

## BACHELOR OF SCIENCE IN DIAGNOSTIC MEDICAL SONOGRAPHY

Credential Awarded: Bachelor of Science Degree

Clock hours: 3240 Quarter Credit Hours: 190

### GENERAL EDUCATION COURSEWORK

Didactic Clock Hours: 600

Outside Work Clock Hours: 1200

Quarter Credit Hours: 60

3 quarters of enrollment

COURSE DESCRIPTION	Quarter Credit Hours	Didactic Clock Hours	Outside Work Clock Hours
<p><b>Written Communication - WCOM101</b>                      This course is designed to empower students to write effectively. Students will learn to evaluate their audience, choose topics and organize their ideas and materials. They will practice writing a first draft, editing and proof reading their work for errors. Additionally, students will undertake a research project following a systematic process.</p>	2.50	25	50
<p><b>Oral Communication - OCOM101</b>                      This course is designed to empower students to speak effectively in a public forum. Students will learn public speaking contexts, topic selection, audience analysis and ethical communication. Students will practice organizing and outlining ideas, constructing introductions and conclusions, and utilizing presentational aids. Students will deliver three speeches in this class; to include one demonstration speech, one informative speech, and one persuasive speech.</p>	2.50	25	50
<p><b>Medical Terminology - MT102</b>                      This course is a comprehensive review of medical terminology. Word analysis will be explained and demonstrated. Terminology relating to anatomy and physiology as well as pathology will be discussed. The course will explore the completion of medical reports and communication with other medical professionals.</p>	5.0	50	100
<p><b>Algebra - ALG103</b>                      Student interests are engaged with an overview of basic algebra. This is a comprehensive review of math topics including linear equations, exponents, quadratic equations and graphing of linear equations.</p>	5.0	50	100
<p><b>Anatomy and Physiology I - AP I 104</b>                      In this course, students will learn the chemical basis of life, cellular metabolism, and the different types of tissues that comprise the human body. The structure and function of the integumentary, skeletal, and muscular systems of the human body will be taught.</p>	5.0	50	100
<p><b>Ethics and Leadership - ETH201</b>                      This course will provide an introduction to professionalism, ethics and leadership. Students will be trained in the seven mindsets of the Power of Professionalism by Bill Wiersma. Students will explore the ethical responsibilities of leadership, moral choice and its impact on organizations.</p>	5.0	50	100

<p><b>Introduction to Psychology - PSY202</b></p> <p>This is a general overview course focusing on the scientific study of both the behavioral and mental processes of human beings. More specifically, we will be covering the history of psychology and scientific thought, the biological basis of behavior, research methodology and statistics, sensation and perception, states of consciousness, memory, language, intelligence, developmental psychology, personality, learning patterns, biological and developmental processes, motivation and emotion, stress, psychopathology, and social behaviors. Core skills needed for developing emotional intelligence will also be discussed.</p>	5.0	50	100
<p><b>Introduction to Biology - BIO203</b></p> <p>This course introduces the student to biology. Organisms are studied from their behavioral, ecological, hereditary and evolutionary perspectives. Topics include: cellular life and reproduction, genetics, biological diversity, animal and plant form and function, and ecology. Students explore the relevance of biology to contemporary issues in human society.</p>	5.0	50	100
<p><b>Anatomy and Physiology II - AP II 204</b></p> <p>In this course, students will learn the structure and function of the nervous, endocrine, blood, cardiovascular, Immune and lymphatic systems of the human body. Electrical and chemical reactions, transport of substances, and defense mechanisms of the human body will be studied.</p>	5.0	50	100
<p><b>Introduction to General Physics - PHY301</b></p> <p>In this course, students will discuss the concepts of physics. Particular emphasis will be placed on measurements and standards in length, mass, and time. Physics of motion in both one and two dimensions will be covered. The laws of motion, energy, momentum and collisions are explained. We will cover states of matter and thermodynamics, and will study waves considering sound, reflection and refraction of light.</p>	5.0	50	100
<p><b>Art History - ART302</b></p> <p>This course is designed to give students an appreciation of the human form in art. Art and the human form have long been studied by early physicians and artists, which leads to a greater understanding of the human body. We will start in the Renaissance period with Leonard Di Vinci and move through the ages until we reach the millennium and the digital age. We will discuss the social and political environments unique to each time period and their affect on the artist.</p>	5.0	50	100
<p><b>Pathology - PATH303</b></p> <p>This course teaches a systems approach to categorize human diseases and other health conditions. Students will review case studies of selected major health problems and develop effective methods of clinical assessment and disease management. Students will strengthen their medical vocabulary; practice critical thinking skills and document case study findings.</p>	5.0	50	100
<p><b>Anatomy and Physiology III - AP III 304</b></p> <p>In this course, students will learn the structure and function of the digestive, respiratory, urinary, and reproductive systems of the human body. Nutrition and metabolism, water, electrolyte, and acid base balance will be discussed. Pregnancy, growth, and development will be studied. Students will also be introduced to the study of genetics and genomics.</p>	5.0	50	100

