison between the different formats.

NB: Each of the chapters is illustrated by practical exercises and complete by achievement of a work of synthesis on the different formats of images. □ Scanner: 1 credit (30 hours); L, T, P, SPW

1. Principles of bases and sequential scanner
2. Helical scanner mono and multi strips
3. The quality factors of the image
4. Post processing of images

Strategies for the acquisition and use of the products of contrast

Computer science applied to the imaging I: 2 credits (30 hours); L, T, P, SPW

1. General Presentation and history
2. The user (login, password)
3. The file system (tree, path, handling)
4. The protection of files
5. A text editor (vi)
6. The shells of command
7. The redirection
8. The tubes of communication

Computer science applied to the Imaging II: 2 credits (30 hours); L,T, P, SPW

9. Networks and Transmission
10. General introduction to telematics
11. Introduction to communication networks
12. The direct network (leased line)
13. The telephone network
14. The packet-switched network
15. The TCP/IP network
16. The network frame-relay
17. The ATM network
18. Concepts of local network
19. The requirements for the transmission of voice
20. The requirements for the transmission of the image fixed;
21. The requirements for the transmission of the moving image
22. The characteristics of the networks
23. The problem of the isochronism
24. Comparison of the networks and their ability to transmit the image DICOM medical (Digital Imaging and Communication in Medicine) is a standard used in medical imaging
25. PACS (Picture Archiving Communication System) is an integrated system of archiving and communication of medical images
26. Presentation of the Telemis software: software for secure distribution of medical images
27. The medical record
28. The computer through the hospital MIT363: Pediatric Imaging, Dosimetry

☐ Pediatric Imaging: 2 credits 30 hours); L, T, SPW

1. Specific radiation protection and problematic to the pregnant woman
2. Technical and thoracic pathologies and upper airway
3. Techniques and traumatic pathology of the skeleton
4. Technical and digestive diseases
5. Technical and urinary pathologies

☐ Dosimetry: 1 credit (15 hours); L, T, SPW

1. Description of the different detectors. dosimetric Description of the dosimetric protocols
2. Description of the methods of planning a treatment therapeutic radio

PAPER: PRACTICE OF MEDICAL IMAGING

Credit Value: 10

Objectives of the paper: to assess student's practical

knowledge Nature of the Exam: Format of the Exam:

Exam Paper	Option	Different sections of the paper	Duration per section	Mark allocated	Percentage
PRACTICE OF MEDICAL IMAGING	MIT	Conventional Radiography	1hr	20	20
		Ultrasound	1hr	20	20
		MRI	1hr	20	20
		CT scan	1hr	20	20
		Nuclear medicine	1hr	20	20
5hrs					
TOTAL MARK				100	100

Contents of the different sections of the paper:

The reviews relate to different stages of the treatment in radiotherapy:

1. Know the different stages of processing;
2. Perform the quality control and the treatment plan in 2D and 3D ;
3. Illustrate the physical principles and the indices of quality and safety seen during the course.

Discover and know the role of the technologist in ultrasound and ultrasound Doppler:

1. Put into practice the bases of the ultrasound and the physics of ultrasound;
2. Know the equipment used;
3. Type of equipment (ultrasound, vascular ultrasound);
4. Settings (The types);
5. Equipment Annex (consoles of viewing and archiving); - the imaging systems of reproduction (paper, films).
6. Know the techniques of examinations to know:
7. The different examinations performed;
8. The main indications (most common);
9. The different preparations;
10. Information to patients;
11. Learn how to prepare and have the patients for routine examinations;

12. Observe the various parameters, settings and necessary probes to ultrasound Explorations (what frequencies used and why);
13. Recognize on the images obtained the has normalnatomie of pathological anatomy.

MRI internship and MRIAbility: 4 appropriations (60 hours); P, SPW

1. Understand (in collaboration with the TRM or the doctor radiologist) the statement of the request for review;
2. Accommodate the patient and the support, explain the conduct of the review and highlight the against-possible indications to the review (essential);
3. Prepare equipment (antenna, containment,...) and argue the choice;
4. Put a infusion and inject the gadolinium by this infusion, choose the protocol of the review;
5. Install the patient depending on the protocol chosen (ensure respect for his person as well as to its comfort);
6. Practice routine examinations and learn to manage a program of patient;
7. Position the slices on the topogram and perform the necessary changes as a function of the structure sought (number of slices, thickness, dimensions, orientation, pre-saturation) and launch a sequence;
8. Apply all the principles of resonance acquired previously;
9. Recognize the main sequences used (ES/EG/IR/fast imaging);
10. Recognize the weighted images in T1 and T2;
11. Identify the key artifacts encountered (flows, movements ...);
12. Best optimize the parameters of acquisition (acquisition time, matrix, resolution);
13. Choose the correct Windows In contrast of images provided to the radiologist;
14. Recognize on the images obtained, the normal anatomy of the Pathological Anatomy;

