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**CURRICULUM/ STATUTES & REGULATIONS**

**For**

**1 YEAR CONDENSED COURSE**

**IN**

**MEDICAL IMAGING TECHNOLOGY**



**2009**

**UNIVERSITY OF HEALTH SCIENCES  
LAHORE, PAKISTAN**

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# **One Year Condensed Course in Medical Imaging Technology**

## **Introduction:**

One year Condensed Course in Medical imaging Technology is directed towards medical imaging technologists who would like to improve their qualifications. The subjects included in Condensed Course in Medical Imaging Technology are **Cross sectional Anatomy & Imaging Anatomy, Clinical pharmacology & Advanced Nuclear Medicine, Echocardiography & Cardiac Imaging, Biostatistics & Research Methods**. The integration of these courses will provide the students with comprehensive knowledge to meet the educational needs of students who can be employed as medical imaging technologists in medical research as well as in tertiary care hospitals.

## **Aims:**

In the light of enhancement in the duration of B.Sc. Medical Imaging Technology Course to 4 years since session 2007-08, it was decided in the meeting of Board of Studies in Allied Health Sciences held on 10<sup>th</sup> April, 2009 that 1 year duration additional course for MIT Degree may be developed. On successful completion of the additional course the students may be awarded a degree of B.Sc. (Hons.) in Medical Imaging Technology to facilitate them to compete for M.S and Ph.D scholarships of Higher Education Commission requiring 16 years of education.

## **Admission Requirements:**

Condensed Programme in Medical Imaging Technology is highly competitive. For admission, a candidate must have already cleared:

- All Professional Examinations for B.Sc. Medical Imaging Technology ( 3-years) Programme
- Interview

## **Program of Study:**

Duration of Condensed Course shall be one year and will include classroom lectures, laboratory exercises, rotation in different disciplines of imaging modalities and preparation of a Research Report in the area of interest in consultation with the supervisor. All students must complete the course work and submit their research report within the prescribed time limit of their study period (One year).

The curriculum is designed to allow students to achieve the following objectives:

- To obtain up-to-date knowledge of foundations and recent advances in imaging modality.
- To develop the ability to apply basic knowledge of radiation technology in the field imaging technology.
- To demonstrate competence in research theory and methodology in order to solve imaging problems as economically and expeditiously as possible.
- To acquire concepts of management, quality assurance and administrative skills.

The curriculum is constructed to allow students to work in deficient disciplines of imaging centers and to move to their area of specialization. Keeping in mind the fact that the medical imaging technologist must be able to apply latest concepts and techniques of basic Radiation Science so that the recent advances in this area are also covered.

**Plan of Study:**

All students shall undergo rotation in different disciplines of imaging modalities (two months each) during the one year of their education. A satisfactory report from the concerned supervisor of the students is compulsory. The students will also select a topic of research and prepare a Research report for submission by the end of academic year.

**Curriculum for Condensed Course in Medical Imaging Technology:**

The courses in the following subjects are compulsory for all students during the academic year.

- 1. Cross sectional Anatomy & Imaging Anatomy**
- 2. Clinical Pharmacology & Advanced Nuclear Medicine**
- 3. Echocardiography & Cardiac Imaging**
- 4. Biostatistics & Research Methods**

**Internal Assessment:**

Attendance in both theory as well as in practical work is essential. Students with less than **75% attendance** will not be allowed to take the final examinations. All the students will be examined in their respective disciplines and their performance shall be evaluated in following ways:

1. Punctuality
2. Practical work

3. Participation in interactive sessions
4. Regularly conducted class tests

**Final Examinations:**

At the end of course work and practical rotations each student with satisfactory attendance report shall be allowed to take the final examination. The format of written examinations paper shall be in the form of MCQs (Multiple Choice Questions) and SEQs (Short Essays Questions).

**PROFESSIONAL EXAMINATION AT THE END OF ONE YEAR MEDICAL IMAGING TECHNOLOGY CONDENSED COURSE**

<b><u>Paper</u></b>	<b><u>Subjects</u></b>	<b><u>Allocated Marks</u></b>
<b>Paper-I</b>	<b>Cross Sectional &amp; Imaging Anatomy</b>	
	Theory	45 Marks
	Practical & Oral	45Marks
	Internal assessment	10 Marks
		<b>Total Marks=100</b>
<b>Paper-II</b>	<b>Clinical Pharmacology &amp; Advanced Nuclear Medicine</b>	
	Theory	45 Marks
	Internal Assessment	05 Marks
		<b>Total Marks=50</b>
<b>Paper-III</b>	<b>Echocardiography &amp; Cardiac Imaging</b>	
	Theory	45 Marks
	Practical & Oral	45Marks
	Internal assessment	10 Marks
		<b>Total Marks=100</b>
<b>Paper-IV</b>	<b>Biostatistics &amp; Research Methods</b>	
	Theory	90 Marks
	Research Report	90 Marks
	Internal Assessment	20 Marks
		<b>Total Marks=200</b>

**NOTE:**

- I. The minimum number of marks required to pass Professional Examination for each subject shall be fifty percent (50%) in Theory, fifty percent (50%) in the Oral & Practical examination and fifty percent (50%) in the aggregate at one and the same time.
- II. The continuous internal assessment shall contribute 10% to the total allocated marks for each subject. These marks will be equally distributed to the final Theory and Oral & Practical Examinations scores.

