PHYS 540 001 W2022 T-1 Medical Imaging

UBC Course Coordinator: Rebecca Feldman Office: ASC 286
UVIC Course Coordinator: Derek Wells Office: VIC 1619

Instructors: See Table 1
Class Location: Virtual via Zoom (https://ubc.zoom.us/j/63104825925) (PWD: 062530)
Class Meeting Time: Tuesday and Thursday, 1:30 pm – 3:00 pm
Canvas: https://canvas.ubc.ca/courses/81885

Table 1: Course Instructors.

Instructor	Module	Institution	Email
Derek Wells	Radiography, UVIC Rad/CT Lab	VIC (BCCA)	dwells@bccancer.bc.ca
Rebecca Feldman	MRI	UBCO	rfeldm01@mail.ubc.ca
Thor Bjarnason	CT, UBCO Rad Lab	Interior Health	Thor.bjarnason@interiorhealth.ca
Marjorie Gonzalez	Nuclear Medicine	Interior Health	Marjorie.Gonzalez@interiorhealth.ca
Manuel Rodriguez	Ultrasound, UVIC US Lab	VIC (BCCA)	manuel.rodriguez@bccancer.bc.ca
Eric Wright	UBCO CT/US Lab	CSI (BCCA)	Eric.wright@bccancer.bc.ca

UBC and UVic Academic Calendar Entry: Fundamental theory and application of medical imaging, including radiology, computed tomography, magnetic resonance imaging, ultrasound, and nuclear medicine imaging. Basic principles, image formation and reconstruction, imaging instrumentation and hardware, and current trends of each imaging modality will be given.

Course Format: Two 75 minute discussion sessions per week plus a lab component consisting of three laboratories.

Course Textbook: Jerrold T. Bushberg *et al.*, The Essential Physics of Medical Imaging, **4th** edition, 2021

Evaluation Criteria and Grading: A minimum of 50% is required to pass this course. Students will be evaluated by their participation in discussion sessions (i.e. during lecture) demonstrating mastery of the material, assignments, written laboratory reports, and a final project, as described below.

Participation (25%)
The "in-class" component of the course is organized as discussion sessions. Prior to the discussion session you will be assigned relevant reading material for that day's discussion. As well, you will be given "sample questions" that may be asked of you in the discussion session. You will be responsible for all the assigned reading. During each session you will be called on to answer questions/explain concepts/draw diagrams of equipment etc. from the assigned sections for that given week, **please make sure you have the ability to draw on a zoom white board.** The questions asked by the instructors will form the "seeds" for the discussion sessions.

Marking for the discussion session component will be undertaken by the instructor leading the discussion session and will be based on your level of preparation for each session and comprehension of material.

Assignments (25%)

There is one assignment for each module (radiography, CT, MRI, ultrasound, nuclear medicine). Each assignment is worth 5% of the total grade.

Labs (30%)

There are three labs (radiography, CT, ultrasound). Lab times will be scheduled for the evenings to allow access to clinical equipment. Data for each lab will be collected in groups. The analysis and lab write-up is to be performed individually. Lab write-ups should be no more than 5 pages (adhere to length restrictions!) and should consist of the following components:

I. **Abstract**: brief summary of the experiment. State relevant results.
II. **Introduction**: brief background to the experiment. May state relevant theory here. State objective of experiment.
III. **Theory**: if not stated in (II), state theory required to perform experiment. This should be concise, yet cover what is needed.
IV. **Materials and Methods**: state equipment used, how it was set-up, and methods used in experiment. Others reading the report should be able to reproduce your experiment and results based on the materials and methods described in this section.
V. **Results**: state main results of experiment. Include tables, plots etc.
VI. **Discussion**: summarize (synthesize) main results. Do they make sense? Answer any questions posed in lab hand-out material.
VII. **Conclusions**: Summarize experiment and main results.
VIII. **References**: include any references other than lab hand-outs.

Project + Presentation (20%)

You can choose any topic that concentrates on an "emerging technique / technology" in medical imaging, i.e. it cannot be a review of basic modalities. Let one of the instructors know your choice of topic before you start your research. The report is to be an "abstract" of 3 pages in length (not more!!) summarizing the scope of your presentation. Presentations are 12 minutes in length followed by 3 minutes for questions and will be held during the last week of class. The abstract is due the class **before** the presentation.

Your abstract and presentation should be based on research presented in recent published papers on your chosen topic. Your abstract should include references to the papers that your work is based on.

Course Schedule

Table 2 is a tentative schedule of topics that will be covered in this course. This schedule is subject to change due to extenuating circumstances and/or to improve student learning. The schedule takes into consideration the different start, end and reading break dates of the two institutions. Course material for discussion sessions, assignments and laboratories is available through ***Canvas***.

