CUMMING SCHOOL OF MEDICINE
GRADUATE COURSE OUTLINE

COURSE TITLE: Medical Imaging Applications			
Course	MDSC 689.11		
Pre/Co-Requisites	Consent of faculty. MDSC 689.01 should be taken prior to 689.11, but exceptions can be made.		
Faculty	Cumming School of Medicine, Graduate Science Education		
Instructor Name(s)	Catherine Lebel, Ashley Harris	**Email**	clebel@ucalgary.ca, Ashley.harris2@ucalgary.ca
Office Location	B4-512, B4-513	**Office Hours**	By appointment
Instructor Email Policy	Please use email addresses above. Inquiries about assignments should be first directed to the TA. For any other questions or comments, please email both instructors.		
Telephone No.			
TA Name, if applicable	Jordan Bannister	**Email**	Jordan.bannister@ucalgary.ca
Class Term, Days	Winter 2020, Mondays		
Class Times	9:30 am – 12:30 pm		
Class Location	Alberta Children's Hospital (room varies; see below)		

COURSE INFORMATION/DESCRIPTION OF THE COURSE

This course teaches research methods relevant to medical imaging. Lectures will cover basic statistical analysis and advanced statistics relevant to medical imaging analysis. Students will learn how to critically evaluate medical imaging literature. The class will overview basic image analysis techniques common to different modalities (e.g., assessing reproducibility), and provide a basic introduction to analysis techniques relevant to multiple imaging disciplines (e.g., machine learning, finite element analysis).

LEARNING RESOURCES/REQUIRED READING

Short readings (typically journal articles) will be assigned each week.

COURSE OBJECTIVES/LEARNING OUTCOMES

At the end of this course, students should be able to:

1. Select appropriate statistical analyses to answer medical imaging research question(s)

2. Locate and critically evaluate relevant medical imaging literature
3. Outline basic image analysis steps appropriate to any modality
4. Compare and contrast different image analysis tools and applications

CUT POINTS FOR GRADES

This course adheres to the grading system outlined in the University of Calgary, Faculty of Graduate Studies Calendar. Grades of A+ and A are not distinguished in the calculation of GPAs. Percentage/letter grade conversion used for this course is as follows

Grade	Grade Point Value	Percentage Conversion	Graduate Description
A+	4.00	95-100	Outstanding
A	4.00	90-94	Excellent – superior performance showing comprehensive understanding of the subject matter
A-	3.70	85-89	Very Good Performance
B+	3.30	77-84	Good Performance
B	3.00	72-76	Satisfactory Performance
B-	2.70	68-71	Minimum Pass for Students in the Faculty of Graduate Studies
C+	2.30	63-67	All grades below 'B-" are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements

Assessment Components: The University policy on grading related matters is outlined in the 2019-2020 Calendar.

Assessment Methods	Description	Weight %	Due Date and Time
Stats Assignment 1	Calculate effect size from literature	10	Jan 28 (11:30 pm)
Stats Assignment 2	Given reading, what is the appropriate statistical test and why	10	Feb 11 (11:30 pm)
Methods of project assignment	Describe and justify the methods of your graduate research project	10	Presentations throughout term
Written review assignment	Write a literature review	20	April 7 (11:30 pm)

Oral review assignment	Present your written literature review to the class	20	Presentations throughout term
Issues in science presentation and discussion	Lead and moderate a current topic/issue in science	20	Presentations throughout term
Participation	Contributing to discussions, asking questions, being engaged in class	10	Throughout term

ASSESSMENT AND EVALUATION INFORMATION

ATTENDANCE AND PARTICIPATION EXPECTATIONS: Attendance at all lectures, be prepared for class – specifically to be prepared to participate in discussion by reading assigned papers in advance, participation in class discussions

GUIDELINES FOR SUBMITTING ASSIGNMENTS: Assignments should be submitted to the TA and/or on D2L by the deadline.

FINAL EXAMINATIONS: No final exam.