## OUTLINE OF TESTS

**Total marks: 450**

The Professional Examination for Condensed Course in MIT shall be held at the end of academic year and shall consist of the following subjects:

### **Paper-I: Cross Sectional & Imaging Anatomy                      **Total Marks: 100****

The examination in the subject of Cross Sectional & Imaging Anatomy shall consist of one theory paper of two hours duration and of maximum **45 marks**. The syllabus to be covered is mentioned in Appendix "A".

There will be **09 SEQs** from the subject of Cross Sectional & Imaging Anatomy and there will be no choice. Each short essay question will carry **05 marks**.

Oral & Practical Examination in the subject of Cross Sectional & Imaging Anatomy will consist of maximum **45 marks**.

### **Paper II: Clinical Pharmacology & Advanced Nuclear Medicine **Total Marks: 50****

The examination in the subject shall consist of one theory paper of two hours duration and of maximum **45 marks**. The syllabus to be covered is mentioned in Appendix "A".

There will be **05 SEQs** from the subject and there will be no choice. Each short essay question will carry **05 marks**.

There will be **20 MCQs** and each question will carry **01 mark**.

### **Paper-III: Echocardiography & Cardiac Imaging                      **Total Marks: 100****

The examination in the subject of Echocardiography & Cardiac imaging shall consist of one theory paper of two hours duration and of maximum **45 marks**. The syllabus to be covered is mentioned in Appendix "A".

There will be **05 SEQs** from the subject of Echocardiography & Cardiac imaging and there will be no choice. Each short essay question will carry **05 marks**.

There will be **20 MCQs** and each question will carry **01 mark**.

Oral & Practical Examination in the subject of Echocardiography & Cardiac Imaging will consist of maximum **45 marks**.

### **Paper-IV: Biostatistics & Research Methods                      **Total Marks: 200****

The written examination in the subject of Biostatistics and Research Methods shall consist of one theory paper of three hours duration and of maximum **90 marks**.

Internal assessment shall be of **10 Marks**. The syllabus to be covered is mentioned in Appendix "A".

There will be **09 SEQs** from the subject of Biostatistics & Research Methods and there will be no choice. Each short essay question will carry **05 marks**.

There will be **45 MCQs** and each question will carry **01 mark**.

Oral & Practical Examination in the subject shall be in the form of a Research Report of maximum 100 Marks. The research report shall be submitted to the UHS by the end of academic year for the evaluation and examination. Research report shall be sent to the external examiner by the UHS and on approval of the examiner the student shall defend his/her research report.

## **STATUTES & REGULATIONS FOR MEDICAL IMAGING TECHNOLOGY CONDENSED COURSE**

### **STATUTES:**

1. The Syllabi and Courses of each subject are given in Appendix "A".
2. The Outline of Tests and the Syllabi and Courses of Studies can be modified from time to time by the Academic Council with the approval of the Syndicate and the Regulations by Board of Governors.
3. The duration of the course shall be of one year.
4. The admission to Medical Imaging Technology Condensed Course shall be carried out in the prescribed manner.
5. There shall be four subjects i.e., **Cross Sectional & Imaging Anatomy, Clinical pharmacology & Advanced Nuclear Medicine, Echocardiography & Cardiac Imaging, Biostatistics & Research Methods** during the academic year. Examination of these subjects will be held at the end of the academic year.
6. The research work and writing of research report in area of specialization will be completed during the academic year. The research report examination shall be conducted at the end of academic year.
7. The candidate shall be eligible to appear in the examination if he/she has registered himself/herself as a student of Condensed Course in Medical Imaging Technology in accordance with the admission regulations and fulfills the requirements of attendance and course work.
8. The degree of B.Sc. Medical Imaging Technology (Hons.) shall be conferred on a person who holds B.Sc. Medical Imaging Technology (3-years duration) degree and has passed Medical Imaging Technology Condensed Course Examination.
9. The Oral & Practical Examination shall be conducted by one external examiner and one internal examiner.
10. The research report shall be evaluated by an external examiner appointed by UHS.