PAPER: MEDICAL IMAGING SCIENCE I

Credit Value: 9

Objective/s of the paper: TO EVALUATE THE STUDENT'S KNOWLEDGE AND UNDERSTANDING ON MEDICAL IMAGING SCIENCE I

Nature of the Exam: WRITTEN

Format of the Exam:

Format of the Exam:					
Exam Paper	Option	Different sections of the paper	Duration per section	Mark allocated	Percentage
MEDICAL IMAGING SCIENCE I	Medical Imaging Technology	General anatomy and physiology Radiology anatomy	3hrs	60	60
		-General pathologies - Specific pathologies in pediatrics (ENT)	1hr	20	20
		- Special gynecological and neurological examinations	1hr	20	20
5hrs					
TOTAL MARK				100	100

MIT14: General Anatomy and Physiology , Radiology Anatomy

- ☐ Anatomy and Physiology general: 2 credits (30 hours); L, T, P, SPW

1. Osteology and arthrology
2. Neuro-anatomy and neurophysiology
3. Myology
4. Heart and blood vessels
5. Blood
6. Respiratory System
7. Digestive System
8. Immune System
9. Endocrine glands
10. Urinary system
11. The genital system (male and female)
12. Pregnancy
13. Growth
14. Senescence

- ☐ Radiology Anatomy: 4 appropriations (60 hours); L, T, P, SPW

The course of Radiological anatomy is based on the basic course of human AnatomyPhysiology. For each structure described in the basic course, supplements of anatomy description useful for understanding the radiological image, to the positioning of the patient or to the execution of specific maneuvers are made. Throughout these presentations, a particular effort is devoted to the understanding of the spatial configuration of the organs and structures described. Few marks of anatomy palpatoire are explained, so as to allow the correct positioning of the patient during the radiological examinations. These marks are shown concretely through exercise sessions of anatomy palpatoire, during which the students practice the a on the other the identification of structures accessible to the palpitation. For each body and structure, the image obtained in conventional radiology according to the implications of the most traditional is described. Each time there is a place, the images recorded by means of other techniques (ultrasound, angiography, NMR, scintigraphy,...) are also explained. The iconographic documents are viewed, so static or dynamic sequences depending on the case, in the course of practical exercises conducted on computer screen. After examination by the students themselves, clichés and sequences are projected on the big screen and are discussed under the direction of professor.

MIT353: Special pathologies in Pediatric (ENT)

- ☐ Special pathologies pediatric - ENT: 6 credits (90 hours); L, T, SPW

1. Pediatrics Neonatology

- ☐ Intrauterine life;
- ☐ The adaptation to the extrauterine life;
- ☐ The common ailments of the neonatal period; - Breastfeeding; ☐ The pain in the child.

2. The pathologies of the infant and the child

- ☐ Elements of pediatric gastroenterology;
- ☐ Spitting up and vomiting;
- ☐ Tears of the infant;
- ☐ Abdominal pain acute of the child;
- ☐ Evaluation of the dehydration;
- ☐ Hirschsprung disease;
- ☐ Accidental ingestion of caustic soda;
- ☐ Mérycisme and anorexia;
- ☐ Celiac disease;
- ☐ Cystic Fibrosis; ☐ Intolerance to lactose ;
- ☐ Cow's milk protein allergy.

3. Infectious pathologies in the child ☐ The acute fever in children;

- ☐ The rash illnesses of the child;
- ☐ Meningococcemia;
- ☐ The other contagious diseases of childhood;

- ☐ The recommendations in the area of immunization diagram in the child.
- 4. The respiratory diseases in children
- 5. Sudden death and malaise of the infant
- 6. Nephrourology Pediatric 7. Haematological disorders
- 8. ENT.

