Diagnostic Ultrasound

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Objectives

The diagnostic ultrasound program prepares students for the profession of diagnostic medical sonography. Founded on a concentration in basic sciences, the program affords simultaneous opportunities for receiving a liberal arts education, as well as didactic and practical exposure to a range of ultrasound specialties. This approach leads not only to competence in the practice of sonography, but also to the development of future leaders in the field.

Degree Offered

Bachelor of Science in Diagnostic Ultrasound

Major Offered

Diagnostic Ultrasound

Accreditation

The diagnostic ultrasound program is accredited by the Commission on Accreditation of Allied Health Education Programs, (CAAHEP).

Program Admission

Individuals may apply for the major of diagnostic ultrasound as freshmen or transfer students from other colleges. Transfer applicants and change of major students will be considered according to admission requirements of the College of Science and Engineering and the department of diagnostic ultrasound. Some supplementary materials are required with transfer student applications. Applicants are encouraged to participate in volunteer or paid health care related activities that promote the development of communication and interpersonal skills and provide an opportunity to evaluate their own suitability to work with patients and the public. All majors are required to meet with program faculty prior to progressing to the third year.

Departmental Requirements (Policy 81-3)

Students must earn a grade of C or higher and an average GPA of 2.50 or higher in PHYS 105, 106, MATH 131, BIOL 161/171, 200, 210 and a biology elective. Any biology, diagnostic ultrasound didactic, diagnostic ultrasound internship, ultrasound physics or pathophysiology course in which a grade lower than a C is earned must be repeated. No further ultrasound course may be taken until the student has earned an acceptable grade. Any course may be repeated only once.

The major requirements, as well as pathophysiology, are taken the third and fourth year of the program. Prior to the third year of the program all students will have completed the math and science prerequisites and all but fifteen (15) credits of the core requirements. Advancement to the third year courses also involves review and approval by the department chair and advisors. The final year of the program is 12 months of internship in a health care facility, which is arranged by a clinical coordinator.

Bachelor of Science in Diagnostic Ultrasound

In order to earn the degree of bachelor of science in diagnostic ultrasound degree, students must complete a minimum of 181 quarter credits with a cumulative and major/program grade point average of 2.80, including the following:

I. Core Curriculum Requirements

ENGL 110	**College Writing: Inquiry and Argument**	**5**
PHIL 110	**Introduction to Philosophy and Critical Thinking**	**5**
Choose one of the following two courses:		5
HIST 120	**Origins of Western Civilization**	
HIST 121	**Studies in Modern Civilization**	
ENGL 120	**Introduction to Literature**	**5**
PHIL 220	**Philosophy of the Human Person**	**5**
Social Science I		**5**
Social Science II (different discipline from Social Science I)		**5**
Theology and Religious Studies Phase II (200-299)		**5**
Ethics (upper-division; prefer Health Care Ethics)		**5**
Theology and Religious Studies Phase III (300-399)		**5**
Interdisciplinary satisfied by DIUS 370		
Senior Synthesis satisfied by Ultrasound Internship (DIUS 473,474, 487,488)		

II. Major Requirements

91 credits in diagnostic ultrasound, including:

DIUS 304	**Pathophysiology - Medical Imaging**	**4**
DIUS 330	**Diagnostic Ultrasound I**	**4**
DIUS 331	**Diagnostic Ultrasound II**	**4**
DIUS 332	**Echocardiography**	**4**
DIUS 333	**Methods of Cardiac Evaluation**	**2**
DIUS 334	**Vascular Evaluation and Doppler**	**4**
DIUS 340	**Diagnostic Ultrasound Lab I**	**1**
DIUS 341	**Diagnostic Ultrasound Lab II**	**1**
DIUS 342	**Diagnostic Ultrasound Lab III**	**1**
DIUS 344	**Vascular Evaluation and Doppler Lab**	**1**
DIUS 350	**Ultrasound Physics**	**3**
DIUS 351	**Instrumentation Lab**	**1**
DIUS 355	**Human Cross Section Anatomy**	**5**
DIUS 370	**Research and Professional Issues**	**4**
DIUS 375	**Ultrasound Instrumentation**	**4**
DIUS 380	**Advanced Ultrasound Topics**	**2**
Senior Synthesis: Ultrasound Internship*		
DIUS 471	**Clinical Experience in Ultrasound I**	***10**
DIUS 472	**Clinical Experience in Ultrasound II**	***8**
DIUS 473	**Clinical Experience in Ultrasound III**	***8**
DIUS 474	**Clinical Experience in Ultrasound IV**	***8**
DIUS 487	**Ultrasound Seminar I***	
	(must be taken four times, 2 credits each)	***8**

DIUS 488 **Basic Science of Ultrasound***
(must be taken twice, 2 credits each) ***4**

*A calendar-year internship is necessary for entry into professional employment and certification. This internship is a part of the degree and follows after the academic course requirements are met. Because of the professional nature of the program, qualities in addition to a good grade point average are required of internship candidates.