Table 2: Course Schedule

Week	Date	Instructor	Assign/Lab	Lecture number, Title		Details
week 1	Sep 8	DW, RF		1	Introduction	Syllabus
week 2	Sep 13	DW		2	Discussion session	Image Quality
	Sep 15	DW		3	Discussion session	Radiography
week 3	Sep 20	DW		4	Discussion session	Radiography
	Sep 22	DW		5	Discussion session	Radiography
week 4	Sep 27	DW		6	Discussion session	Radiography
	Sep 29	DW/TB		7	Laboratory 1	Radiography
week 5	Oct 4	RF	A1 (Rad) Due	8	Discussion session	MRI
	Oct 6	RF		9	Discussion session	MRI
week 6	Oct 11	RF	L1 (Rad) Due	10	Discussion Session	MRI
	Oct 13	RF		11	Discussion Session	MRI
week 7	Oct 18	TB		12	Discussion session	CT
	Oct 20	TB	A2 (MRI) Due	13	Discussion session	CT
week 8	Oct 25	DW/EW		14	Laboratory 2	CT
	Oct 27	MG		15	Discussion session	Nuclear Medicine
week 9	Nov 1	MG	A3 (CT) Due	16	Discussion session	Nuclear Medicine
	Nov 3	MG	Project Topic Due	17	Discussion session	Nuclear Medicine
UBCO RB	Nov 7-11					
UVIC RB	Nov 9-11					
week 10	Nov 15	MG	L2 (CT) Due	18	Discussion session	Nuclear Medicine
	Nov 17	MR		19	Discussion session	Ultrasound
week 11	Nov 22	MR	A4 (NM) Due	20	Discussion session	Ultrasound
	Nov 24	MR/EW	Project Abstract Due	21	Laboratory 3	Ultrasound
week 12	Nov 29	RF, DW ++		22	Student presentations	
	Dec 1	RF, DW ++	A5 (US) Due	23	Student presentations	
Week 13	Dec 8		L3 (US) Due			

UBCO

Grading Practices: Faculties, departments, and schools reserve the right to scale grades in order to maintain equity among sections and conformity to University, faculty, department, or school norms. Students should therefore note that an unofficial grade given by an instructor might be changed by the faculty, department, or school. Grades are not official until they appear on a student's academic record. http://www.calendar.ubc.ca/okanagan/index.cfm?tree=3,41,90,1014

Academic Integrity: The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.
A more detailed description of academic integrity, including the University's policies and procedures, may be found in the Academic Calendar at:
http://okanagan.students.ubc.ca/calendar/index.cfm?tree=3,54,111,0

Cooperation vs. Cheating : Working with others on assignments is a good way to learn the material and we encourage it. However, there are limits to the degree of cooperation that we will permit. Any level of cooperation beyond what is permitted is considered cheating.
When working on programming assignments, you must work only with others whose understanding of the material is approximately equal to yours. In this situation, working together to find a good approach for solving a programming problem is cooperation; listening while someone dictates a solution is cheating. You must limit collaboration to a high-level discussion of solution strategies, and stop short of actually writing down a group answer. Anything that you hand in, whether it is a written problem or a computer program, must be written by you, from scratch, in your own words. If you base your solution on any other written solution, you are cheating. If you provide your solution for others to use, you are also cheating.

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Grievances and Complaints Procedures: A student who has a complaint related to this course should follow the procedures summarized below:

- The student should attempt to resolve the matter with the instructor first. Students may talk first to someone other than the instructor if they do not feel, for whatever reason, that they can directly approach the instructor.

If the complaint is not resolved to the student's satisfaction, the student should e-mail Christina Haston christina.haston@ubc.ca or the Department Head pro tem, Dr. Andrew Jirasek at andrew.jirasek@ubc.ca

UBCO Student Service Resources

Disability Assistance: The Disability Resource Centre ensures educational equity for students with disabilities, injuries or illness. If you are disabled, have an injury or illness and require academic accommodations to meet the course objectives, e-mail us or visit our website for more information.
Web: http://students.ok.ubc.ca/drc/welcome.html **E-mail** DRC at: drc.questions@ubc.ca

Equity, Human Rights, Discrimination and Harassment: UBC Okanagan is a place where every student, staff and faculty member should be able to study and work in an environment that is free from human rights-based discrimination and harassment. If you require assistance related to an issue of equity, discrimination or harassment, please contact the Equity Office, your administrative head of unit, and/or your unit's equity representative. **UBC Okanagan Equity Advisor: ph. 250-807-9291**
Web: https://equity.ok.ubc.ca/ **E-mail:** equity.ubco@ubc.ca

Health & Wellness - UNC 337: At UBC Okanagan health services to students are provided by Health and Wellness. Nurses, physicians and counsellors provide health care and counselling related to physical health, emotional/mental health and sexual/reproductive health concerns. As well, health promotion, education and research activities are provided to the campus community. If you require assistance with your health, please contact Health and Wellness for more information or to book an appointment.
Web: www.students.ok.ubc.ca/health-wellness **Email:** healthwellness.okanagan@ubc.ca

Sexual Violence Prevention and Response Office (SVPRO): A safe and confidential place for UBC students, staff and faculty who have experienced sexual violence regardless of when or where it took place. Just want to talk? We are here to listen and help you explore your options. We can help you find a safe place to stay, explain your reporting options (UBC or police), accompany you to the hospital, or support you with academic accommodations. You have the right to choose what happens next. We support your decision, whatever you decide. Visit svpro.ok.ubc.ca or call us at 250-807-9640

Independent Investigations Office (IIO): If you or someone you know has experienced sexual assault or some other form of sexual misconduct by a UBC community member and you want the Independent Investigations Office (IIO) at UBC to investigate, please contact the **IIO**. Investigations are conducted in a trauma informed, confidential and respectful manner in accordance with the principles of procedural fairness. You can report your experience directly to the **IIO by** calling 604-827-2060.
Web: https://investigationsoffice.ubc.ca/ **E-mail:** director.of.investigations@ubc.ca

The Hub: The Student Learning Hub (LIB 237) is your go-to resource for free math, science, writing, and language learning support. The Hub welcomes undergraduate students from all disciplines and year levels to access a range of supports that include **tutoring in math, sciences, languages, and writing, as well as help with study skills and learning strategies**. **Web:** (https://students.ok.ubc.ca/student-learning-hub/) **Ph:** 250-807-9185.

SAFEWALK - Download the UBC SAFE – Okanagan app.
Don't want to walk alone at night? Not too sure how to get somewhere on campus?
Call Safewalk at 250-807-8076 For more information: https://security.ok.ubc.ca/safewalk/

UVIC

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