### **REGULATIONS:**

#### **1. GENERAL REGULATIONS**

- (i) Academic requirements for Condensed Course in Medical Imaging Technology shall comprise course work, Clinical rotation and a research report carried out during one year.
- (ii) Each student shall follow the Syllabi and Courses of Studies as may be prescribed by the Board of Studies Allied Health Sciences from time to time with the approval of the Syndicate.
- (iii) The courses and research report shall be completed by the end of the academic year.
- (iv) Students shall be required to pay tuition fee and such other dues as may be determined by the Institution.
- (v) The candidate shall be awarded the degree of B.Sc. (Hons.) Medical Imaging Technology after successful completion of all subjects of studies, qualifying all examinations and fulfilling all other requirements of the degree (clinical rotation & research report).



## **2. REGULATIONS FOR ADMISSION**

- (i) Admission process will be organized and completed by the Affiliated Institution.
- (ii) There shall be an Admission Committee to supervise admissions.
- (iii) Admissions shall be made strictly on the basis of merit. However the Institution may prefer its own B.Sc. Medical Imaging Technology (3-Years) degree holders and candidates with practical experience.
- (iv) To be eligible for admission to Condensed Course in Medical Imaging Technology, a candidate shall be required to possess a B.Sc. Medical Imaging Technology (3- years Course) degree from a HEC recognized University.
- (v) For admission, a candidate must have already cleared:
  - All Professional Examinations for B.Sc. Medical Imaging Technology ( 3-years) Programme
  - Interview

A detailed CV along with 2 letters of references must be submitted with the application form.

- (vi) The Principal/Head of the Institution shall finally approve the admissions in the light of recommendations made by the Admission Committee.
- (vii) The number of students each year for admission shall be decided by the Admission Committee headed by the Principal/Head of the institution.
- (viii) Each candidate shall submit application for admission in response to advertisement, on a prescribed form along with documents specified in the admission form.
- (ix) A candidate who is in Government service will apply through proper channel.
- (x) Students dropped or struck off the rolls of the Institution due to shortage of lectures or poor performance or non appearance in examination or non-payment of dues or on disciplinary grounds etc. shall not be granted re-admission.
- (xi) Any student, who was rusticated, expelled or whose entry in the Institution was banned for any reason whatsoever, shall not be re-admitted.
- (xii) The following shall not be eligible for admission:
  - a. Anyone who has been rusticated or expelled by the Institution for misconduct or use of unfair means in the examinations or any offence involving moral turpitude.
  - b. Any one who was earlier admitted to Condensed Course in Medical Imaging Technology but was later declared to have ceased to be a student of the Institution under the prescribed regulations.
- (xiii) All admissions made in contravention of these Regulations shall be void.

## **3. REGULATIONS FOR STUDIES AND EXAMINATIONS**

- (i) The students of Condensed Course in Medical Imaging Technology shall be assessed monthly for their performance in academic

- activities, punctuality and discipline. Monthly report of each student shall be submitted to the Principal/Head of the Institution by the programme coordinator.
- (ii) Any student who fails to achieve satisfactory assessment report will be given warning and his/her case will be referred to Admission Committee for further necessary action.
  - (iii) Examination of Condensed Course in Medical Imaging Technology shall be held twice a year (Annual & Supplementary) on a prescribed schedule.
  - (iv) The date sheet to hold the examination shall be notified by the Controller of Examinations in consultation with the Allied Health Sciences Institutions conducting the course.
  - (v) A student shall be allowed to appear in the examination, provided he/she has been registered by the University during the session and has attended at least 75% of the lectures/clinical rotations and completed the course work to the satisfaction of the institution.
  - (vi) Written Examinations for Condensed Course in Medical Imaging Technology shall be based on MCQs & SEQs pattern. The MCQs paper will have the format of single best answer.
  - (vii) The minimum number of marks required to pass Professional Examination for each subject shall be fifty percent (50%) in Theory, fifty percent (50%) in the Oral & Practical examination and fifty percent (50%) in the aggregate at one and the same time.
  - (viii) The continuous internal assessment shall contribute 10% to the total allocated marks for each subject. These marks will be equally distributed to the final Theory and Oral & Practical Examinations scores.
  - (ix) The candidate shall have to pass the Professional Examination for the Condensed Course in Medical Imaging Technology in a maximum of four consecutive attempts, availed or un-availed, after becoming eligible for the first examination.
  - (x) A candidate who fails to clear the Professional Examination for Condensed Course in Medical Imaging Technology even after availing **four** chances shall cease to be a student of the University and shall not be eligible for another attempt.
  - (xi) Candidates who secure eighty percent (80%) or above marks in any subject shall be declared to have passed "with distinction" in that subject and no candidate who does not pass in all the subjects of the Professional Examination as a whole at one and the same time shall be declared to have passed "with distinction" in any subject.
  - (xii) A student obtaining first position in the final shall be awarded a '**Certificate of Merit**' by the UHS provided that he/she obtains a total of at least 75% marks and has passed all the examinations in first attempt and has completed the entire requirements for Condensed Course in Medical Imaging Technology within one year.

#### **4. REGULATIONS FOR THE APPOINTMENT OF EXAMINERS IN THEORY**

- (i) The Institution shall recommend internal examiner, paper setters and paper assessors in the concerned subject and forward it to the Controller of Examinations UHS for approval.

