

CLASS SYLLABUS



COURSE TITLE: MIDS 139 - Sonography Principles & Instrumentation 1

CLASS SECTION: X01A and X01B

TERM: S2022

COURSE CREDITS: 3

DELIVERY METHOD(S): Synchronous, Blended

Camosun College campuses are located on the traditional territories of the Lək̓ʷəŋən and W̱SÁNEĆ peoples. We acknowledge their welcome and graciousness to the students who seek knowledge here.

Learn more about Camosun's [Territorial Acknowledgement](#).

<https://camosun.ca/about/covid-19-updates>

Camosun College requires mandatory attendance for the first class meeting of each course. If you do not attend, and do not provide your instructor with a reasonable explanation in advance, you will be removed from the course and the space offered to the next waitlisted student.

INSTRUCTOR DETAILS

NAME: Matthew Barbas

EMAIL: BarbasM@camosun.ca

OFFICE: CHW 317

HOURS: By appointment

As your course instructor, I endeavour to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me. Camosun College is committed to identifying and removing institutional and social barriers that prevent access and impede success.

CALENDAR DESCRIPTION

Students examine the function and safe operation of ultrasound equipment, transducers, and accessory equipment found in diagnostic medical sonography environments. Students learn about the underlying physical and electronic principles of producing two-dimensional and three-dimensional anatomic and flow imaging using sounds pitched higher than that of human hearing. Students learn how to use special instruments to produce anatomic images generated by pulse-echo techniques. By identifying factors necessary for successful image production and considering conditions negatively affecting image quality, students learn how to operate ultrasound equipment properly.

PREREQUISITE(S): **ENGLISH:** One of: B in English 12; B in English First Peoples 12; B in ENGL 091 and ENGL 093; B in ENGL 092 and ENGL 094; B in ENGL 103 and ENGL 104; B in ENGL 142; B in ELD 092 and ELD 094; B in ELD 097; B in ELD 103 and ELD 104

PHYSICS: One of: B in Physics 12; B in PHYS 104; B in PHYS 105; C+ in AHLT 165

CO-REQUISITE(S): Click or tap here to enter text.

PRE/CO-REQUISITE(S): Click or tap here to enter text.

COURSE DELIVERY

ACTIVITY	HOURS / WEEK	# OF WEEKS	ACTIVITY HOURS
Lecture	3	14	
Seminar			
Lab / Collaborative Learning	2	14	
Supervised Field Practice			
Workplace Integrated Learning			
Online			
TOTAL HOURS			

COURSE LEARNING OUTCOMES

Upon successful completion of this course a student will be able to:

- a) explain and apply the fundamental principles of waves as they pertain to medical imaging.
- b) explain the influence of pulse-echo technique on image formation, resolution, and framerates.
- c) describe how the components and function of ultrasound equipment interrelate to produce diagnostic images.
- d) describe how the major components of a diagnostic medical sonography systems interrelate to create, process, store, and retrieve a digital image.
- e) explain how flow and Doppler are used in ultrasound imaging.
- f) compare and contrast the use of A-mode, B-mode, M-mode, and Doppler Imaging (Colour Doppler, Pulsed Wave or Spectral Doppler, and Power Doppler) for obtaining images.
- g) discuss problem solving, troubleshooting, and corrective actions for errors in equipment selection, operation, malfunction and other technical errors suggested by image artifacts.
- h) explain the bioeffects of diagnostic ultrasound and current practice standards, American Institute of Ultrasound in Medicine, and Health Canada statements as they apply to risk, safety considerations, and elements of prudent practice.

COURSE OBJECTIVES AND MAPPED PROFESSIONAL COMPETENCIES

(also known as "sub-outcomes" or "learning objectives")

Sonography Canada Competencies

- 4.1a Select optimum system and transducer for examination considering patient's age and size, structures being examined and specific indications for examination.
- 4.2c Monitor output display indices and adjust power output in accordance with "as low as reasonably achievable" (ALARA) principle.
- 4.2d Adjust instrument controls to optimize image.
- 4.2e Identify artifacts.

