

## Sonography Principles and Instrumentation Examination Content Outline

### (Outline Summary)

#	Domain	Percentage
1	Perform Ultrasound Examinations	23%
2	Manage Ultrasound Transducers	7%
3	Optimize Sonographic Images	26%
4	Apply Doppler Concepts	34%
5	Provide Clinical Safety & Quality Assurance	10%

### (Detailed Outline)

1	Perform Ultrasound Examinations	Knowledge, Skills, and Abilities
1.A	Provide patient care (e.g., comfort, safety)	<ul style="list-style-type: none"> <li>• Knowledge of contrast agents</li> <li>• Knowledge of ergonomics</li> <li>• Knowledge of established imaging protocols</li> <li>• Knowledge of general patient care standards</li> <li>• Knowledge of the interaction of sound and matter</li> <li>• Knowledge of metric system of measurement</li> <li>• Knowledge of tissue density, penetration and depth</li> <li>• Knowledge of ultrasound limitations Knowledge of confidentiality &amp; privacy guidelines</li> <li>• Ability to review medical/surgical history Ability to correct imaging artifacts</li> </ul>
1.B	Apply sonographic ergonomic techniques	
1.C	Differentiate interactions of sound and matter (e.g., echogenicity, reflection)	
1.D	Modify exam based on gray-scale artifacts (e.g., reverberation, shadowing)	
1.E	Apply knowledge of reflectors to modify scanning technique	
1.F	Identify potential bioeffects	
1.G	Apply beam steering concepts	
1.H	Apply extended field of view function (e.g., panoramic imaging)	
1.I	Apply 3D/4D concepts	
1.J	Apply contrast imaging concepts	
1.K	Manage initial patient encounter (e.g., verify ID, medical history, verify appropriateness of order)	
1.L	Analyze clinical history and previous imaging studies	
1.M	Demonstrate appropriate patient care and communication skills (e.g., privacy, confidentiality, safety)	

1.N	Document preliminary findings and images (e.g., paper-based, digital)	
<b>2</b>	<b>Manage Ultrasound Transducers</b>	<b>Knowledge, Skills, and Abilities</b>
2.A	Select transducers for the test	<ul style="list-style-type: none"> <li>• Knowledge of the components of a transducer</li> <li>• Knowledge of frequency relationship in the selection of appropriate transducer</li> <li>• Ability to use different transducers</li> </ul>
2.B	Adjust transducer frequency	
2.C	Apply 2D array transducer concepts	
2.D	Apply 3D/4D transducer concepts	
2.E	Apply nonimaging transducer concepts	
<b>3</b>	<b>Optimize Sonographic Images</b>	<b>Knowledge, Skills, and Abilities</b>
3.A	Integrate optimization of axial resolution concepts	<ul style="list-style-type: none"> <li>• Knowledge of frequency, PRF, PRP and pulse duration</li> <li>• Knowledge of pre- &amp; post-processing techniques</li> <li>• Knowledge of the principles of 2D imaging</li> <li>• Knowledge of sector widths</li> <li>• Knowledge of the concepts of scan lines, line density, frames and frame rate</li> <li>• Ability to optimize image beyond scan preset</li> </ul>
3.B	Integrate optimization of lateral resolution concepts (e.g., transmit focus, multiple focal zones)	
3.C	Integrate optimization of elevational resolution concepts	
3.D	Integrate optimization of temporal resolution concepts	
3.E	Utilize magnification techniques (i.e., pre- & post-processing)	
3.F	Optimize image brightness (e.g., overall gain, TGC)	
3.G	Apply harmonic imaging concepts	
3.H	Apply PRF concepts (e.g., depth, penetration, frame rate)	
3.I	Apply output power concepts	
3.J	Apply duty factor concepts	
3.K	Apply dynamic range concepts (e.g., compression)	
3.L	Apply spatial compounding concepts	
3.M	Apply knowledge related to gray scale (e.g., colorized B-mode, frequency compounding, persistence)	
3.N	Apply edge enhancement concepts	
3.O	Apply image depth concepts	
3.P	Apply M-mode concepts	
<b>4</b>	<b>Apply Doppler Concepts</b>	<b>Knowledge, Skills, and Abilities</b>
4.A	Apply Doppler angle to flow concepts	<ul style="list-style-type: none"> <li>• Knowledge of Doppler angle</li> <li>• Knowledge of Doppler effect</li> <li>• Knowledge of Doppler shift</li> <li>• Knowledge of hemodynamic principles</li> <li>• Knowledge of low flow areas</li> <li>• Ability to optimize image in 2D color and Doppler</li> </ul>
4.B	Apply Doppler wall filter concepts	
4.C	Apply Doppler sample gate concepts	
4.D	Apply color priority over gray scale concepts	
4.E	Apply concepts related to color Doppler map	
4.F	Apply concepts to eliminate aliasing	

4.G	Apply continuous wave Doppler concepts	<ul style="list-style-type: none"> <li>• Ability to interpret Doppler colors</li> <li>• Ability to identify imaging artifacts</li> </ul>
4.H	Apply pulsed wave Doppler concepts	
4.I	Apply color Doppler concepts	
4.J	Apply power Doppler concepts	
4.K	Evaluate spectral Doppler waveform concepts	
4.L	Apply tissue Doppler concepts	
4.M	Apply general hemodynamic concepts (e.g., pressure gradient, resistance)	
4.N	Apply Doppler artifacts concepts	
4.O	Perform Doppler measurements (e.g., velocity)	
4.P	Apply spectral Doppler gain concepts	
4.Q	Apply spectral Doppler scale concepts	
4.R	Apply color Doppler gain concepts	
4.S	Apply color Doppler scale concepts	
<b>5</b>	<b>Provide Clinical Safety &amp; Quality Assurance</b>	
5.A	Apply universal infection control protocols	<ul style="list-style-type: none"> <li>• Knowledge of CDC guidelines</li> </ul>
5.B	Document QA check on ultrasound machine	
5.C	Assess transducer integrity	
5.D	Verify ultrasound machine integrity	
5.E	Perform gray scale QA testing with tissue-mimicking phantoms	
5.F	Apply statistical parameter concepts (e.g., sensitivity, specificity)	