- (ii) The Controller of Examinations shall have the final authority to appoint an internal examiner, paper setter, paper assessor and external examiners in theory as well as Practical & Oral examination.
- (iii) The external examiner shall be an allied health teacher in any University/Hospital within Pakistan or a college affiliated with the University or any other recognized academic institution.
- (iv) No person shall be appointed as examiner who has near relation i.e., father, mother, full and half brother and sister, paternal and maternal uncle, father-in-law, mother-in-law, brother-in-law, sister-in-law, son-in-law, daughter-in-law, wife, son, daughter or husband appearing in the paper to be set or examined by him/her.
- (v) The award list of the practical examination shall be submitted to the Controller of Examinations by both internal and external examiners independently.
- (vi) The Controller of Examinations shall compile and declare the results on the basis of evaluation record in theory and practical examinations submitted by the examiners strictly in accordance with the regulations.

## **5. RESEARCH WORK & APPOINTMENT OF SUPERVISOR**

- (i) A student shall select a topic of research report which will be finally recommended by the supervisor.
- (ii) Each student shall perform research work under the supervisor appointed for the purpose by the Principal/Head of the Institution.
- (iii) The research supervisor must hold a degree which shall not be less than B.Sc. (Hons.) Medical Imaging Technology / M.Sc. in the relevant subject with sufficient experience.
- (iv) The student is required to submit the research report of **10-15 pages**.
- (v) A copy of the research report shall be kept by the library of the Institution.
- (vi) The research report shall be submitted to the UHS at the end of academic year for the evaluation and examination. Research report shall be sent to the external examiner by the UHS and the student shall defend his/her research report in Oral & Practical examination.

## **6. STUDENTS DISCIPLINE**

- (i) The progress report of each student shall be prepared that will contain academic progress, attendance and behavior. Progress report will be submitted to the Principal/Head of the Institution.
- (ii) All the students shall abide by the Rules, Regulations and Statutes of the Institution and follow all directives issued from time to time.
- (iii) No students shall, through document or by any communication, approach the press in his/her own name or through an association.
- (iv) No student shall take part in political activities or form union, association or any other
- (v) Violation of these rules shall entail rustication/expulsion under the provisions of the Institution.

**7. FEES & OTHER DUES**

Each student shall be required to pay registration and tuition fees, examination fee and such other charges as may be prescribed by the Institution and the University from time to time.

**SYLLABI & COURSES**

**PAPER I: REGIONAL & IMAGING ANATOMY**

Theory Hours: 50  
 Practical Hours: 100

**Describe the structures of organs & their anatomical positions/relations of the following Contents:**

**THORACIC WALL**

Basic Anatomy Introduction to: Opening of the Thorax Structure of the Thoracic Wall Sternum Costal Cartilages Ribs Intercostal Spaces Intercostal Muscles Intercostal Arteries and Veins Intercostal Nerves Suprapleural Membrane Endothoracic Fascia Diaphragm Internal Thoracic Artery	Internal Thoracic Vein Levatores Costarum Serratus Posterior Superior Muscle Serratus Posterior Inferior Muscle Radiographic Anatomy Surface Anatomy Anterior Chest Wall Ribs Diaphragm Nipple Apex Beat of the Heart Axillary Folds Posterior Chest Wall Lines of Orientation	Trachea Lungs Pleura Heart Thoracic Blood Vessels Mammary Gland
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## THE THORACIC CAVITY

Basic Anatomy	Pericardium	Radiographic Anatomy
Mediastinum	Heart	Posteroanterior Radiograph
Superior Mediastinum	Surfaces of the Heart	Right Oblique Radiograph
Inferior Mediastinum	Borders of the Heart	Left Oblique Radiograph
Pleurae	Chambers of the Heart	Broncography and Contrast
Nerve Supply of the Pleura	Blood Supply of the	Visualization of the
Trachea	Esophagus	Esophagus
Nerve supply of the	Lymph Drainage of the	Coronary Angiography
Trachea	Esophagus	Computed Tomographic
Principal Bronchi	Nerve supply of the	(CT)
Lungs	Esophagus	Scanning of the Thorax
Bronchopulmonary	Thymus	
Segments	Blood Supply	
Blood Supply of the Lungs	Cross-Sectional Anatomy of	
Lymph Drainage and	the Thorax	
Nerve supply of the Lungs		

