Course Syllabus – RADS 301: Exploring Imaging in the 21st Century

University of British Columbia, Vancouver, Canada
Faculty of Medicine, Department of Radiology

Instructors:

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*For any course-related inquires, please contact rads301.undergrad@ubc.ca as the primary point of contact to ensure a timely response.

Class Time: Monday, Wednesday, Friday | Lecture Hours: 2-2:50 pm
Location: Centre for Interactive Research and Sustainability, Room 1250
Credit Value (3): 3 hours per week lecture-based content

COURSE OVERVIEW

Course Description:

Students from all backgrounds are encouraged to take this interdisciplinary course that covers a wide range of topics regarding not only the scientific and technological basis of medical imaging, but also its origins and impact on society and the individual.

Full course description:

RADS 301 is an introductory level course that will offer undergraduate students the opportunity to learn more about medical imaging and its applications today and in the future. This interdisciplinary course

will explore the various uses of imaging in fields including medicine, forensics, informatics, anatomy, ethics, engineering, computer sciences, anthropology, biology, physiology, and more. We will also cover a brief history of Radiology, the basic principles of various imaging technologies, and their practical applications in our daily lives. Diagnostics, therapeutic and interventional procedures, cinematic animations, 3D model reconstruction and printing, virtual autopsy, artificial Intelligence, and live real-time imaging highlight some of the uses of Radiology in the 21st century.

COURSE OBJECTIVES

1. This course will provide students with a foundational knowledge of basic human anatomy and discuss the principles of various medical imaging modalities.
2. An emphasis will be placed on developing a conceptual appreciation of the diverse applications of medical imaging in modern society, and its impact on the individual.
3. The course will also serve as an interdisciplinary platform to encourage knowledge exchange amongst disciplines and facilitate a collaborative learning environment.
4. By developing an understanding of the interdisciplinary nature of medical imaging, students will leave more informed about future career options related to medical imaging, and about collaborative work amongst adjacent fields.

LEARNING OUTCOMES

By the end of the course, students will be able to (in-brief):

1. Describe the basic principles of major imaging modalities including X-ray, CT, ultrasound, and MRI.
2. Label and describe basic human anatomy in X-ray, CT, ultrasound, and MRI images.
3. Briefly summarize some the applications of medical imaging in various fields outside of medicine, including forensics, informatics, anatomy, ethics, engineering, computer sciences, anthropology, biology, and physiology.
4. Describe the applications of modern medical imaging, such as diagnosis of diseases, therapeutic and interventional procedures, cinematic animations, 3D model reconstruction and printing, virtual autopsy, artificial Intelligence, and live real-time imaging.

COURSE EVALUATION

Online Exam Practice Questions – 20%

Each week, several multiple-choice questions (MCQs) will be posted on Canvas as practice exam questions. Students will complete these individually. Each question allows unlimited number of attempts, and all questions must be submitted by **Dec 1, 2025**.

Quiz 1 (Multiple-choice questions) – 20%

This quiz will take place during scheduled class time in paper-based format. It will consist of ~30 questions to be completed in 30 minutes. The quiz will test material taught during lecture up to the end of **Week 4** (see Appendix 1 for the course schedule). Review slides will be provided in advance. Any content modifications will be discussed with the class in person, and via Canvas.

*To accommodate the large class size, the quiz will be administered in **multiple locations across campus**. A **sign-up sheet** will be provided in advance for students to select their exam location.

Quiz 2 (Multiple-choice questions) – 20%

This quiz will take place during scheduled class time in paper-based format. It will consist of ~30 questions to be completed in 30 minutes. The quiz will test material taught during lecture **from Week 5 to Week 8** (see Appendix 1 for the course schedule). Review slides will be provided in advance. Any content modifications will be discussed with the class in person, and via Canvas.

*To accommodate the large class size, the quiz will be administered in **multiple locations across campus**. A **sign-up sheet** will be provided in advance for students to select their exam location.

Final Exam (Multiple-choice questions) – 30%

The final examination will take place during final exam period. The final exam is **non-cumulative** and will test materials from **Weeks 9 to 14**. It will consist of ~45 questions to be completed in 50 minutes. Review slides and a review session will be provided. Any content modifications will be discussed with the class in person, and via Canvas.

*The exact date, time, and location will be announced once confirmed by Scheduling Services.

Final Reflection Short Essay – 10%

At the end of term, every student will be required to submit a short reflection essay (~500 words). Students are to reflect on their experience in the course, highlight one novel or new concept they have learned, and discuss briefly how their chosen topic might apply to themselves or to their future career paths.

Expectations:

- 500 words or less, flexible essay format.
- Choose 1 central topic discussed in the course.
- Use the content provided during lectures and/or additional to describe a take-home learning point and relate it to your future career or academic goals.

Examples of things to avoid:

- Re-iteration of content strictly from course materials. Be creative! Incorporate your own style and interpretations of the utility, feasibility, etc.
- Discussion surrounding too many distinct topics (eg. >2). The goal is to find something that speaks to you and describe its relevance.

Marks will be assigned based on completion and discussion of a topic and how it relates to you, not by content. Take the opportunity to think of the assignment as a preparation for future interviews or help guide your academic direction!