5.3h Recognize artifacts and normal variants.

5.4c Understand the variables and their relationships within calculations.

REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

Kremkau, F. W. (2020) Sonography principles and instruments. St. Louis, MI: Elsevier

Desire-to-Learn (D2L):

- D2L – the Camosun College online learning portal contains the remainder of the learning materials for this course. Students are expected to familiarize themselves with the online learning environment and all the features it has to make this course experience enriching. Log on at <https://online.camosun.ca/> to access these materials.
- Additional resources may include, but are not limited to: lecture notes, PowerPoint slides, Laboratory Manuals, and hyperlinks. You may prefer to download lectures notes ahead of time (when available) and then write your notes directly onto copies of the slides. YouTube and other media services will also be used throughout the course via public domains.
- D2L materials must not be considered your sole source of information. The materials in D2L simply summarize the main points and provide direction for your learning experiences. You may need to write down additional information in each lecture. Additionally, not all details can be covered in a lecture, and you will be required to refer to textbook material that is not discussed specifically in class.

STUDENT EVALUATION

DESCRIPTION	WEIGHTING
Quizzes	15%
Lab Assignments	20%
Midterm Exam	30%
Final Exam	35%
	TOTAL
	100%

If you have a concern about a grade you have received for an evaluation, please come and see me as soon as possible. Refer to the [Grade Review and Appeals](#) policy for more information.

Quizzes

Quizzes will be completed on D2L learning management system and must be completed by the end of the week specified in the course schedule (Sundays by 11:59 PM). There are a total of 10 quizzes.

Lab Assignments

There are two lab assignments that will be submitted on the end of the week specified in the course schedule. Lab assignments will be submitted electronically on D2L. Specifically, Lab Assignment 1 will consist of (Lab 2 & Lab 3), and Lab Assignment 2 will consist of (Lab 8 & Lab 9). Both lab assignments are worth 10% each of your final grade. Late submissions will be subject to an immediate 5% penalty. Please contact me if you need an extension at least two weeks before the due date.

Midterm Exam

The midterm exam will assess learning from lectures, textbook readings, and laboratory instruction from week one through week six. The exam format will consist of multiple choice, true or false and short answer questions.

Final Exam

The final exam will be cumulative and assess all learning from lectures, textbook readings, and laboratory instruction from week one through week thirteen. The final exam will consist of multiple choice questions.

COURSE SCHEDULE, TOPICS, AND ASSOCIATED PREPARATION / ACTIVITY / EVALUATION

The following schedule and course components are subject to change with reasonable advance notice, as deemed appropriate by the instructor.

Week	Date	Topic	Readings	Learning Outcomes	Sonography Canada Competency	Assessment
1	Mon. May 2, 2022	1. Introduction to sonography principles and instrumentation	Chapter 1: Sonography A Window into the Human Body	a		Practice Quiz: Chapter 1
	Fri. May 6, 2021	2. Foundational Mathematics in Diagnostic Ultrasound <i>(Asynchronous Online Video and self-directed activities)</i>				
	Wed. May 4/Fri. May 6, 2022	Online Asynchronous Video Lab 1: Orientation to the US Console		a		
2	Mon. May 9, 2022	1. Basic Sound Wave Principles	Chapter 2: Ultrasound: Sound We Don't Hear	a, b	5.4c	Quiz 1: Foundations for Mathematics in Diagnostic Ultrasound
	Fri. May 13, 2022	2. Pulsed Ultrasound Principles				
	Wed. May 11/Fri. May 13, 2022	Lab/Tutorial: Pulsed Ultrasound and Attenuation review questions		a,b	5.4c	
3	Mon. May 16, 2022	1. Attenuation Ultrasound Principles	Chapter 2: Ultrasound: Sound We Don't Hear	b	5.4c	Quiz 2: Basic Sound Wave and Puled