## ABDOMINAL WALLS

Basic Anatomy	Costal Margin	Gallbladder
Introduction to	Iliac Crest	Spleen
Structure of the	Pubic Tubercle	Pancreas
Abdominal	Symphysis Pubis	Kidneys
Walls	Inguinal Ligament	Stomach
Inguinal Canal & its	Superficial inguinal Ring	Duodenum (First Part)
contents	Scrotum	Cecum
Scrotum, Testis and	Linea Alba	Appendix
Epididymides	Umbilicus	Ascending Colon
Vagina	Rectus Abdominis	Transverse Colon
Peritoneal Lining of the	Linea Semilunaris	Descending Colon
Abdominal Walls	Abdominal Lines and Plans	Urinary Bladder and
Radiographic Anatomy	Vertical Lines	Pregnant Uterus
Surface Anatomy	Trannphyloric Plane	Aorta
Surface Landmarks of	Subcostal Plane	External Iliac Artery
the	Intercristal Plane	
Abdominal Wall	Intertubercular Plane	
Xiphoid Process	Abdominal Quadrants	
	Surface Landmarks of the	
	Abdominal Viscera	
	Liver	

## ABDOMINAL CAVITY

Basic Anatomy( Location, structure, relations, blood supply, nerve supply, lymphatics)	Transverse Colon Descending Colon Differences Between the Small& Large Intestine	Cross-Sectional Anatomy of the Abdomen Radiographic Anatomy Radiographic Appearances of the Abdomen
Liver	Retroperitoneal Space	Radiographic Appearances of
Gallbladder	Ureter	The:
Esophagus	Blood supply of abdominal Organs	Gastrointestinal Tract
Stomach	Portal Vein	Stomach
Small Intestine	Lymphatics on the posterior	Duodenum
Large Intestine	Abdominal Walls	Jejunum and Ileum
Pancreas	Lymph Nodes	Large Intestine
Spleen	Lymph Vessels	Radiographic Appearances of
Kidneys	Nerve on the Posterior	the Urinary Tract
Suprarenal Glands	Abdominal Walls	Kidneys
Peritoneum	Lumbar Plexus	Calyces, Renal Pelvis and
Jejunum and Ileum	Sympathetic Trunk (Abdominal Part)	Ureter
Large Intestine Cecum	Aortic Plexuses	
Ileocecal Valve		
Appendix		
Ascending Colon		



## PELVIC WALL

<b>Basic Anatomy</b>	<b>Plexus</b>	<b>Radiographic Anatomy</b>
The Pelvis		Surface Anatomy
Orientation of the Pelvis	Autonomic Nerves	Surface Landmarks
False Pelvis	Arteries of the Pelvis	Iliac Crest
True Pelvis	Common Iliac Artery	Anterior Superior Iliac Spine
Structure of the Pelvic Walls	External Iliac Artery	Posterior Iliac Spine
Anterior Pelvic Wall	Arteries of the True Pelvis	Pubic Tubercle
Posterior Pelvic Wall	Internal Iliac Artery	Pubic Crest
Lateral Pelvic Wall	Veins of the Pelvis	Symphysis Pubis
Inferior Pelvic Wall or Pelvic Floor	External Iliac Vein	Spinous Processes of Sacrum
Pelvic Diaphragm	Internal Iliac Vein	Sacral Hiatus
Pelvic Fascia	Lymphatics of the Pelvis	Coccyx
Parietal Pelvic Fascia	Nerves of the Pelvis	Viscera
Visceral Layer of Pelvic Fascia	Sacral Plexus	Urinary Bladder
Pelvic Peritoneum	Branches of the Lumbar Plexus	Uterus
Joints of the Pelvis		Rectal and Vaginal Examinations As a Means of palpating the Pelvis Viscera
Sacroiliac Joints		
Symphysis Pubis		
Sacrococcygeal Joint		
Sex Differences of the Pelvis		

## **PELVIC CAVITY**

Basic Anatomy	Urethra.
Cross sectional anatomy of pelvis	Vasdeferens
Radiological Anatomy.	Seminal vesicles.
Radiological appearances of the bony pelvis	Prostate.
Radiographic appearances of the pelvic organs.	Cervix.
Introduction, location, structure, relations, blood supply, nerve supply, lymphatic drainage of:	Ovary.
Rectum	Uterine tubes.
Ureters	Uterus. Vagina.
Urinary bladder	

## HEAD AND NECK

Basic Anatomy Platysma Superficial Veins Superficial Lymph The Triangles of the Neck Main Arteries of the Neck Main Veins of the Neck Main Lymph Nodes of the Neck Main Nerves of the Neck Cervical part of the Viscera of the Neck Thyroid Gland Parathyroid Glands Trachea Esophagus Thoracic Duct The Scalp Muscle of the Scalp Sensory Nerve supply of the Scalp Arterial Supply of the Scalp Venous Drainage of the Scalp	Lymph Drainage of the Scalp The Face Development of the Face Skin of the Face Sensory Nerves of the Face Arterial Supply of the Face Venous Drainage of the Face Lymph Drainage of the Face Bones of the Face Muscles of the Face Facial Nerves Parotid Glands The Temporal and Infra Temporal Fossae Temporomandibular Joint The Submandibular Salivary Glands The Skull Orbital Region Eyelids The Orbit Muscle of the Orbit	Nerves of the Orbit Blood Vessels and Lymph The Eye The Ear The Mouth The Pharynx The Palate The Nose The Paranasal Sinuses The Larynx Radiographic Anatomy Radiographic Appearance of the Head and Neck Radiographic Appearance of the skull Surface Anatomy Surface Landmarks of the Head Nasion
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## LOWER LIMB