EXPECTATIONS FOR WRITING: Writing should be professional, clear, and grammatically correct.

LATE AND/OR MISSING ASSIGNMENTS: No extensions for final assignment. Extensions for other assignments only under extenuating circumstances and with prior arrangement.

Is a passing grade on a particular component essential to pass the course as a whole? No

	COURSE TIMETABLE		
Course Schedule Date	**Room**	**Topic**	**Instructor**
January 13	ACH Amphitheatre	Course objectives, assignments, etc. Literature review How to review a paper	Catherine Lebel, Ashley Harris Helen Lee Robertson (librarian) Catherine Lebel, Ashley Harris
January 20	ACH Conf 9	Statistics: T-tests Paper review	Geoff Schneider Svenja Espenhahn
January 27	ACH B2-200	Statistics: ANOVA, GLM	Geoff Schneider
February 3	ACH Conf 14	Statistics: regression	Geoff Schneider
February 10	ACH Conf 14	Multiple comparisons Bayesian Statistics	Rebecca Williams Jordan Bannister
February 17	NO CLASS	FAMILY DAY	

February 24	ACH Conf 14	Non-parametric statistics Registration	Ashley Ware Rebecca Williams
March 2	ACH Conf 10	Imaging biomarkers Multimodal imaging	Frank MacMaster Catherine Lebel
March 9	ACH Conf 5	Longitudinal statistics	Kathryn Manning
March 16	ACH Conf 5	Machine Learning	Roberto Souza
March 23	ACH Conf 9	Repeatability, validation	Tiffany Bell
March 30	ACH Conf 14	Simulations	Justin Tse
April 6	ACH Conf 5	Wrap-up	Catherine Lebel, Ashley Harris

INTERNET AND ELECTRONIC COMMUNICATION DEVICE INFORMATION

Cell phones must be turned off in class unless otherwise arranged with the instructor.

The use of laptop and mobile devices is acceptable when used in a manner appropriate to the course and classroom activities. Students are to refrain from accessing websites that may be distracting for fellow learners (e.g. personal emails, Facebook, YouTube). Students are responsible for being aware of the University's Internet and email use policy, which can be found at https://www.ucalgary.ca/policies/files/policies/electronic-communicationspolicy.pdf.

MEDIA AND RECORDING IN LEARNING ENVIRONMENTS

Media recording for lesson capture

The instructor may use media recordings to capture the delivery of a lecture. These recordings are intended to be used for lecture capture only and will not be used for any other purpose. Although the recording device will be fixed on the Instructor, in the event that incidental student participation is recorded, the instructor will ensure that any identifiable content (video or audio) is masked, or will seek consent to include the identifiable student content to making the content available on University approved platforms.

Media recording for assessment of student learning

The instructor may use media recordings as part of the assessment of students. This may include but is not limited to classroom discussions, presentations, clinical practice, or skills testing that occur during the course. These recordings will be used for student assessment purposes only and will not be shared or used for any other purpose.

Media recording for self-assessment of teaching practices

The instructor may use media recordings as a tool for self-assessment of their teaching practices. Although the recording device will be fixed on the instructor, it is possible that student participation in the course may be inadvertently captured. These recordings will be used for instructor self-assessment only and will not be used for any other purpose.

Student Recording of Lectures

Audio or video recording of lectures is prohibited except where explicit permission has been received from the instructor.

UNIVERSITY OF CALGARY POLICIES AND SUPPORTS

ACADEMIC ACCOMMODATIONS

Students seeking an accommodation based on disability or medical concerns should contact Student Accessibility Services; SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/. Students who require an accommodation in relation to their coursework based on a protected ground other than disability should communicate this need in writing to their Instructor. The full policy on Student Accommodations is available at http://www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf

IMPORTANT INFORMATION

Any research in which students are invited to participate will be explained in class and approved by the appropriate University Research Ethics Board

COPYRIGHT

It is the responsibility of students and professors to ensure that materials they post or distribute to others comply with the Copyright Act and the University's Fair Dealing Guidance for Students (library.ucalgary.ca/files/library/guidance_for_students.pdf). Further information for students is available on the Copyright Office web page (https://library.ucalgary.ca/copyright)