	Fri. May 20, 2022	2. Image Formation with Echoes				Ultrasound Principles
	Wed. May 18/Fri. May 20, 2022	Lab 2: Applying Ultrasound Principles in Attenuation		b		
4	Mon. May 23, 2022	Victoria Day – No Class ☺	Chapter 3: Transducers: Sending and Receiving	c, d	4.2d	Quiz 3: Attenuation and Image Formation with Echoes
	Fri. May 27, 2022	1. Construction and Operation of Transducers 2. Beams and Focusing				
	Wed. May 18/Fri. May 27, 2022	Lab 3: Image Formation of Echoes (Acoustic Impedance, Refraction, Scattering, Speckle)		b		
5	Mon. May 30, 2022	1. Types of Transducers and Electronic Phasing	Chapter 3: Transducers: Sending and Receiving	b, c, d	4.1a	Quiz 4: Construction of Transducers, Beams and Focusing
	Fri. June 3, 2022	2. Imaging Resolution				
	Wed. June 1/Fri. June 3, 2022	Lab 4: Transducer Guide and Imaging Resolution		c, d	4.2d	
6	Mon. June 6, 2022	1. Sonographic Instrumentation (Beam Former) 2. Test Review	Chapter 4: Instruments: Imaging Anatomy with Principle 1	d		Quiz 5: Types of Transducers, Imaging Resolution
	Fri. June 10, 2022					
	Wed. June 8/Fri. June 10, 2022	Lab Flex Time for Lab Assignment		b,c	4.2d	Lab Assignment 1 Due (Labs 2 & 3) Attenuation of Ultrasound and Image Formation of Echoes

						Due 11:59 PM on Sunday, June 12
7	Mon. June 13, 2022	1. Mid-Term Test 2. Signal Processor	Chapter 4: Instruments: Imaging Anatomy with Principle 1	d		Mid-Term Test
	Fri. June 17, 2022					
	Wed. June 15/Fri. June 17, 2022	Lab 5: Pre and Post Processing Functions		d	4.2d	
8	Mon. June 20, 2022	1. Signal & Image Processor 2. Types of Flow and the Doppler Effect	Chapter 4: Instruments: Imaging Anatomy with Principle 1	b, d, f	4.2d	Quiz 6: Principle 1 Instrumentation Beam Former, Signal Processor
	Fri. June 24, 2022					
	Wed. June 22/Fri. June 24, 2022	Online Lab/Tutorial: Contemporary Features				
9	Mon. June 27, 2022	1. Colour and Power Doppler	Chapter 5: Instruments: Imaging Motion and Flow With Principle 1	e		Quiz 7: Image Processor
	Fri. July 1, 2022	Canada Day – No Class ☺				
	Wed. June 29/Fri. July 1, 2022	No Labs this week – Canada Day		e		
10	Mon. July 4, 2022	1. Spectral Doppler 2. <i>Flex Time</i>	Chapter 5: Instruments: Imaging Motion and Flow With Principle 1	f		Quiz 8: Flow and the Doppler Effect
	Fri. July 8, 2022					
	Wed. July 6/Fri. July	Lab 6: Colour and Power Doppler Instrumentation		f		

	8, 2022					
11	Mon. July 11, 2022	1. Imaging Anatomy, Motion and flow with Principle 2 2. 2-D Ultrasound Artifacts	Chapter 6: Instruments: Imaging Anatomy, Motion, and Flow with Principle 2 Chapter 7: Artifacts: What Can Go Wrong	g		Quiz 9: Colour, Power and Spectral Doppler
	Fri. July 15, 2022					
	Wed. July 13/Fri. July 15, 2022	Lab 7: Spectral Doppler Instrumentation		f	4.2e, 5.3h	
12	Mon. July 18, 2022	1. Doppler Imaging Artifacts	Chapter 7: Artifacts What Can Go Wrong Chapter 9: Is it Safe?	g,h		Quiz 10: 2-D Ultrasound Imaging Artifacts
	Fri. July 22, 2022					
	Wed. July 20/Fri. July 22, 2022	Lab 8: Analyzing and Resolving 2D Ultrasound B-Mode artifacts		g	4.2e, 5.3h	
13	Mon. July 25, 2022	1. Safety and Bioeffects of Ultrasound 2. Test Review/Flex Time	Chapter 10: To Conclude		4.2c	
	Fri. July 29, 2022					
	Wed July 27/Fri. July 29, 2022	Lab 9: Doppler Imaging Artifacts				
14	Mon. Aug. 1, 2022	BC Day – No Class ☺				Lab Assignment #2 Due (Labs 8 & 9) Recognizing and Problem Solving for Ultrasound Artifacts Due 11:59 PM Friday, Aug. 5
	Fri. Aug 5, 2022	1. Test Review				