<p>Organization of Lower Lamb</p> <p>The Gluteal Region</p> <p>The Skin of the Buttock</p> <p>Fascia of the Buttock</p> <p>Bones of the Gluteal Region</p> <p>Ligaments of the Gluteal Region</p> <p>Foramina of the Gluteal Regions</p> <p>Nerves of the Lower Limb</p> <p>Nerves of the Gluteal Region</p> <p>Arteries of the Gluteal Region</p> <p>The front and Medical Aspects of the Thigh</p> <p>Skin of the Thigh</p> <p>Superficial Fascia of the Thigh</p> <p>(Fascia Lata)</p> <p>Deep Fascia of the Thigh</p> <p>(Fascia Lata)</p> <p>Fascial Compartments of the Thigh</p> <p>Contents of the Interior</p> <p>Contents of the Medical Fascial</p> <p>Compartment of the Thigh</p> <p>The Back of Thigh</p> <p>Skin</p> <p>Contents of the Posteriors</p> <p>Fascial Compartment of the Thigh</p> <p>Hip Joint</p> <p>Bones of the Leg</p> <p>Bones of the Foot</p> <p>Popliteal Fossa</p> <p>Boundaries</p>	<p>Popliteus Muscle</p> <p>Popliteal Artery</p> <p>Popliteal Vein</p> <p>Arterial Anastomosis</p> <p>Around the Knee Joint</p> <p>Popliteal Lymph Nodes</p> <p>Tibial Nerve</p> <p>Common Peroneal Nerve</p> <p>Posterior Cutaneous Nerve of the Thigh</p> <p>Obturator Nerve</p> <p>Fascial Compartments of the leg</p> <p>The front of the Leg</p> <p>Skin</p> <p>Contents of the Anterior Fascial</p> <p>Compartment of the Leg</p> <p>Contents of the Lateral Fascial Compartment of the Leg</p> <p>The Back of the Leg</p> <p>Skin</p> <p>Ankle Region and Foot</p> <p>Contents of the Posteriors</p> <p>Fascial</p> <p>Compartment of the Leg</p> <p>The Region of the Ankle</p> <p>Anterior Aspect of the Ankle</p> <p>Posterior Aspect of the Ankle</p> <p>The Foot</p> <p>The Sole of The Foot</p> <p>Skin</p> <p>Deep Fascia</p> <p>Muscles of the Sole of the Foot</p> <p>Arteries of the Sole of the Foot</p> <p>Veins of the Sole of the Foot</p> <p>Nerves of the Sole of the Foot</p> <p>The Dorsum of the Foot</p>	<p>Skin</p> <p>Dorsal Venous Arch (or Network)</p> <p>Muscles of the Dorsum of the Foot</p> <p>Artery of the Dorsum of the Foot</p> <p>Nerve Supply of the Dorsum of the Foot</p> <p>Joints of the Lower Limb</p> <p>Knee Joint</p> <p>Proximal Tibiofibular Joint</p> <p>Distal Tibiofibular Joint</p> <p>Ankle Joint</p> <p>Tarsal Joint</p> <p>Tarsometatarsal and Intermetatarsal Joints</p> <p>Metatarsophalangeal and Interphalangeal Joints</p> <p>The Foot as a Functional Unit</p> <p><b>Radiographic Anatomy</b></p> <p>Radiographic Appearances of the Lower Limb</p> <p>Radiographic Appearances of the Hip Region</p> <p>Radiographic Appearances of the Knee Region</p> <p>Radiographic Appearances of the Ankle Region</p> <p>Radiographic Appearances of the Tarsus, Metatarsus, and Phalanges</p> <p><b>Surface Anatomy</b></p> <p>Gluteal Region</p> <p>Inguinal Region</p> <p>Femoral Triangle</p> <p>Adductor Canal</p> <p>Knee Region</p> <p>Tibia</p>
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## **THE BACK**

