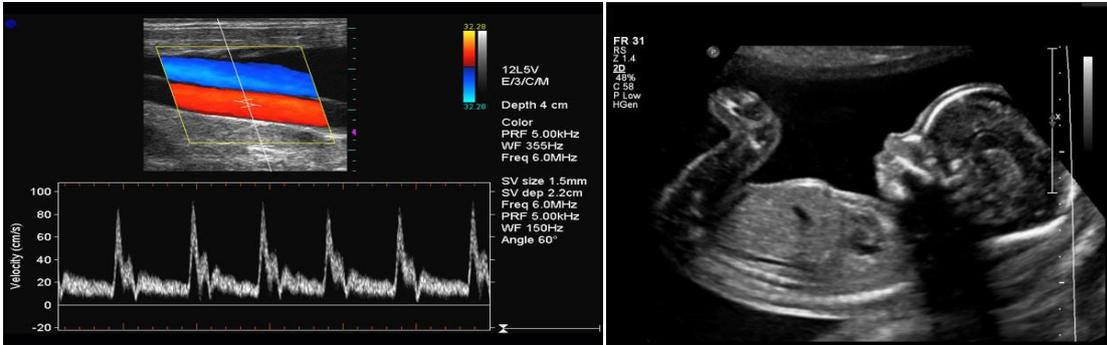
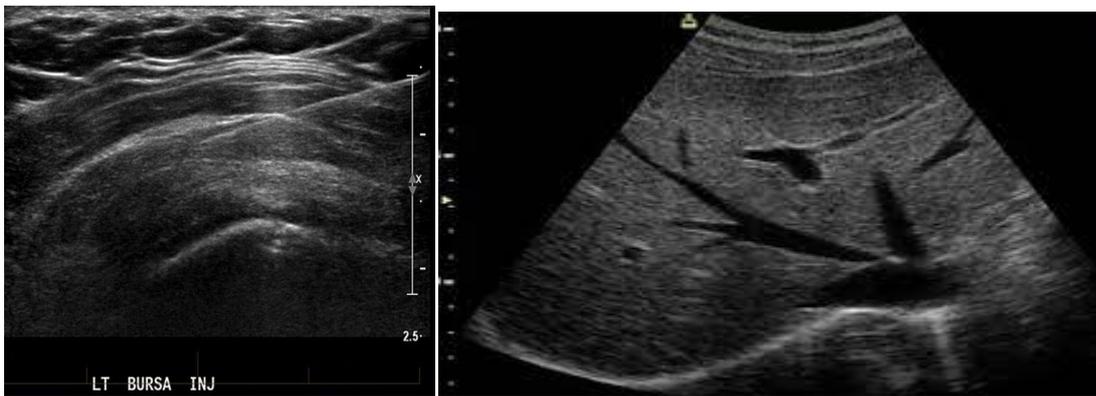


**National University-Sudan**  
**Faculty of Graduate Studies and Scientific Research**  
**Faculty of Radiography and Medical Imaging Sciences**



**M.Sc. Diagnostic Medical Ultrasound**



## **M.Sc. Diagnostic Medical Ultrasound**

### **Introduction**

Diagnostic Medical Ultrasound is an entry-to-practice program. It qualifies specialists in medical sonography (ultrasound sonologists) to provide trusted accurate diagnosis for prevention and treatment of diseases. For this, the program has adopted hands-on practical learning module. The module integrates clinical applications, ultrasound physics, sonographic identifications of: anatomy, physiology, pathology and pathophysiology of human body.

### **General objective**

Qualify critical mass of Ultrasound specialists to work in health care units universities and in research centers.

### **Specific objectives**

The program qualifies the students to:

- Identify the normal and abnormal anatomy patterns in Ultrasound images
- Use Ultrasound instrumentations
- Utilize advanced technologies in Ultrasound
- Apply quality control measures in Ultrasound
- Implement strategies to minimize Ultrasound dose to patients.
- Efficiently teach, learn and communicate with peers and other healthcare colleagues.
- Conduct health and health-related research.

### **Expected learning outcomes**

Upon completion of the program, successful graduates should be able to:

- Provide physician with apt anatomic, pathologic, and/or physiologic reports.
- Record, analyze, and process diagnostic data and other pertinent observations made during the Ultrasound exam.
- Demonstrate appropriate communication skills with patients and colleagues;
- Behave in a professional and ethical manner;
- Apply good health Ultrasound practices.