15	TBD	Final Exam
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CLASS GUIDELINES & EXPECTATIONS

Online synchronous lectures will be facilitated on Zoom video conferencing software. There may be some weeks where there will be asynchronous online content for you to work on. I will inform you ahead of time whether a lecture will be synchronous or asynchronous. Labs will take place in the teaching clinic. You are expected to arrive on time and in proper Camosun College Diagnostic Medical Sonography uniforms. It is imperative that you are present in every lab. There are four laboratory sessions that you will submit work for the two lab assignments. Laboratory sessions are held for you to apply your knowledge from lectures and online content.

You are also responsible for reading and following the [Diagnostic Medical Sonography Program Handbook](#).

SCHOOL OR DEPARTMENTAL INFORMATION

Health & Human Services Student Handbook: <http://camosun.ca/learn/school/health-human-services/student-info/index.html>

General Practicum Information: <http://camosun.ca/learn/school/health-human-services/student-info/practicum-info.html>

Allied Health & Technologies Department Handbooks:

- Certified Medical Laboratory Assistant: <http://camosun.ca/learn/school/health-human-services/student-info/program-info/cmla.html>
- Diagnostic Medical Sonography: <http://camosun.ca/learn/school/health-human-services/student-info/program-info/sono.html>
- Medical Radiography: <http://camosun.ca/learn/school/health-human-services/student-info/program-info/mrad.html>

Students enrolled in Allied Health & Technologies Programs must achieve a minimum of 65% or a “COM” in each of their courses in order to use their course as a pre-requisite and progress in their program.

Students enrolled in Allied Health & Technologies Programs must participate in learning activities that include intimate and direct personal contact with their classmates during supervised practice. Students are training to perform the duties of a healthcare professional. These duties usually require constant, close physical contact with patients and clients. Students may be required to simulate and perform these activities on one another during this course. Students may also be required to use special hygiene practices and protective gear to protect themselves from the transmission of communicable diseases (like COVID-19). Risks associated with learning and performing the physical duties of a healthcare profession cannot be entirely eliminated by any

amount of caution or protection. Students who refuse, or are incapable of participating and performing these activities due to personal or medical limitations, may only continue to participate in their course work when supported by officially registered accommodations or temporary medical advisory.

STUDENT RESPONSIBILITY

Enrolment at Camosun assumes that the student will become a responsible member of the College community. As such, each student will display a positive work ethic, assist in the preservation of College property, and assume responsibility for their education by researching academic requirements and policies; demonstrating courtesy and respect toward others; and respecting expectations concerning attendance, assignments, deadlines, and appointments.

SUPPORTS AND SERVICES FOR STUDENTS

Camosun College offers a number of services to help you succeed in and out of the classroom. For a detailed overview of the supports and services visit <http://camosun.ca/students/>.