<p>Basic Anatomy</p> <p>The Vertebral Column</p> <p>Composition of the Vertebral Column</p> <p>General Characteristics of a Vertebra</p> <p>Lumber Vertebra</p> <p>Sacrum</p> <p>Coccyx</p> <p>Important Variations in the Vertebrae</p> <p>    Joints of the Vertebral Column</p> <p>Nerve Supply of Vertebral Joints</p> <p>    Curves of the Vertebral Column</p> <p>Movements of the Vertebral Column</p> <p>Muscles of the Back</p> <p>Superficial Muscles</p> <p>Intermediate Muscles</p> <p>Deep Muscles of the Back (Postvertebral Muscles)</p> <p>    Splenius</p> <p>Deep Fascia of the Back (Thoracolumbar Fascia)</p> <p>Blood Supply of the Back</p> <p>Lymph Drainage of the Back</p> <p>Spinal Cord</p> <p>    Blood Supply of the Spinal Cord</p> <p>Meninges of the Spinal Cord</p> <p>Cerebrospinal Fluid</p>	<p>Radiographic Anatomy</p> <p>Radiographic Appearances of the Vertebral Column</p> <p>Cervical Region</p> <p>Surface Anatomy</p> <p>Midline Structures</p> <p>External Occipital Protuberance</p> <p>Cervical Vertebrae</p> <p>Thoracic and Lumber Vertebrae</p> <p>Sacrum</p> <p>Coccyx</p> <p>Upper Lateral Part of the Thorax</p> <p>Scapula</p> <p>Lower Lateral Part of the Back</p> <p>Iliac Crests</p> <p>Spinal Cord and Subarachnoid Space</p> <p>Symmetry of the Back</p>
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## **PAPER II: CLINICAL PHARMACOLOGY**

Theory Hours: 50

### **The Evolution of Medical Drugs**

- American Pharmacology
- Drug Origins and Sources
- The Food and Drug Administration (FDA)
- British Pharmacopia

### **Introduction to General pharmacology**

- Receptors
- Mechanisms of Drug Action
- Pharmacokinetics
- Pharmacokinetic Process
- Absorption
- Distribution
- Metabolism
- Elimination
- Drug Effect
- Beneficial Responses
- Harmful Responses
- Allergic Responses
- Drug Dependence, Addiction, Abuse and Tolerance
- Drug interactions
- Administration of Pharmacologic Agents
- The Drug Prescription
- Dosage Forms and Routes of Administration
- Oral Routes

- Parenteral Routes
- Topical Routes
- Factors that influence Drug Effects
- Special Considerations in Elderly Patients
- Special Considerations in Pediatric Patients
- Routes of Drug Administration
- Gene Therapy

### **Autonomic Nervous System**

- Introduction to Autonomic Pharmacology
- Cholinergic System
- Anticholinergic Drugs
- Adrenergic System
- Adrenergic drugs (Sympathomimetics)
- Adrenergic Antagonists

### **Cardiovascular System**

- Cardiac Glycosides and Treatment of Cardiac Failure
- Anti-arrhythmic Drugs
- Drugs used in the Treatment of Angina Pectoris
- Antihypertensive drugs
- Pharmacotherapy of Shock
- Plasma Expanders
- Diuretics

### **Autacoids**

- ◆ Histamines
- ◆ Antihistamines
- ◆ 5-Hydroxytryptamine
- ◆ Ergot Alkaloids
- ◆ Eicosanoids

## **Hormones**

- ◆ Hypothalamus and anterior pituitary hormones
- ◆ Thyroid hormones and anti-thyroid drugs
- ◆ Insulin and oral hypoglycemic
- ◆ Corticosteroids
- ◆ Estrogens, progestin and oral contraceptive
- ◆ Agents affecting bone mineral turnover

## **Anesthetics, Analgesics and Narcotics**

- ◆ Anesthesia
- ◆ General anesthesia
- ◆ Preanesthetic Medications
- ◆ Inhalant Anesthetics
- ◆ Malignant Hyperthermia
- ◆ Injectable Anesthetics

## **Muscle Relaxants, Non Narcotic Analgesics**

- ◆ Muscle Relaxants
- ◆ Nonnarcotic analgesics
- ◆ Salicylates
- ◆ Antipyretic Analgesics
- ◆ Mixed Analgesics
- ◆ Nonsteroidal Anti-Inflammatory Drugs
- ◆ ( NSAIDs)
- ◆ Cox-2 Inhibitors

## **Gastrointestinal Drugs**

- ◆ Antacids
- ◆ Histamine Receptor Antagonists
- ◆ Combinations Proton Pump Inhibitors
- ◆ Coating Agents



- ◆ Prostaglandin E Analog
- ◆ Cholinergic Agents
- ◆ Mast Cell Stabilizer

### **Radio pharmacy in Nuclear Medicine**

- ◆ Fundamentals of Nuclear Pharmacy

### **Positron Emission Tomography**

- ◆ Nuclear Medicine Technology and Techniques
- ◆ Quality control tests for gamma camera
- ◆ Routine operational tests for SPECT
- ◆ Dynamic studies with patient
- ◆ Static and SPECT studies

## **Paper III: ECHOCARDIOGRAPHY**

Theory Hours: 50  
Practical Hours: 100

- Physical Principles of Ultrasonography
- Ultrasound transducers
- Ultrasonic beam
- Operational modes
- Ultrasonic instrumentation and operation
- Image perception & Anatomy
- Biological effects