### **Admission requirements**

- Applicants must satisfy the general regulations set by the faculty of graduate studies and scientific research of National University for registration for master degrees.
  - Eligible candidates are:
    - (a) Holders of B.Sc. Radiology Sciences: Diagnostic Imaging, Nuclear Medicine, Radiotherapy with grade C at least and pass an interview.

(b) Holders of B.Sc. Radiology Sciences in: Diagnostic Imaging, Nuclear Medicine, Radiotherapy with grade C at least with cGPA 2.5, out of 4.0 or 3.5 out of 5.0 and pass an interview

### Study program

#### Semester One

Code	Course	Credit hours	Contact hours	
			Theory	Practical
US-511	Advanced Medical Education	1(1+0)	1	0
US-512	Applied Anatomy	3(2+1)	2	2
US-513	Applied Physiology	2(1+0)	2	0
US-514	Applied Pathology	2(2+0)	2	0
US-515	Ultrasound Physics and Instrumentation	2(2+0)	2	0

#### Semester Two

Code	Course	Credit hours	Contact hours	
			Theory	Practical
US-521	Abdominal Ultrasound	3(3+0)	3	0
US-522	Obstetric Ultrasound	2(2+0)	2	0
US-523	Gynecology Ultrasound	2(2+0)	2	0
US-524	Ultrasound Clinical Practices	4(0+4)	0	12
US-525	Ethics in Medical Imaging	1(1+0)	1	0

#### Semester Three

Code	Course	Credit hours	Contact hours	
			Theory	Practical
US-631	Doppler Ultrasound	3(3+0)	3	0
US-632	Musculoskeletal Ultrasound	2(2+0)	2	0
US-633	Small Parts Ultrasound	2(2+0)	2	0
US-634	Ultrasound Clinical Practices	5(0+5)	0	10
US-635	Research Methods	2(2+0)	2	0

#### Semester Four

Code	Course	Credit hours	Contact hours	
			Theory	Practical
US-641	Ultrasound Clinical Practices	5(0+5)	0	10
US-642	Dissertation	4(0+4)	0	8

## **Courses contents**

### **US-511 Advanced Medical Education**

Health profession education; Adult learning theories; Learning outcomes and skills acquisition; Instructional design (models); Instructional design (micro teaching); Formative Assessment; Communication in multidisciplinary teams; Simulation in multidisciplinary teams; Purposeful assessment; Reflection and feedback; Learning portfolios and Mentorship.

### **US-512 Applied Anatomy**

Cardiovascular system; Lymphatic system; Respiratory system; Digestive system; Urinary system; Peritoneum; Developmental anatomy; Nervous system; General and special senses and autonomic nervous system.

### **US-513 Applied Physiology**

Homeostasis; Body fluid; Cardiac cycle; Cardiac output; Blood; Respiratory; Platelets; Renal physiology; GIT physiology; Endocrine physiology; Male and female genital physiology.

### **US-514 Applied Pathology**

Cell Injury; Apoptosis and necrosis; Adaptation to cell injury; Acute Inflammation; Sequel of acute inflammation; Inflammatory mediators; Intracellular accumulation; Chronic inflammation; Healing and repair; Neoplasia-1; Neoplasia-2; Carcinogenesis; Laboratory diagnosis of cancer o Genetic.

### **US-515 Ultrasound Physics and Instrumentation**

Sound waves; Acoustic variables; Speed of sound; Amplitude; Continuous pulsed wave and duty factor; Wave interference; Attenuation; Sound transmission and echo reflection; Terminology associated with image characteristics; Ultrasound transducers; Sound beams; Pulse echo instruments; Principles of pulse echo imaging; Artifacts; Bio-effects and safety.

### **US-521 Abdominal Ultrasound**

Liver; Gall bladder biliary system; Pancreas; Spleen; Appendix; Aorta; Lymphnodes; Urinary bladder; kidney; prostate.

### **US-522 Obstetric Ultrasound**

Early pregnancy (First, second and third trimester); Gestational age (First: CRL, BPD, EDD, GS, MSD, anomalies, Nuchal translucency, blighted ova, molar pregnancy, trisomy, position of gestational sac, ectopic pregnancy, number of GS, luteal cyst , hematomas, Second trimester (number, BPD, FL, AC, HC, EDD); Placenta position; Grading and anomalies; Liquor measurement and amount (polyhydroaminos and oligohydroaminos); IUGR; AFI macro and micro size of fetus; Fetal position and weight equation; Third trimester measures (FL, AC, HC, AC, BPD); Fetal weight at birth; Placenta localization and type of previa; EDD; Fetal biophysical profile; Doppler.