NOTE: 1. Students must provide physician verification of good health and immunizations prior to ultrasound-specific courses. 2. All courses must be graded C (2.00) or higher.

III. Other Major Department Requirements

BIOL 161/171 **Biology I: Molecular and Cellular Biology and Lab**
(majors level biology, not 100/101) ***5**
BIOL 200 **Anatomy and Physiology I** ***5**
BIOL 210 **Anatomy and Physiology II** ***5**
BIOL **Elective (majors level biology, not 100/101)** ***5**
Elective as determined by Diagnostic Ultrasound **5**
PHYS 105 **Mechanics** ***5**
PHYS 106 **Waves, Sound, Electricity and Magnetism** ***5**

Choose option a, b, or c ..... *5 or 10
a. MATH 131 **Calculus for Life Sciences (preferred) (5)**
b. MATH 130 **Elements of Calculus for Business (5)**
c. MATH 134 **Calculus I (5)**
MATH 135 **Calculus II (5)**

NOTE: 1. MATH 120 and MATH 121 are prerequisites to PHYS 105 and MATH 131. Contact the department regarding preferred course sequence. 2. A grade of C or higher is required.

Diagnostic Ultrasound Courses

DIUS 304 **Pathophysiology—Medical Imaging** **4**
An conceptual approach to alterations in the structure and function that occur in human organ systems as a result of disease processes. The cellular, biological and/or genetic basis for these pathologies will be discussed. Prerequisites: BIOL 200 and 210. (fall)

DIUS 330 **Diagnostic Ultrasound I** **4**
Pathophysiology of obstetrics and pelvic organ systems evaluated by ultrasound and their sonographic appearance. Integration of ultrasound physics, instrumentation, and principles. Prerequisites: DIUS 304, 331, 333, 334, 341, 344 ,350, 375. Co-requisite: DIUS 340. (spring)

DIUS 331 **Diagnostic Ultrasound II** **4**
Pathophysiology of abdominal organ systems evaluated by ultrasound and their sonographic and Doppler appearance. Introduction to hemodynamics of abdominal and vascular systems. Integration of ultrasound physics, instrumentation, and principles. Prerequisites: DIUS 304, 355, 350, 370, 375. Co-requisite: DIUS 341. (winter)

DIUS 332 **Echocardiography** **4**
Anatomy, physiology, and pathology of the adult and pediatric heart. Integration of ultrasound physics, instrumentation, and principles. Prerequisites: DIUS 304, 331, 333, 334, 341, 344, 350, 370, 375. Co-requisite: DIUS 342. (spring)

DIUS 333 Methods of Cardiac Evaluation 2
Integration of various modes of cardiac evaluation with echocardiography. Cardiac catheterization, ECG, auscultation, and cardiac pharmacology are covered in addition to other pertinent topics. The course serves to expand students' knowledge of cardiac physiology and pathophysiology. Open to all qualified majors, and non-majors by instructor permission. Prerequisite: DIUS 350.

DIUS 334 Vascular Evaluation and Doppler..... 4
Introduction to hemodynamics and the application of Doppler ultrasound for the detection and evaluation of vascular anatomy, physiology, and pathology. Additional methods of evaluating vascular disease which complement Doppler data. Integration of ultrasound physics, instrumentation, and principles. Prerequisites: DIUS 304, 350, 355, 370. Co-requisite: DIUS 344. (winter)

DIUS 340 Diagnostic Ultrasound Lab I 1
Hands-on experience in scanning pelvic structures. Simulator experience scanning obstetrical model. Practice in modes of equipment operation and safety. Co-requisite: DIUS 330. (spring)

DIUS 341 Diagnostic Ultrasound Lab II 1
Hands-on experience in scanning abdominal organ systems. Practice in modes of equipment operation and safety. Co-requisite: DIUS 331. (winter)

DIUS 342 Echocardiography Lab 1
Hands-on experience in the evaluation of sonographic appearances of the heart with real-time 2-D imaging, Doppler, and M-mode echocardiography. Practice in modes of equipment operation and safety. Co-requisite: DIUS 332.