## TECHNICAL COURSEWORK

Didactic Clock Hours: 1680 Outside Work Clock Hours: 144 Quarter Credit Hours: 98

7 quarters of enrollment

COURSE DESCRIPTION	Quarter Credit Hours	Didactic Clock Hours	Outside Work Clock Hours
<p><b>Ultrasound Physics and Instrumentation Lecture - PHY200</b> Through discussion, the properties of sound physics and machine instrumentation will be addressed. Students will gain a deeper understanding of the interactions of ultrasound within the human body and the proper use of ultrasound applications. Emphasis will be placed on ultrasound theory, parts of the machine, transducer construction/ function and Doppler principles.</p>	8.0	120	24
<p><b>Ultrasound Physics and Instrumentation Clinical/laboratory - PHY200L</b> Students will learn “knobology” by scanning predetermined protocols that afford manipulation of specific knobs and machine function. Emphasis is placed on the technical aspects of scanning and applying the principles of physics.</p>	6.0	120	0
<p><b>Vascular Sonography Lecture - VAS201</b> Student interests are engaged with this challenging series on vascular anatomy, physiology, hemodynamics and disease of the vascular system. Emphasis is placed on intra/extra-cranial vessels as well as vessels of the upper and lower extremity arterial and venous systems. Doppler, Bernoulli’s Principle, Poiseuille’s Law and relative statistics complete this course study.</p>	8.0	120	24
<p><b>Vascular Sonography Clinical/laboratory - VAS201L</b> Students learn with a hands-on approach to perform ultrasound on cerebral carotids and vessels of the upper and lower extremity both arterial and venous. Doppler waveforms and spectral analysis, as well as initial impressions are taught. ABI’s, blood pressure, and intima medial thickness are explained.</p>	6.0	120	0
<p><b>Abdominal Ultrasound Lecture - ABD202</b> In lecture students are introduced to anatomy, physiology and pathophysiology of the abdominal soft tissue structures. Additionally, students will appreciate the sonographic appearance of the visceral organs and vasculature, as well as the thyroid, testes and breast.</p>	8.0	120	24
<p><b>Abdominal Ultrasound Laboratory - ABD202L</b> Students will learn and demonstrate scanning protocols for the abdominal organs and vasculature in the on-campus laboratory. Emphasis is placed on basic patient evaluation, care, and preliminary reporting.</p>	6.0	120	0
<p><b>Gynecology and Obstetrics Lecture - OBG203</b> Students will be introduced to anatomy, physiology and ultrasound appearance of the female pelvis. Special emphasis will be placed on recognizing normal and abnormal anatomy of the uterus, ovaries, fallopian tubes and adnexa. In the obstetrical portion, students will be exposed to the trimesters, normal and abnormal fetal development, the placenta, fetal presentation, and fetal biometry.</p>	8.0	120	24
<p><b>Gynecology and Obstetrics Laboratory - OBG203L</b></p>	6.0	120	0

