

Post-Graduate Diploma in Medical Ultrasound (PG DMU)

1. Syllabus

A) Basics of medical ultrasound

- a. *Introduction*: Components of an ultrasound unit and their basic function, scanning planes, image orientation and documentation (image printing and report writing)
- b. *Patient safety*: Cross infection and its prevention

B) Ultrasound physics and instrumentation

- a. *Knobology*: Introduction of different buttons, keys and their uses
- b. *Basic ultrasound physics*: Basic mathematics, unit of measurements, Metric system, Decimal system
- c. *Waves*: Definition, classification, characteristics & parameters of sound waves
- d. *Attenuation*: Definition, Attenuation coefficient, power intensity
- e. *Pulse wave*: Pulse echo principle, pulse wave and continuous wave, range equation, parameters for pulse wave ultrasound
- f. *Transducer*: Transducer construction, classification of transducer, multifrequency and broadband transducer, crystal thickness and operating frequency, sequencing and focusing
- g. *System operation*: Realtime imaging, Dynamic range, frame averaging techniques
- h. *Artifacts*: Definition, classification, Resolution artifact, Doppler artifact
- i. *Bioeffects*: Measurement of sound energy, thermal bioeffects, mechanical bioeffects
- j. *Contrast harmonics*: Definition, harmonic imaging, tissue harmonics, contrast harmonics, test object
- k. *Quality assurance*
- l. *Doppler principles*

C) Abdominal ultrasound

- a. *Retroperitoneum*: Abdominal aorta and inferior vena cava (IVC)
- b. *Hepatobiliary system*: Normal anatomy, developmental variant and related disease, liver parenchymal disease, solid and cystic lesions, Gallbladder and biliary tract diseases, normal anatomy of spleen and its diseases, normal anatomy of pancreas and its diseases,
- c. *Urinary system*: Normal anatomy, developmental variant of urinary system and related disease, kidney disease, anatomy of adrenal gland and its disease, diseases of urinary bladder and prostate
- i. *Gastrointestinal tract (GIT)*: Anatomy of GIT and sonographic appearance, gut wall pathology, inflammatory bowel disease, Acute abdomen

D) Ultrasound of pelvic organs

- a. *Uterus and ovary*: Normal anatomy and related disease, developmental anomaly
- b. *Uterus*: Abnormal uterine bleeding, fibroid uterus, adenomyosis, post-surgery complications
- c. *Adnexa*: Ovarian pathology, diseases of fallopian tube, pelvic inflammatory disease
- d. *Transvaginal sonography*: Indication, uses, advantages, disadvantages and contraindication

E) Obstetric ultrasound

- a. *First trimester scan*: General aspects, estimation of gestational age from GS, CRL
- b. *Level II obstetric ultrasound*: Fetal anomaly scan
- c. *Second and third trimester scan*: Estimation of gestational age in second and third trimester, assessment of amniotic fluid and placenta, biophysical profile scoring
- d. *Obstetric Doppler study*: Protocol, IUGR

F) Musculoskeletal ultrasound

- a. *Basics of MSK ultrasound*: Definitions and scopes
- b. *Ultrasound of shoulder*: Rotator cuff sonography
- c. *Ultrasound of knee and ankle*

G) Pediatric ultrasound

- a. *Neonatal brain*: Indication, anatomy of brain, scanning plane, interventricular hemorrhage, periventricular leukomalacia, cerebral edema, meningitis, ventriculitis, holoprosencephaly, Dandy-Walker malformation, Hydrocephalus
- b. *Abdomen*: Infantile hypertrophic pyloric stenosis (IHPS), intussusception, pediatric tumors
- c. *Dislocation of hip joint*

H) Lung ultrasound:

- a. *General aspects*: Patient position and scanning zone, indications, normal sonographic findings, A-line, B-line, dynamic changes in sonography,
- b. *Lung disease*: Pneumothorax, pleural effusion, pneumonia and alveolar interstitial syndrome

I) Small parts ultrasound:

- a. *Scrotum*: Normal anatomy, techniques of scanning, scrotal mass, extra testicular lesion, epididymal lesion, scrotal pain
- b. *Breast*: Normal anatomy, application, sonographic findings of breast, techniques of scanning, disease, cystic disease, solid and complex mass, BIRADS score, reporting techniques
- c. *Thyroid*: Instruments and protocol of scanning, normal anatomy, developmental variants, values, sonographic findings, imaging pitfalls, nodular disease, thyroid carcinoma, TIRADS score, diffuse thyroid disease
- d. *Salivary gland*: Normal anatomy, common diseases
- e. *Penis*: Normal anatomy, sonographic techniques and normal ultrasound findings, indications, erectile dysfunction, Peyronie's disease, penile fracture, priapism, Mondor disease, urethral stricture,

J) Doppler and vascular ultrasound

- a. Carotid system: Indications, risk factors for carotid disease, standard protocols, measurement techniques of IMT, plaque morphology, grading of plaques, PW and criteria of ICA stenosis, vertebral artery and subclavian steal syndrome
- b. Lower limb venous system: Normal anatomy, venous drainage, deep vein thrombosis (DVT), venous insufficiency and varicose vein
- c. Lower limb arterial system: Scanning techniques, basics of color Doppler and hemodynamics, peripheral arterial disease, diagnostic criteria of arterial stenosis
- d. Renal artery: Indications, sonographic techniques of scanning, interpretation of stenosis

K) Professional development

- a. *Hands-on training:* At least 400 hours scanning at an approved a clinical set up under a supervisor, maintaining logbook of scanning record
- b. *Observation:* At least 300 hours observation of scanning techniques and protocols at an approved clinical set up.

2. Eligibility criteria for enrollment: MBBS or equivalent degree

3. Course duration: One year

4. Mode of study: Hybrid mode (online and classroom based)

5. Semester: Two

6. Intake: January and July