

BACHELOR OF SCIENCE IN DIAGNOSTIC CARDIOVASCULAR SONOGRAPHY COURSES

GENERAL EDUCATION COURSEWORK

Algebra I	ALG101	This course introduces the student to the basic rudiments of algebraic theory including the following: linear algebra, associative algebra, logarithmic scale, scientific notation, solving for x. Practice exercises are provided throughout the course.
Algebra II	ALG301	This course is a continuation of Algebra 101. It explores polynomials, radicals and quadratic equations.
Anatomy and Physiology I	AP101	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.
Anatomy and Physiology II	AP102	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.
Anatomy and Physiology III	AP103	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.
Art History	ART301	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 effect on the artist.
Ethics and Leadership	ETH301	This course will introduce professionalism, ethics and leadership. Students will explore the ethical responsibilities of leadership, moral choice and its impact on organizations.
Introduction to Biology	BIO301	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.
Introduction to General Physics	PHY301	In this course, students will discuss the concepts of physics. 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.
Introduction to Psychology	PSY301	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.
Oral Communication	OCOM101	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.
Pathology	PATH301	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.
Written Communication	WCOM101	This course is designed to empower students to write effectively. Students will learn to 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.
TECHNICAL COURSEWORK		
Adult Congenital Heart Defects Lecture	CAR301	This is an advanced course specific to the diagnosis, management and repair of congenital heart disease (CHD) in the adult. Students will learn to identify congenital cardiac malformations and evaluate cardiac hemodynamic and physiologic function. Specialized scanning techniques will be discussed to help students obtain diagnostic images in adults with congenital heart disease.
Adult Congenital Heart Defects Laboratory	CAR301L	This is an advanced echocardiography laboratory course offering comprehensive training in specialized techniques. Students will practice diagnostically evaluating congenital heart disease in the adult (CHD by echocardiography). Students will analyze congenital cardiac malformations and complex lesions. Advanced scanning techniques will be practiced helping students obtain diagnostic imaging in the difficult to image

		patient. Views that will be practiced include right parasternal views, high left parasternal views, and subcostal views for meso and dextrocardiac patients.
Advanced Cardiovascular Procedures Lecture	ACP301	This is an advanced course which focuses on the role of cardiac sonographers in performing special cardiac imaging procedures. Students will learn the fundamentals as well as the basic techniques of transesophageal imaging, IV insertion and contrast media, cardiac resynchronization therapy, pacemaker optimization settings, strain rate, stress echocardiography, pharmacological stress testing, ultrasound guided biopsy and catheter lab procedures for interventional echocardiography.
Advanced Vascular Sonography Lecture	VAS202	This lecture course will take the student to the upper levels of Advanced Vascular Sonography. 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.
Advanced Vascular Sonography Laboratory	VAS202L	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.
Cardiovascular Sonography Lecture I	CAR221	Students will learn the anatomy, physiology, embryology and pathology of the cardiovascular system. Doppler principles including color flow mapping, color M-mode and tissue Doppler will also be emphasized.
Cardiovascular Sonography Laboratory I	CAR221L	This clinical/laboratory course is an introduction to Doppler principles, velocities, pathology and basic ultrasound physics. Emphasis will be placed on normal anatomy and disease state conditions. M-mode and measurements of valve area will be demonstrated. Students will learn probe manipulation for optimal visualization of anatomy.
Cardiovascular Sonography Lecture II	CAR222	Students will explore the pathophysiology of the heart focusing on diastolic and systolic dysfunction. They will also explore congenital heart defects, transesophageal echo and stress echo testing. They will learn to incorporate velocity measurements and implement calculation to document overall mechanical function of

		the heart. Case studies will be discussed and technical reports prepared.
Cardiovascular Sonography Laboratory II	CAR222L	This clinical/laboratory course will continue with Doppler Principles and explore pathophysiology of the heart. Extensive focus will be put on diastolic and systolic function as well as the hemodynamics of echocardiography. Students will recognize congenital heart defects, murmurs and equations to determine severity. They will learn to incorporate velocity measurements and implement calculation to document overall mechanical function. Students will perform echocardiograms on fellow students by utilizing scanning protocol standards.
Electrocardiography	CAR220	This course prepares the student to sit for CCT or CRAT certification exams with the globally recognized CCI, to become a Certified Cardiographic Technician or Certified Rhythm Analyst Technician, respectively. The course will introduce cardiac electrophysiology and electrocardiography concepts, techniques, and applications. The student will be trained to perform ECG protocols and to recognize and report various cardiac and pacemaker rhythms, conduction disturbances, and life-threatening conditions, with focus on patient care and management. The course will also explore Holter and telemetry monitoring in addition to different stress testing modalities and protocols and will conclude with a comprehensive approach to 12-lead ECG analysis and interpretation. In the lab, the student will learn to perform and analyze the standard 12-lead ECG on fellow students.
Medical Terminology I	MT101	Students will be introduced to medical terminology and learn how to build and analyze medical terms using prefixes, suffixes, roots and combining vowels. Students will practice building and defining medical terms for anatomical structures and pathologies associated with the various body systems. Writing medical reports and communicating with medical staff using medical terms and abbreviations will be discussed and practiced.
Medical Terminology II	MT301	This course builds on the basic medical terminology learned in MT101. Additional terminology for anatomical structures and pathology will be taught. Students will practice speaking, spelling and choosing the most relevant medical terms when writing technical reports. Students will practice communicating effectively with patients and the health care team using medical terminology through role play activities.
Ultrasound Physics and Instrumentation Lecture	PHY201	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.
Ultrasound Physics and Instrumentation Laboratory	PHY201L	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.
Vascular Sonography Lecture	VAS201	This course will address vascular anatomy, physiology, hemodynamics and disease of the vascular system. Emphasis is placed on intra/extracranial 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.
Vascular Sonography Laboratory	VAS201L	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.
EXTERNSHIP		
Externship Preparation Laboratory I	EPL201	This course prepares students for clinical application of their skills via externship with a focus on what will make students successful professionals upon graduation. Students will successfully complete all ultrasound protocols required in their program and required for clinical rotation. Students will also participate in career building tools required for long-term success in their chosen field of study, including professionalism, important clinical skills, patient care, case studies, and pathology. As a core component of this class, students must successfully complete all ultrasound protocols and pass an exit evaluation prior to Externship.
Externship Preparation Laboratory Advanced II	EPL401	This course prepares bachelors students for clinical application of their skills via externship with a focus on what will make students successful professionals upon graduation. Students will successfully complete all ultrasound protocols required in their program and required for clinical rotation. Students will also participate in career building tools required for long-term success in their chosen field of study, including professionalism, important clinical skills, patient care, case studies, pathology, and registry reviews. For all bachelor's students, this class will be taken prior to, or in conjunction with, EPL 402.
Externship Preparation Laboratory Advanced III	EPL402	This course adds to what the bachelors' students have learned in EPL 401. It is designed to refine the skills required for successful application of the skills students have learned thus far to real-life clinical settings. Students will successfully complete all ultrasound protocols required in their program and required for clinical rotation. Students will also participate in career building tools required for long-term success in their chosen field of study, including professionalism, important clinical skills, patient care, complex case studies, and pathology. As a core component of this class, students must successfully complete all ultrasound protocols and pass an exit evaluation prior to Externship.

Externship I (BS)	EXT401	<p>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>
Externship II (BS)	EXT402	<p>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>