### **Practical Training:**

- Transverse Sections of Retroperitoneum
- Pancreas
- Liver, Gallbladder, Biliary Ducts
- Adrenal Gland, Kidneys, Urinary Bladder, Renal Tract  
Gastrointestinal Tract, Spleen
- New Imaging Techniques
- Artifacts
- C.M.P (Clinical management practice)
- Clinical internship of ultrasound

## **Paper IV: BIOSTATISTICS AND RESEARCH METHODS**

Theory Hours:	100
Practical Hours:	200

### **CONTENTS OF THE COURSE**

1. **Introduction of Statistics:** Statistical data condensation of data, presentation of data by graphs, health related data, rates and their relative importance, presentation of quantitative data.
2. **Sampling:** The concept of sampling, types and methods of drawing ideal sample, sampling distribution of sample mean, error of sampling, standard error, chi square, T-test and their uses in health.
3. **Central Tendency:** Concepts of central tendency, mean, median and mode and their value in health, percentiles, measure of dispersion, coefficient of variation and skewness, normal distribution, range, standard deviation and relative deviation.
4. **Hypothesis:** Concepts of hypothesis testing, null & alternative hypothesis, two types of errors, acceptance & rejection regions, two sided & one sided tests, general steps in hypothesis testing, test about means, confidence interval for mean, meaning of significance in statistical procedures and methods of inferential statistics.
5. **Regression & Correlation:** Scatter diagram, straight line regression model, method of least squares, sample correlation coefficient, inference about regression coefficient and correlation coefficient.
6. **Introduction to Research:** The question of legitimate knowledge, knowledge & decision making, the scientific method, quantitative vs qualitative research, application of scientific method, positivistic vs naturalistic paradigm.
7. **Classification of Research:** Basic vs applied research, evaluation research, research & development (R&D), action research.
8. **Selection & Formulation of a Problem:** From generic to a specific program, program statement, getting an access to primary and secondary resources, note taking and information to management, Review of related literature, questions and/or hypothesis of the study.
9. **Development of a Research Plan:** The ethical, legal and professional obligations, the rationale of the study, the research plan, evaluation of a research plan.
10. **Selection of sample:** sample & population, basic considerations in sampling, random sampling, stratified random sampling cluster sampling, systematic sampling determination of sample size, and elimination of sampling bias.

11. **Instrumentation and Data Collection:** Tests and scales, objectivity and standardization, types of tests and scales, validity and reliability of an instrument, assessment of validity and reliability, development of tests/scale.
12. **Data Analysis & Interpretation:** Preparing data analysis, types of measurement scales, descriptive statistics inferential statistics, using computer for data analysis.
13. **Preparation of a Research Report:** Format & style, citation, references & bibliography writing theses, dissertations & journal articles.

## **PREPARATION OF THE RESEARCH REPORT**

1. Preparation and evaluation of technical comparative statement of specifications of imaging modalities. Student shall select a modality Item among the Medical Imaging modalities and prepare a comparative statement of the same modality manufactured by various manufacturers.
2. Comparison of two different modalities for any specific investigation. Student shall select a topic under the guidance their teacher to compare the investigation of two different modalities for the same human body system.

Example:

Renal function test of nuclear medicine and IVP.

Renal function test verses ultrasound.

Angiocardiology verses nuclear medicine cardiac investigation.

3. Student will prepare a comprehensive report on medical imaging investigation of any human body system.

## RECOMMENDED BOOKS AND JOURNALS

- Ultrasound Teaching Manual: The Basics of Performing and Interpreting Ultrasound Scans by Mathias Hofer
- Diagnostic Ultrasound: Principles and Instructions by Frederick W. Kremkau
- Ultrasound By WHO
- Nuclear Medicine Physics: the basics by Ramesh Chandra
- Nuclear Medicine Technology and Techniques by Mosby, Donald R. Bernier, Paul E.Christian
- Grossman's Cardiac Catheterization, Angiography, and Intervention (By Donald S. Rain., & William Grossman)
- Ramesh Chandra. Nuclear Medicine Physics, Lippincott Williams and Wilkins, 2004.
- Donald R. Bernier, Nuclear medicine: technology and techniques. Mosby, @1997.
- Saha, G.B, "Fundamentals of Nuclear Pharmacy", Spring-Verlag, 1992.
- Martin, A. and Harbison, SA, "An Introduction to Radiation Protection," (4th ed.), Chapman and Hill, 1996.
- Knoll G. F., "Radiation Detection & Measurements", 2nd Ed., John Wiley, 1990.
- Kaplan, I. "Nuclear Physics", Narosa Pub, 1998.
- Gay. L.R. (1987) Educational Research: Competencies for Analysis and Applications Columbus: Merrill.
- Walpole, R.E.: Introduction to Statistic, Publishing Co. Inc, New York.
- Spiegel, Murray R.: Theory & Problems of Statistics, Sehawm Publishing Co., New York.
- PARK'S; Text Book of Preventive and Social Medicine