Late Assignments and Unpreventable Events:

If you cannot meet a deadline or attend an exam, please contact the TA or instructor as soon as possible to discuss your situation and possible accommodations. Penalties may apply if prior arrangements are not made.

Learning Materials:

No additional learning materials are required for this course.

GRADING

A pass or fail will be based on the UBC senate guidelines. For students failing the course, a remediation MCQ exam will be provided.

Letter Grade	Percentage (%)
A+	90 to 100
A	85 to 89
A-	80 to 84
B+	76 to 79
B	72 to 75
B-	68 to 71
C+	64 to 67
C	60 to 63
C-	55 to 59
D	50 to 54
F (Fail)	0 to 49

COURSE REQUIREMENTS

This course has no pre-requisite requirements. Students must in good standing; exceptions may be made at the discretion of the course instructor.

ACADEMIC INTEGRITY AND PLAGIARISM

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.

APPENDIX 1

Exam/quiz	Wk	Date		Lecture	Speaker lecturer
		Wednesday	3-Sep	Introduction to the course and expectations - Journey Begins	Dr. Savvas Nicolaou
	Week1	Friday	5-Sep	Ionizing Radiation - Basic Principles	Dr. Lulu Liu
		Monday	8-Sep	Introduction to medical imaging: MRI and ultrasound	Dr. Erik Venalainen
		Wednesday	10-Sep	Introduction to medical imaging: X-rays and CTs	Dr. Savvas Nicolaou
	Week2	Friday	12-Sep	Careers In Radiology and why choose radiology	Dr. Savvas Nicolaou and others
Quiz 1		Monday	15-Sep	Visual Journey of Imaging Chest	Dr. Savvas Nicolaou
		Wednesday	17-Sep	Life Saving Impact of ER and Trauma Radiology	Dr. Savvas Nicolaou
	Week3	Friday	19-Sep	Radiation and Health	Dr. Lulu Liu
		Monday	22-Sep	Visual Journey of Imaging Cardiac	Dr. Jonathon Leipsic
		Wednesday	24-Sep	Visual Journey of Imaging Abdomen and Pelvis	Dr. Erik Venalainen
	Week4	Friday	26-Sep	Ultrasound session - Lecture (Abdo)	Dr. Savvas Nicolaou
		Monday	29-Sep	**QUIZ 1**	
		Wednesday	1-Oct	Visual Journey of Imaging Brain and Spine	Dr. Erik Venalainen
	Week5	Friday	3-Oct	Machine learning, Neural Networks and Data Science Transforming Imaging	Dr. Ilker Hacihaliloglu
		Monday	6-Oct	Visual Journey of Imaging Musculoskeletal	Dr. Tim Murray
		Wednesday	8-Oct	Ultrasound session - Live demonstration (MSK)	Dr. Luck Louis
	Week6	Friday	10-Oct	Interventional Radiology and Image Guided Therapy - Part 1 Body	Dr. Lindsay Machan
Quiz 2		Monday	13-Oct	**Thanksgiving Day**	
		Wednesday	15-Oct	Art of Cinematic and Dynamic Imaging (Live session)	Dr. Savvas Nicolaou
	Week7	Friday	17-Oct	Interventional Radiology and Image Guided Therapy - Part 2 Brain and Spine	Dr. Will Guest
		Monday	20-Oct	Population Screening and Impact on Society for Diseases - Liver	Dr. Silvia Chang
		Wednesday	22-Oct	Environmental Sustainability in Medical Imaging	Dr. Maura Brown
	Week8	Friday	24-Oct	Population Screening and Impact on Society for Diseases - Lung	Dr. Israr Ahmad
		Monday	27-Oct	**QUIZ 2**	
		Wednesday	29-Oct	Population Screening and Impact on Society - Breast diseases	Dr. Paula Gordon
	Week9	Friday	31-Oct	Population Screening and Impact on Society for Diseases - Brain	Dr. Erik Venalainen
		Monday	3-Nov	Research in Radiology- Pioneering innovation	Dr. Jonathon Leipsic
		Wednesday	5-Nov	Population Screening and Impact on Society for Diseases - Coronary Disease	Dr. Jonathon Leipsic
Final Exam	Week10	Friday	7-Nov	Population Screening and Impact on Society for Diseases – Gynecological	Dr. Jessica Li
		Nov-10–12		**Midterm Break**	
	Week11	Friday	14-Nov	Revolutionary Role of Imaging in Oncology	Dr. Ren Yuan
		Monday	17-Nov	What role does imaging play in major sporting events?	Dr. Bruce Forster
		Wednesday	19-Nov	When to image, and when not to image: Patient care and economic considerations	Dr. Bruce Forster
	Week 12	Friday	21-Nov	Forensic Imaging: Finding the truth	Dr. Savvas Nicolaou
		Monday	24-Nov	Imaging the Invisible: Radiologic Insights into Vaping and Drug Abuse	Dr. Savvas Nicolaou
	Week 13	Wednesday	26-Nov	3D printing	Dr. Adnan Sheikh

Final Exam		Friday	28-Nov	Pediatric Radiology	Dr. Lydia Bajno
	Week 14	Monday	1-Dec	Exponential Progress - Artificial Intelligence and Augmented Reality in Medical Imaging	Dr. Philip Edgcumbe
		Wednesday	3-Dec	TBD	TBD
		Friday	5-Dec	Review session	Dr. Erik Venalainen