

CLASS SYLLABUS



COURSE TITLE: MIDS 139- Sonography Principles & Instrumentation 1

CLASS SECTION: BX01A and BX01B

TERM: 2021S

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](#).

The COVID-19 pandemic has presented many challenges, and Camosun College is committed to helping you safely complete your education. Following guidelines from the Provincial Health Officer, WorkSafe BC, and the B.C. Government to ensure the health and wellbeing of students and employees, Camosun College is providing you with every possible protection to keep you safe. Our measures include COVID Training for students and employees, health checks, infection control protocols including sanitization of spaces, PPE and ensuring physical distancing. For details on these precautions please follow this link: <http://camosun.ca/covid19/faq/covid-fags-students.html>. However, if you're at all uncomfortable being on campus, please share your concerns with your Instructor. If needed, alternatives will be discussed.

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 3, 2021 | 1. Introduction to sonography principles and instrumentation | Chapter 1: Sonography A Window into the Human Body | a | | Practice Quiz: Chapter 1 |
| | Thurs. May 6, 2021 | 2. Foundational Mathematics in Diagnostic Ultrasound <i>(Asynchronous Online Video and self-directed activities)</i> | | | | |
| | Thurs. May 6, 2021 | Lab/Tutorial: Video Tutorial: Orientation to GE Logiq E10 Lab 1: Orientation to the US Console | | a | | |
| 2 | Mon. May 10, 2021 | 1. Basic Sound Wave Principles 2. Pulsed Ultrasound Principles | Chapter 2: Ultrasound: Sound We Don't Hear | a, b | 5.4c | Quiz 1: Foundations for Mathematics in Diagnostic Ultrasound |
| | Thurs. May 13, 2021 | | | | | |

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|----------|-----------------------------|---|--|---------|------|--|
| | Thurs. May 13, 2021 | Lab/Tutorial: Pulsed Ultrasound and Attenuation review questions | | a,b | 5.4c | |
| 3 | Mon. May 17, 2021 | 1. Attenuation Ultrasound Principles 2. Image Formation with Echoes | Chapter 2: Ultrasound: Sound We Don't Hear | b | 5.4c | Quiz 2: Basic Sound Wave and Pulsed Ultrasound Principles |
| | Thurs. May 20, 2021 | | | | | |
| | Thurs. May 20, 2021 | Lab 2: Applying Ultrasound Principles in Attenuation | | | | |
| 4 | Mon. May 24, 2021 | 1. Construction and Operation of Transducers 2. Beams and Focusing | Chapter 3: Transducers: Sending and Receiving | c, d | 4.2d | Quiz 3: Attenuation and Image Formation with Echoes |
| | Thurs. May 27, 2021 | | | | | |
| | Thurs. May 27, 2021 | Lab 3: Image Formation of Echoes (Acoustic Impedance, Refraction, Scattering, Speckle) | | | | |
| 5 | Mon. May 31, 2021 | 1. Types of Transducers and Electronic Phasing 2. Imaging Resolution | Chapter 3: Transducers: Sending and Receiving | b, c, d | 4.1a | Quiz 4: Construction of Transducers, Beams and Focusing |
| | Thurs. June 3, 2021 | | | | | |
| | Thurs. June 3, 2021 | Lab 4: Transducer Guide and Imaging Resolution | | | | |
| 6 | Mon. June 7, 2021 | 1. Sonographic Instrumentation (Beam Former) 2. Test Review | Chapter 4: Instruments: Imaging Anatomy with Principle 1 | d | | Quiz 5: Types of Transducers, Imaging Resolution |
| | Thurs. June 10, 2021 | | | | | |
| | Thurs. June 10, 2021 | 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 13 |
| 7 | Mon. June 14, 2021 | 1. Mid-Term Test 2. Signal Processor | Chapter 4: Instruments: Imaging Anatomy with Principle 1 | d | | Mid-Term Test |
| | Thurs. June 17, 2021 | | | | | |
| | Thurs. June 17, 2021 | Lab 5: Pre and Post Processing Functions | | d | 4.2d | |
| 8 | Mon. June 21, 2021 | 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 |
| | Thurs. June 24, 2021 | | | | | |
| | Thurs. June 24, 2021 | Online Lab/Tutorial: Contemporary Features | | | | |
| 9 | Mon. June 28, 2021 | 1. Colour and Power Doppler | Chapter 5: Instruments: Imaging Motion and Flow With Principle 1 | e | | Quiz 7: Image Processor |
| | Thurs. July 1, 2021 | No Class and Lab – Canada Day | | e | | |
| 10 | Mon. July 5, 2021 | 1. Spectral Doppler 2. Flex Time | Chapter 5: Instruments: Imaging Motion and Flow With Principle 1 | f | | Quiz 8: Flow and the Doppler Effect |
| | Thurs. July 8, 2021 | | | | | |
| | Thurs. July 8, 2021 | Lab 6: Colour and Power Doppler Instrumentation | | f | | |
| 11 | Mon. July 12, 2021 | 1. Imaging Anatomy, Motion and flow with Principle 2 | Chapter 6: Instruments: Imaging Anatomy, | g | | Quiz 9: Colour, Power and Spectral Doppler |

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|----|---|--|--|-----|------------|--|
| | Thurs. July 15, 2021 | 2. 2-D Ultrasound Artifacts | Motion, and Flow with Principle 2 Chapter 7: Artifacts: What Can Go Wrong | | | |
| | Thurs. July 15, 2021 | Lab 7: Spectral Doppler Instrumentation | | f | 4.2e, 5.3h | |
| 12 | Mon. July 19, 2021 | 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 |
| | Thurs. July 22, 2021 | | | | | |
| | Thurs. July 22, 2021 | Lab 8: Analyzing and Resolving 2D Ultrasound B-Mode artifacts | | g | 4.2e, 5.3h | |
| 13 | Mon. July 26, 2021 | 1. Safety and Bioeffects of Ultrasound 2. Test Review/Flex Time | Chapter 10: To Conclude | | 4.2c | |
| | Thurs. July 29, 2021 | | | | | |
| | Thurs. July 29, 2021 | Lab 9: Doppler Imaging Artifacts | | | | |
| 14 | Mon. Aug. 2, 2021 | BC Day | Chapter 10: To Conclude | | | Lab Assignment #2 Due (Labs 8 & 9) Recognizing and Problem Solving for Ultrasound Artifacts Due 11:59 PM Friday, Aug. 6 |
| | Thurs. Aug 5, 2021 | 1. Test Review | | | | |
| 15 | TBD | Final Exam | | | | |

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.