DIUS 344 Vascular Evaluation and Doppler Lab..... 1
Hands-on experience in scanning the peripheral vascular system and extracerebral circulation. Hands-on experience with physiologic testing equipment. Practice in modes of equipment operation and safety. Co-requisite: DIUS 334.

DIUS 350 Ultrasound Physics..... 3
An introduction to ultrasound physics. Topics include the physics of pulsed ultrasound, including its production and detection by transducers; characteristics of pulses and sound beams; interaction of ultrasound with tissue, including attenuation, impedance, reflection, refraction, scattering and ranging; hemodynamics; the Doppler effect; introduction to ultrasonic instrumentation. Prerequisites: PHYS 106 or equivalent; MATH 131 or 134; enrollment in the diagnostic ultrasound program or permission of the diagnostic ultrasound department.

DIUS 351 Instrumentation Lab 1
A review of the ultrasound systems and the controls used to change imaging parameters. Students will learn how each control affects the ultrasound image and the reasons for making changes to the image; and will participate in simple scanning experiments to demonstrate image manipulation and the properties of high-frequency sound. Co-requisite: DIUS 350. (fall)

DIUS 355 Human Cross Section Anatomy..... 5
Survey of cross section anatomy with emphasis on organs of body amenable to ultrasound diagnostic techniques. Prerequisites: BIOL 210; PHYS 106.

DIUS 370 Research and Professional Issues 4
Introduction to basic scientific writing, study design and critique, statistical analysis, and formulation and testing of hypotheses. Examination of ethical, legal, and psycho-social aspects of health care. Methods of budgeting, hiring, firing, and departmental administration. The sonographer's role in relation to the patient, physician, and staff. Fulfills interdisciplinary core requirement. Open to all qualified majors, and non-majors by instructor permission.

DIUS 375 Ultrasound Instrumentation 4
Understanding the operation of diagnostic ultrasound equipment, including B-mode, M mode, 2-D/real-time and Doppler systems, quality assurance, and safety. Prerequisite: DIUS 350.

DIUS 380 Advanced Ultrasound Topics 2
This course will include extensive review of ultrasound images and patient exams in a variety of ultrasound specialty areas. Students will organize and present cases and discuss ultrasound findings, correlate lab results with patient exams and determine a differential diagnosis. This course will also include advanced lectures in ultrasound imaging and technologies. Prerequisites: DIUS 304, 331, 333, 334, 350, 355, 370, 375. Co-requisites: 330, 332.

DIUS 391-393 Special Topics ..... 1 to 5

DIUS 396 Directed Study ..... 1 to 5

DIUS 471 Clinical Experience In Ultrasound I 10
40 hours a week spent in an approved ultrasound clinical practice learning patient care, practical medical ethics, observing and performing ultrasound procedures and other diagnostic modalities. Prerequisite: Successful completion of all DIUS didactic courses and compliance with policy (81-3). Co-requisite: DIUS 487.

DIUS 472 Clinical Experience in Ultrasound II 8
40 hours a week in an approved ultrasound clinical practice. Prerequisite: DIUS 471 and compliance with policy (81-3). Co-requisite: DIUS 487.

DIUS 473 Clinical Experience in Ultrasound III 8
40 hours a week in an approved ultrasound clinical practice. Prerequisites: DIUS 471, 472 and compliance with policy (81-3). Co-requisite: DIUS 487.

DIUS 474 Clinical Experience in Ultrasound IV 8
40 hours a week in an approved ultrasound clinical practice. Prerequisites: DIUS 471, 472, 473 and compliance with policy (81-3). Co-requisite: DIUS 487.

DIUS 487 Ultrasound Seminar I 2
Seminar to review and discuss cases performed by students and issues of professional interest. Seattle-based students meet on campus one day every week. Students based outside Seattle area present projects by distance learning. Program requires this course be taken four times for a maximum of eight credits. Fulfills senior synthesis core requirement, together with DIUS 488. Co-requisite: 471, 472, 473 or 474. Prerequisite: Clinical internship assignment. Mandatory CR/F grading.

DIUS 488 Basic Science of Ultrasound 2
Project of professional interest assigned by faculty involving critical examination of current literature and research techniques. Program requires this course be taken twice for a maximum four credits. Fulfills senior synthesis requirement together with DIUS 487. Co-requisites: DIUS 472, 473. Prerequisite: successful completion of all DIUS didactic courses and compliance with policy (81-3).

DIUS 491-493 Special Topics ..... 1 to 5

DIUS 496 Independent Study ..... 1 to 5