



Fundamentals Learning Modules Curriculum Outline

Domains	Description	Percentage	Resources and References
Principles of Ultrasound Physics	Describe and comprehend the following: <ul style="list-style-type: none"> Principles of Ultrasound Physics Physics of Sound Wave Characteristics Ultrasound machine basics Common Calculations of Sound Pulse Repetition Frequency Pulse Repetition Period Distance 	12.5%	<ul style="list-style-type: none"> Edelman, S.K. (2007). Understanding Ultrasound Physics, 3rd. Ed. ESP, Inc. Woodlands, Texas.
Echogenicity and Attenuation	Describe and understand the following: <ul style="list-style-type: none"> Echogenicity Homogeneous vs. Heterogeneous Propagation Speed Intensity, Power and Amplitude of Sound Normal Incidence Attenuation of Sound Waves Attenuation Types 	12.5%	<ul style="list-style-type: none"> Hagen-Ansert, S. (2006). Textbook of Diagnostic Ultrasonography, 6th edition. Mosby: Saint Louis.
Machine Modes	Describe and comprehend the following: <ul style="list-style-type: none"> Ultrasound Modes Color Doppler Color Doppler: Power Doppler Other Doppler Types M-Mode 	12.5%	<ul style="list-style-type: none"> Hagen-Ansert, S. (2006). Textbook of Diagnostic Ultrasonography, 6th edition. Mosby: Saint Louis.
Instrumentation	Describe and comprehend the following: <ul style="list-style-type: none"> Ultrasound Machine Settings Gain Settings (B-Mode) Gain Settings (Doppler) Depth Settings Time Gain Compensation (TGC) Frame Rate Focal Zones Resolution 	12.5%	<ul style="list-style-type: none"> Curry, R.A. & Tempkin, B.B. (2004). Sonography: Introduction to Normal Structure and Function, 2nd Ed. Saunders: Philadelphia, Pennsylvania. Hagen-Ansert, S. (2006). Textbook of Diagnostic Ultrasonography, 6th edition. Mosby: Saint Louis. Gill, K.A. (2001). Abdominal Ultrasound: A Practitioner's Guide. W.B. Saunders Company: Philadelphia, Pennsylvania.
Transducers	Describe and comprehend the following: <ul style="list-style-type: none"> Transducer Types Pulse Bandwidth & Varying Frequencies Anatomy of a Transducer Body Habitus and Transducer Choice Hand Positioning Acoustic Windows 	12.5%	<ul style="list-style-type: none"> Hedrick, W. & Wagner, P. (2013). Technology for Diagnostic Sonography: Study Guide and Laboratory Exercises. Elsevier Mosby: St. Louis, Missouri.



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Image Orientation	Describe and comprehend the following: <ul style="list-style-type: none"> • Body Sections and Scanning • Image Orientations • Transducer Manipulation • Tips for Scanning 	12.5%	<ul style="list-style-type: none"> • Gill, K.A. (2001). <i>Abdominal Ultrasound: A Practitioner's Guide</i>. W.B. Saunders Company: Philadelphia, Pennsylvania.
Ultrasound Artifacts	Describe and comprehend the following: <ul style="list-style-type: none"> • What Are Artifacts, And Why Are They Important? • Types of Artifacts 	12.5%	<ul style="list-style-type: none"> • Hedrick, W. & Wagner, P. (2013). <i>Technology for Diagnostic Sonography: Study Guide and Laboratory Exercises</i>. Elsevier Mosby: St. Louis, Missouri. • American Institute of Ultrasound in Medicine. (1999). <i>Standard Presentation and Labeling of Ultrasound Images: A Stage 2 Standard</i>. • Curry, R.A. & Tempkin, B.B. (2004). <i>Sonography: Introduction to Normal Structure and Function</i>, 2nd Ed. Saunders: Philadelphia, Pennsylvania. • Erez, Y., Schechner, Y.Y., & Adams, D. (2008). Space variant ultrasound frequency compounding based on noise characteristics. <i>Ultrasound in Med. & Biol.</i>, 34 (6), 981-1000. • Gil, K.A. (2001). <i>Abdominal Ultrasound: A Practitioner's Guide</i>. W.B. Saunders Company: Philadelphia, Pennsylvania. • Hagen-Ansert, S. (2006). <i>Textbook of Diagnostic Ultrasonography</i>, 6th edition. Mosby: Saint Louis.
Safety and Bioeffects	Describe and comprehend the following: <ul style="list-style-type: none"> • Ultrasound in a Sterile Field • Potential Bioeffects of Ultrasound • Heat as a Potential Risk • Parameters for Energy • Keep It Simple 	12.5%	<ul style="list-style-type: none"> • Craig, M. (2013). <i>Essentials of Sonography and Patient Care</i>, 3rd Ed. Saunders: St. Louis, MO. • Ellis, J. R., & Bentz, P. M. (2007). <i>Modules for basic nursing skills</i> (7th ed.). Philadelphia: Lippincott Williams & Wilkins. pp. 488-491. • Hagen-Ansert, S.L. (2012). <i>Textbook of Diagnostic Medical Sonography</i>, 7th Ed. Elsevier: St. Louis, Missouri. • Perry, A. G., & Potter, P. A. (2006). <i>Clinical nursing skills and techniques</i> (6th ed.). St. Louis, MO: Elsevier Mosby. pp. 1222-1225. • American Institute of Ultrasound in Medicine. (2015). <i>Official Statement on Prudent Use and Clinical Safety</i>. • American Institute of Ultrasound in Medicine. (2015). <i>Official Statement on Mammalian Biological Effects of Heat</i>. • Edelman, S.K. (2007). <i>Understanding Ultrasound Physics</i>, 3rd. Ed. ESP, Inc. Woodlands, Texas.