Students will learn and demonstrate gynecology and obstetrical protocols, including biometry measurements and report writing. Limited obstetrical exams are performed on volunteers.			
<b>Musculoskeletal Ultrasound Lecture - MSK310</b> Students will study the anatomy, physiology and kinesiology of soft tissue structures associated with the upper and lower extremities. Students will identify bone markings for the purpose of locating origins and insertions of muscles. Students will analyze sports, work, and accident related injuries. Musculoskeletal disorders including pathological, genetic, vascular, neurological and, articular will be discussed.	8.0	120	24
<b>Musculoskeletal Ultrasound Laboratory - MSK310L</b> Students will practice predetermined musculoskeletal ultrasound protocols of the upper and lower extremities. Students will identify soft tissue anatomy and differentiate pathology. Students will learn how to present their findings and write preliminary reports.	6.0	120	0
<b>Advanced Vascular Lecture - AVAS300</b> This lecture course will take the student to the upper levels of advanced vascular. The ultrasound scanning protocols will include radio frequency ablation of the superficial veins, IMT (Intima Media Thickness), renal insufficiency, penile Doppler and diabetes evaluation. A particular emphasis will be placed on carotid examination and disease state, intracranial study and disease, and lower extremity vascular study and disease. Students will also study vein mapping for surgical interventions, graft studies, upper vascular, renal failure with inclusion of hemodialysis and the study of patients with diabetes and pathology due to the disease.	8.0	120	24
<b>Advanced Vascular Clinical/Laboratory - AVAS300L</b> In the clinical/laboratory the student will perform bilateral carotid artery Duplex examination, transcranial Doppler (TCD), bilateral lower extremity arterial and venous Duplex examination, and bilateral upper extremity arterial and venous Duplex examination. Arterial segmental pressures of upper and lower extremities will be introduced. The student will also perform mesenteric Duplex examination, renal artery Duplex, aorto-iliac Duplex and venous valvular incompetence Duplex examinations. The student will also perform bilateral lower and upper extremity vein mapping.	6.0	120	0
<b>Procedures and Biopsy Lecture - PB400</b> Students will study the use of ultrasound guided interventional procedures for diagnostic and therapeutic purposes. The range of interventions covered will include biopsy of multiple abdominal and pelvic viscera, the chest, thyroid, breast and lymph nodes; vascular access; endoluminal biopsy; drainage procedures and sclerotherapy/radiofrequency thermal ablation. Students will learn the critical role of the technologist as a team member in preparing the patient and assisting the physician during the course of the procedure. Emphasis will be placed on sonographic technique required to assure a safe and successful intervention.	8.0	120	24
<b>Procedures and Biopsy Laboratory - PB400L</b> Students will practice and develop proficiency with sterile technique as applied to interventional procedures. Students will set up interventional procedure trays that are specific for each type of	6.0	120	0

<p>ultrasound guided procedure, i.e., needle aspiration, core needle biopsy, vacuum assisted biopsy, thoracocentesis, vascular access, catheter drainages and hysterosonography. Students will have hands on experience with different types of needles and catheters to understand how they are utilized in both free hand techniques and with the use of a mechanical needle guide. Phantoms of abdominal organs, thyroid and breast containing embedded lesions for biopsy will be scanned. Students will practice appropriate scanning technique that will demonstrate target lesions and then recommend a safe needle trajectory and skin entry site for the intervention. Students will scan while the interventionalist is performing a procedure on the phantom, learning to maintain proper transducer alignment so that the long axis of the needle and the needle tip are visualized throughout the intervention. Proper handling of retrieved fluid and biopsy specimens for microbiology, cytology or histology processing will be practiced.</p>			
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**EXTERNSHIP**

Clock Hours: 960 Quarter Credit Hours: 32

2 Quarters of enrollment

Prerequisites: Successful completion of all didactic and clinical/laboratory coursework, including all protocol competencies.

COURSE DESCRIPTION	Quarter Credit Hours	Clock Hours	Outside Work Clock Hour
<p><b>Externship A - EXT410A</b>            Externship involves the direct interaction of the student within a specific medical environment. The student is assigned to a hospital, imaging center, clinic, or other environment in which ultrasound is performed on patients. Students observe and, when allowed by a supervisor, may perform a portion of the exam. This module serves to assist the student in making a successful transition from the school environment to a clinical setting. Students will write reports, present findings, and further explore pathologies.</p>	16	480	0
<p><b>Externship B - EXT410B</b>            Externship involves the direct interaction of the student within a specific medical environment. The student is assigned to a hospital, imaging center, clinic, or other environment in which ultrasound is performed on patients. Students observe and, when allowed by a supervisor, may perform a portion of the exam. This module serves to assist the student in making a successful transition from the school environment to a clinical setting. Students will write reports, present findings, and further explore pathologies.</p>	16	480	0

**PROGRAM OBJECTIVES**

Graduates of the Diagnostic Medical Sonography program will:

1. Demonstrate a commitment to the field of Diagnostic Medical Sonography, including:
  - Vascular Ultrasound
  - Abdominal Ultrasound
  - Gynecology and Obstetrics Ultrasound
  - Musculoskeletal Ultrasound
  - Ultrasound procedures for biopsy
  - Preventative and screening protocols
2. Demonstrate introductory level knowledge of arts and humanities and social and behavioral sciences.
3. Read and listen with understanding and express oneself effectively in written and spoken English.
4. Demonstrate problem-solving techniques in the basic concepts and principles of the biological and physical sciences.
5. Solve mathematical and computational problems.
6. Relate anatomy and physiology to the field of diagnostic medical sonography.
7. Demonstrate entry level clinical knowledge, skills, and attitudes in the care of patients undergoing ultrasound procedures.
8. Demonstrate a commitment to ethics and professionalism.
9. Be eligible for an entry level position as an ultrasound technologist.
10. Develop skills for lifelong learning.