MIT354: Special Gynecological and Neurological Pathologies

Special neurological Pathologies: 2 credits (30 hours); L, T, P, SPW

1. Neurology

- ☐ Anatomy elementary neuroradiological;
- ☐ Traumatic pathology, tumor cells, inflammatory and infectious diseases, vascular disease (including malformations) of the brain ;
- ☐ Traumatic pathologies, degenerative, metastatic and of the Bone Spine; ☐ Semiology of basis of the spinal cord.

Special gynecological Pathologies: 2 credits (30 hours); L, T, SPW

1. Gynecology :

- ☐ Summary of the theoretical and practical knowledge;
- ☐ Clinical cases concrete and algorithms of reflection diagnostic and therapeutic treatment.

General pathologies: 2 credits (30 hours); L, T, P, SPW

1. Introduction: The mechanism of the disease, clinical examination, diagnostic value of the tests, Epidemiology
2. The water and electrolytes, acid-base balance
3. The disorders of the renal function

PAPER: MEDICAL IMAGING SCIENCE II

Credit Value: 9

Objective/s of the paper: TO EVALUATE THE STUDENT'S KNOWLEDGE AND UNDERSTANDING ON MEDICAL IMAGING SCIENCE II

Nature of the Exam: WRITTEN

Format of the Exam:

Format of the Exam					
Exam Paper	Option	Different sections of the paper	Duration per section	Mark allocated	Percentage
MEDICAL IMAGING SCIENCE II	MIT	- Image positioning techniques, radio conventional dosimetry and MRI in pediatrics	2hrs	40	40
		- - Radiation protection and biological effects of ionizing radiation - Physics biology	2hrs	40	40
		Electronics ECG – EEG	1hr	20	20
TOTAL MARK				100	100

Contents of the different sections of the paper:

MIT352 : Techniques of image position: Radio-conventional, Dosimetry, MRI – Pediatrics

- MRI - Pediatrics: 2 credits (30 hours); L, T, SPW

Practical modalities of realization of a MRI examination relative contraindications and absolute, preparation of the patient; choice of hardware (antennas, containment,...) Programming sequences and manipulation of the console, reproduction, reconstruction and archiving of images. The Artifacts Arts facts related to the patient artifact related to magnetic field, artifact related to calculation of the image; interpretation of the signal and the contrast in the IRL; List of Entities causing a high signal e, TI List of Entities causing a high signal in T2, list of years causing a low signal in MRI contrast products in MRI. What product to use; presentation of the different reviews in MRI modality and preparation MRI of the brain RM spine MRI; Angio member cardiac MRI MRI abdomen, MRI pediatric; quality of the MRI image; influence of the receiving equipment; influence of geometric parameters influenced the parameters of pulse.

□ Clinical MRI (IM2TECHTRM): 1 credit (15 hours); L, T, SPW
Sequences of pulses and weights, filling the space-k, acquisition parameters and quality imaging, MRI angiography, diffusion imaging and infusion, functional imaging (bold), Spectroscopy.

□ Os and Positioning (IM2TECHRDC): 2 credits (30 hours); L, T, SPW
Technique of correct positioning of the patient for each impact, implementation adequate place of the equipment for the realization of the snapshot (TABLE, TUBE, filters, collimation, chair or stretcher). Approach In free tube and on remotecontrolled table. Handling of the patient for the dynamic tests.Measures of radiation protection for the patient and the technologist.Study of the imagery of reference to identify the criteria for success.

Positioning

This course of practice positioning refers strictly to the theoretical course.

MIT232 : Radiation- Protection and biological effects of ionizing radiation, Computer science applied to the imaging I

□ Radiation and biological effects of ionizing radiation: 2 credits (30 hours); L, T, P, SPW

1. Introduction to the dangers of ionizing radiation and to the protection against ionizing radiation
2. The quantities and units used in radiation protection
3. The Radio external exposure
4. The radio internal exposure
5. The detection of ionizing radiation

15. The Biological Effects of Ionizing Radiation

16. The inventory of human exposures

7. The legislation

Electronic : 4 appropriations (60 hours); L, T, P, SPW

Electronic : 4 appropriations (60 hours); L, T, P, SPW

First part: General electronics

1. The signals and forms of waves encountered in electronics
2. The filters
3. The oscilloscope
4. The semi-conductors

5. The Diodes

6. The transistors

7. Integrated circuits

8. The operational amplifiers 9. Digital techniques

First part: applied to the imaging

1. The sensors in medical imaging,

2. The treatment of the analog signal

3. Digital Signal Processing

4. Two-dimensional signals 5. Application