### **US-523 Gynecology Ultrasound**

GYN preparation (TVS,TAS); Urinary bladder as window; Uterus shape; Uterus anomaly; Fibroid; Ectopic pregnancy; Uterus anatomy physiology; Endometrium; Pouch of Douglas; Ovaries anatomy, and physiology and pathology; Grading of follicle and cycle; Ovarian cyst and mass; IUCD positioning and type; Cervix; Biophysical uterine; Doppler.

### **US-524 Ultrasound Clinical Practices**

Knobology of ultrasound; Positioning of patients for ultrasound; Patient preparation for Ultrasound; Normal sonographic appearance of organs: abdomen, obstetrics and gynecological; Examination protocols of abdomen, obstetrics and gynecological; Evaluation of abnormalities; Writing diagnostic reports.

### **US-525 Ethics in Medical Imaging**

Introduction to Ethics; Medico-legal issues in radiology; Principles of ethics; ARRT standard of ethics; Confidentiality; Informed consent and negligence.

### **US-631 Doppler Ultrasound**

Physics of Doppler; Color Doppler; Power Doppler; Blood flow indices measurement; Signal; Carotid; Abdomen; Venous and artery normal and abnormal; DVT; Pathology vacuolar; Vacuolar anatomy and pathology; Renal doppler; Upper and lower venous and artery; Vistula; Sub-clavian shunt; AV Vistula.

### **US-632 Musculoskeletal Ultrasound**

Musculoskeletal anatomy; Physiology and pathology; Shoulder; Elbow; wrist; Knee; Ankle and Foot; Pediatric hip joint; Nerves and muscle scan normal and abnormalities.

### **US-633 Small Parts Ultrasound**

Breast; Scrotum; Thyroid; Parathyroid; Penis; Eye; Brain of infant and neonate; Doppler.

### **US-634 Ultrasound Clinical Practices**

Knobology of Doppler ultrasound; Positioning patients for ultrasound; Patient preparation for ultrasound; Normal sonographic appearance of organs: vascular, small parts and musculoskeletal; Examination protocols of vascular, small parts and musculoskeletal; Evaluation of abnormalities; Writing diagnostic reports.

### **US-635 Research Methods**

Layout of thesis; definition and importance of research; Characteristics of research; Classification of health research; Identify a research topic: Introduction (problem of the study, objective, significance and overview), Literature review (theoretical background and previous studies); Materials and methods (materials, design, population, sample, method of data collection and analysis, ethical approval); Research proposal, Results, discussion and conclusion; References citation and bibliography; Central tendency and dispersion; Association; Tests of significance; Statistical decision theory.

**US-641 Ultrasound Clinical Practices:** Advanced Doppler and clinical applications of Ultrasound in medicine.

**RAD-642 Dissertation** Scientific writing of dissertations: Preliminaries; Introduction; Literature Review; Materials and Methods; Results; Discussion; References; Appendices.

### **Human resource and facilities**

**Teaching staff:** One professor  
Two associate professors  
Four assistant professors  
One lecturer

### **Facilities**

**Rooms:** One lecture room: 42 seats

**Laboratories:** Radiology Lab: 15 seats

**Hospitals:** Alraqi University Hospital; Primary Health care (PHC); Royal Care International Hospital; Dar Elag Hospital; Alribat Teaching Hospital; Omar Sawie Hospital; Military Hospital; Antalya Medical Centre; Alemtiaz Hospital; Alneeelen Diagnostic Centre

**Libraries:** National University Main Library: 400 seats

E- Library: 250 seats

**Duration of the program:** Four semesters: 52 weeks

**Teaching modules:** Lectures, group discussion, workshops

### **Examination regulations**

- Abide by the examinations rules of the general regulations of the graduate studies of the National University-Sudan
- A student failing any supplementary examination should repeat the course.
- Duration of the dissertation shall be 16 weeks. If need be, an extension of 4 weeks is allowed if approved by the program coordinator.
- Exceeding the aforementioned period the student has to settle a one semester fees to allow her/him an extension of four weeks.
- Expiring the extension periods without completing the dissertation, the student shall be dismissed from the program.
- A student scoring less than 60% in the dissertation oral examination will be allowed only one chance for oral defense. In such case the student should settle 50% of one semester fees.

<b>Assessment:</b>	Continuous assessment	25%
	Mid examination	25%
	Final examination	50%

**Grading system:** A<sup>+</sup> ( $\geq 85$ ) A (80- 84) B<sup>+</sup> (70- 79) B (65-69) C (60-64) F (< 60)

#### **Award of the degree**

The Scientific Council of the National University, based on the recommendation of the board of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate

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