Fundamentals Assessment Content Outline

Domains	Description	Percentage	Resources and References
Instrumentation	<ul style="list-style-type: none"> Describe the appropriate use of gain settings Understand the factors that determine transducer selection Describe the appropriate use of depth settings Describe the conventional image orientations 	37%	<ul style="list-style-type: none"> Hedrick, W. & Wagner, P. (2013). <i>Technology for Diagnostic Sonography: Study Guide and Laboratory Exercises</i>. Elsevier Mosby: St. Louis, Missouri. Gill, K.A. (2001). <i>Abdominal Ultrasound: A Practitioner's Guide</i>. W.B. Saunders Company: Philadelphia, Pennsylvania.
Basic Principles of Ultrasound	<ul style="list-style-type: none"> Understand the basic principles & terminology of US physics Describe the variables that affect the echogenicity of tissue & structures Describe the variables that affect ultrasonic signal attenuation Describe the variables that affect ultrasonic signal reflection Understand the effect of different media on sound propagation Describe the fundamental differences between Doppler US & B-mode US 	27%	<ul style="list-style-type: none"> Hedrick, W. & Wagner, P. (2013). <i>Technology for Diagnostic Sonography: Study Guide and Laboratory Exercises</i>. Elsevier Mosby: St. Louis, Missouri. Gill, K.A. (2001). <i>Abdominal Ultrasound: A Practitioner's Guide</i>. W.B. Saunders Company: Philadelphia, Pennsylvania. Hagen-Ansert, S. (2006). <i>Textbook of Diagnostic Ultrasonography</i>, 6th edition. Mosby: Saint Louis.
Ultrasound Artifacts	<ul style="list-style-type: none"> Recognize & understand the cause of common US artifacts 	22%	<ul style="list-style-type: none"> Hedrick, W. & Wagner, P. (2013). <i>Technology for Diagnostic Sonography: Study Guide and Laboratory Exercises</i>. Elsevier Mosby: St. Louis, Missouri. American Institute of Ultrasound in Medicine. (1999). <i>Standard Presentation and Labeling of Ultrasound Images: A Stage 2 Standard</i>. Curry, R.A. & Tempkin, B.B. (2004). <i>Sonography: Introduction to Normal Structure and Function</i>, 2nd Ed. Saunders: Philadelphia, Pennsylvania. Erez, Y., Schechner, Y.Y., & Adams, D. (2008). Space variant ultrasound frequency compounding based on noise characteristics. <i>Ultrasound in Med. & Biol.</i>, 34 (6), 981-1000. Gil, K.A. (2001). <i>Abdominal Ultrasound: A Practitioner's Guide</i>. W.B. Saunders Company: Philadelphia, Pennsylvania. Hagen-Ansert, S. (2006). <i>Textbook of Diagnostic Ultrasonography</i>, 6th edition. Mosby: Saint Louis.
Safety and Bioeffects	<ul style="list-style-type: none"> Describe precautions used to prevent cross-contamination Describe the potential bioeffects of US 	14%	<ul style="list-style-type: none"> American Institute of Ultrasound in Medicine. (2015). <i>Official Statement on Prudent Use and Clinical Safety</i>. American Institute of Ultrasound in Medicine. (2015). <i>Official Statement on Mammalian Biological Effects of Heat</i>. Edelman, S.K. (2007). <i>Understanding Ultrasound Physics</i>, 3rd. Ed. ESP, Inc. Woodlands, Texas.