Support Service	Website
Academic Advising	http://camosun.ca/advising
Accessible Learning	http://camosun.ca/accessible-learning
Counselling	http://camosun.ca/counselling
Career Services	http://camosun.ca/coop
Financial Aid and Awards	http://camosun.ca/financialaid
Help Centres (Math/English/Science)	http://camosun.ca/help-centres
Indigenous Student Support	http://camosun.ca/indigenous
International Student Support	http://camosun.ca/international/
Learning Skills	http://camosun.ca/learningskills
Library	http://camosun.ca/services/library/
Office of Student Support	http://camosun.ca/oss
Ombudsperson	http://camosun.ca/ombuds
Registration	http://camosun.ca/registration
Technology Support	http://camosun.ca/its
Writing Centre	http://camosun.ca/writing-centre

If you have a mental health concern, please contact Counselling to arrange an appointment as soon as possible. Counselling sessions are available at both campuses during business hours. If you need urgent support after-hours, please contact the Vancouver Island Crisis Line at 1-888-494-3888 or call 911.

COLLEGE-WIDE POLICIES, PROCEDURES, REQUIREMENTS, AND STANDARDS

Academic Accommodations for Students with Disabilities

The College is committed to providing appropriate and reasonable academic accommodations to students with disabilities (i.e. physical, depression, learning, etc). If you have a disability, the [Centre for Accessible Learning](#) (CAL) can help you document your needs, and where disability-related barriers to access in your courses exist, create an accommodation plan. By making a plan through CAL, you can ensure you have the appropriate academic accommodations you need without disclosing your diagnosis or condition to course instructors. Please visit the CAL website for contacts and to learn how to get started:

<http://camosun.ca/services/accessible-learning/>

Academic Integrity

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.13.pdf> for policy regarding academic expectations and details for addressing and resolving matters of academic misconduct.

Academic Progress

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.1.pdf> for further details on how Camosun College monitors students' academic progress and what steps can be taken if a student is at risk of not meeting the College's academic progress standards.

Course Withdrawals Policy

Please visit <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.2.pdf> for further details about course withdrawals. For deadline for fees, course drop dates, and tuition refund, please visit <http://camosun.ca/learn/fees/#deadlines>.

Grading Policy

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf> for further details about grading.

Grade Review and Appeals

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf> for policy relating to requests for review and appeal of grades.

Mandatory Attendance for First Class Meeting of Each Course

Camosun College requires mandatory attendance for the first class meeting of each course. If you do not attend, and do not provide your instructor with a reasonable reason in advance, you will be removed from the course and the space offered to the next waitlisted student. For more information, please see the "Attendance" section under "Registration Policies and Procedures"

(<http://camosun.ca/learn/calendar/current/procedures.html>) and the Grading Policy at <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf>.

Medical / Compassionate Withdrawals

Students who are incapacitated and unable to complete or succeed in their studies by virtue of serious and demonstrated exceptional circumstances may be eligible for a medical/compassionate withdrawal. Please visit <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.8.pdf> to learn more about the process involved in a medical/compassionate withdrawal.

Sexual Violence and Misconduct

Camosun is committed to creating a campus culture of safety, respect, and consent. Camosun's Office of Student Support is responsible for offering support to students impacted by sexual violence. Regardless of when or where the sexual violence or misconduct occurred, students can access support at Camosun. The Office of Student Support will make sure students have a safe and private place to talk and will help them understand what supports are available and their options for next steps. The Office of Student Support respects a student's right to choose what is right for them. For more information see Camosun's Sexualized Violence and Misconduct Policy: <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.9.pdf> and camosun.ca/sexual-violence. To contact the Office of Student Support: oss@camosun.ca or by phone: 250-370-3046 or 250-370-3841

Student Misconduct (Non-Academic)

Camosun College is committed to building the academic competency of all students, seeks to empower students to become agents of their own learning, and promotes academic belonging for everyone. Camosun also expects that all students to conduct themselves in a manner that contributes to a positive, supportive, and safe learning environment. Please review Camosun College's Student Misconduct Policy at <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.5.pdf> to understand the College's expectations of academic integrity and student behavioural conduct.

Changes to this Syllabus: Every effort has been made to ensure that information in this syllabus is accurate at the time of publication. The College reserves the right to change courses if it becomes necessary so that course content remains relevant. In such cases, the instructor will give the students clear and timely notice of the changes.