A NOTE REGARDING INSTRUCTOR INTELLECTUAL PROPERTY

Generally speaking, course materials created by professor(s) (including course outlines, presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the professor (s). These materials may NOT be reproduced, redistributed or copied without the explicit consent of the professor. The posting of course materials to third party websites such as note-sharing sites without permission is prohibited. Sharing of extracts of these course materials with other students enrolled in the course *at the same time* may be allowed under fair dealing

ACADEMIC INTEGRITY

The Cumming School of Medicine expects intellectual honesty from its students. Course participants should be aware of University policies relating to Principles of Conduct, Plagiarism and Academic Integrity. These are found in the printed Faculty of Graduate Studies Calendar, or online under Academic Regulations in the Faculty of Graduate Studies Calendar, available at **Faculty of Graduate Studies Academic Regulations**

ACADEMIC MISCONDUCT
For information on academic misconduct and its consequences, please see the University of Calgary Calendar at http://www.ucalgary.ca/pubs/calendar/current/k.html

EMERGENCY EVACUATION AND ASSEMBLY POINTS
Assembly points for emergencies have been identified across campus. The primary assembly points for South Campus (Health Science Centre (HSC); Health & Research Innovation Centre (HRIC); Heritage Medical Research Building (HMRB) and Teaching, Research and Wellness (TRW)) are:

- HSC and HMRB: HRIC Atrium (alternate assembly point is Parking Lot 6)
- HRIC: HMRB Atrium (alternate assembly point is Parking Lot 6)
- TRW: McCaig Tower (alternate assembly point is HMRB – Atrium)

APPEALS
If there is a concern with the course, academic matter or a grade, first communicate with the instructor. If these concerns cannot be resolved, students can proceed with an academic appeal, as per Section N of the Faculty of Graduate Studies Calendar. Students must follow the official process and should contact the Student Ombuds Office (http://www.ucalgary.ca/provost/students/ombuds) for assistance with this and with any other academic concerns, including academic and non-academic misconduct

THE FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY (FOIP) ACT
This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIP) and students should identify themselves on written assignments (exams and term work.) by their name and ID number on the front page and ID on each subsequent page. Assignments given by you to your course instructor will remain confidential unless otherwise stated before submission. The assignment cannot be returned to anyone else without your expressed permission to the instructor. Grades will be made available on an individual basis and students will not have access to other students' grades without expressed consent. Similarly, any information about yourself that you share with your course instructor will not be given to anyone else without your permission

WELLNESS AND MENTAL HEALTH RESOURCES
The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the excellent mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre), https://www.ucalgary.ca/wellnesscentre/services/mental-health-services and the Campus Mental Health Strategy website https://www.ucalgary.ca/mentalhealth/"

SUPPORTS FOR STUDENT LEARNING, SUCCESS, AND SAFETY

Student Ombudsman: The Student Ombuds' Office supports and provides a safe, neutral space for students. For more information, please visit www.ucalgary.ca/ombuds/ or email ombuds@ucalgary.ca

Student Union: The SU Vice-President Academic can be reached at (403) 220-3911 or suvpaca@ucalgary.ca; Information about the SU, including elected Faculty Representatives can be found here: https://www.su.ucalgary.ca

Graduate Student's Association: The GSA Vice-President Academic can be reached at (403) 220- 5997 or gsa.vpa@ucalgary.ca; Information about the GSA can be found here: https://gsa.ucalgary.ca

SAFEWALK
Campus security will escort individuals, day or night, anywhere on campus (including McMahon Stadium, Health Sciences Centre, Student Family Housing, the Alberta Children's Hospital and the University LRT station). Call 403-220-5333 or visit http://www.ucalgary.ca/security/safewalk. Use any campus phone, emergency phone or the yellow phone located at most parking lot pay booths. Please ensure your personal safety by taking advantage of this service.