UNIVERSITY OF CALGARY

CUMMING SCHOOL OF MEDICINE
GRADUATE COURSE OUTLINE

COURSE TITLE:			
Course Name and Number	MDSC 689.02 – Advanced Magnetic Resonance Imaging		
Pre/Co-Requisites	Pre-Requisites: MDSC 689.01 or equivalent, permission from instructor		
Faculty	Cumming School of Medicine, Graduate Science Education		
Instructor Name(s)	Bradley Goodyear	**Email**	goodyear@ucalgary.ca
Office Location	Zoom (link provided upon request)	**Office Hours**	N/A
Instructor Email Policy	No restrictions		
Telephone No.	n/a		
TA Name	n/a	**Email**	n/a
Class Term, Days	Winter 2021 , Tuesdays		
Class Times	1130 – 1430		
Class Location	via Zoom, synchronous and asynchronous		

This course will take place **online** via Zoom. To best succeed in the course, students are encouraged to participate in the asynchronous learning tasks (e.g., reading papers, watching videos) using the synchronous Zoom sessions, which will be recorded. When unable to participate live due to the time difference or unforeseen circumstances, inform the instructor in advance to arrange an alternative participation activity (e.g., watch the recordings).

COURSE INFORMATION/DESCRIPTION OF THE COURSE
An in-depth study of the principles of magnetic resonance imaging (MRI), recent technological advances in MRI, and how MRI is used to study brain structure and function in combination with other imaging technologies. Individuals will gain practical experience with MRI data and current analysis techniques.

LEARNING RESOURCES/REQUIRED READING
Series of papers and online resources provided during synchronous sessions.

COURSE OBJECTIVES/LEARNING OUTCOMES

To understand:
- the principles of MRI and how images are formed of various contrasts
- how multimodal MRI studies are designed to investigate brain structure and function.
- other imaging modalities that provide complementary measures of brain function.
- how to use several software packages for the analysis of brain images.
- how to analyze multimodal imaging data.

Communication:

Please discuss how you will communicate with your students (including how you provide link to online classes)

Email will the primary form of communication with students. A Zoom link for the course will be sent to students at the beginning of the term. Please ensure that you are regularly checking your @ucalgary.ca account.

Learning Technology Requirements

In order to successfully engage in learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security and malware updates;
- A current and updated web browser;
- Webcam (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Broadband internet connection

Most current laptops will have a built-in webcam, speaker and microphone.

Please see the following for a detailed explanation of the minimal required technology for online learning
https://elearn.ucalgary.ca/technology-requirements-for-students/

The University of Calgary Cumming School of Medicine would like to acknowledge the traditional territories of the people of the Treaty 7 region in Southern Alberta, which includes the Blackfoot Confederacy (comprising the Siksika, Piikani, and Kainai First Nations), as well as the Tsuut'ina First Nation, and the Stoney Nakoda (including the Chiniki, Bearspaw, and Wesley First Nations). The City of Calgary is also home to Métis Nation of Alberta, Region III.

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	85-94	Excellent – superior performance showing comprehensive understanding of the subject matter
A-	3.70	80-84	Very Good Performance
B+	3.30	75-79	Good Performance
B	3.00	70-74	Satisfactory Performance
B-	2.70	65-69	Minimum Pass for Students in the Faculty of Graduate Studies
C+	2.30	55-64	All grades below 'B-" are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements
C	2.00	50-54	

Assessment Components: The University policy on grading related matters is outlined in the 2020-2021 Calendar.

Assessment Methods	Description	Weight %	Due Date and Time
Oral Quiz	Oral Quiz #1	15	Feb 9, 2021, 13:30
Written Report	Lab Report #1	15	Feb 23, 2021, 8:00
Oral Quiz	Oral Quiz #2	15	Mar 16, 2021, 13:30
Written Report	Lab Report #2	15	Apr 6, 2021, 8:00
Written Exam	Final Exam	40	Registrar scheduled

ASSESSMENT AND EVALUATION INFORMATION

ATTENDANCE AND PARTICIPATION EXPECTATIONS:
Students are expected to attend the synchronous Zoom sessions, with video enabled. Students may be called upon to answers questions and participate in group discussions.

GUIDELINES FOR SUBMITTING ASSIGNMENTS:
Assignments are to be submitted in PDF form by email to the instructor by the dates and times outlined above.

FINAL EXAMINATIONS:
The final exam will be written, and exam questions will be emailed to students at the time of the examination, which will be conducted as a synchronous Zoom session.

EXPECTATIONS FOR WRITING:
Students are expected to write in clear and concise language using Microsoft Word or similar software. PDFs are desirable.

LATE AND/OR MISSING ASSIGNMENTS:
Missing assignments will be assigned a mark of zero. Late assignments are acceptable if students have made arrangements with the instructor.

Is a passing grade on a particular component essential to pass the course as a whole?
Final exam

Date	Topics
Jan 12, 2021	Review of MRI Concepts
Jan 19, 2021	Gradients, Contrast, k-space
Jan 26, 2021	More on k-space and image properties; Lab Project #1
Feb 2, 2021	Pulse Sequences; Fast Techniques (GRAPPA, SENSE, SMS, HYPERBAND)
Feb 9, 2021	Diffusion Tensor Imaging (DTI); DTI Software Demos; Oral Quiz #1
Feb 16, 2021	**NO CLASS**
Feb 23, 2021	Quantitative Susceptibility Mapping (QSM); Perfusion Imaging
Mar 2, 2021	Functional Magnetic Resonance Imaging (fMRI); fMRI Software Demos
Mar 9, 2021	Brain Atlases and Volumetric Analysis; Multimodal MRI Study Designs and Analysis
Mar 16, 2021	Machine-Learning Based Image Reconstruction; Oral Quiz #2; Lab Project #2
Mar 23, 2021	Electroencephalography (EEG); functional Near-infrared Spectroscopy (fNIRS)
Mar 30, 2021	Neurostimulation: Transcranial Magnetic Stimulation (TMS); Focussed ultrasound; Deep Brain Stimulation
Apr 6 , 2021	A Review of Selected Papers on Multimodal MRI and Neurostimulation/MRI
Apr 14, 2021	Review

Guidelines for Zoom Sessions

Zoom is a video conferencing program that will allow us to meet at specific times for a 'live' video conference, so that we can have the opportunity to meet each other virtually and discuss relevant course topics as a learning community.

To help ensure Zoom sessions are private, do not share the Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published without the instructor's permission.

The use of video conferencing programs relies on participants to act ethically, honestly and with integrity; and in accordance with the principles of fairness, good faith, and respect (as the Code of Conduct). When entering Zoom or other video conferencing sessions, you play a role in helping create an effective, safe and respectful learning environment. Please be mindful of how your behaviour in these sessions may affect others. Participants are required to use names officially associated with their UCID (legal or preferred names listed in the Student Centre) when engaging in these activities. Instructors/moderators can remove those whose names do not appear on class rosters. Non-compliance may be investigated under relevant University of Calgary conduct policies. If participants have difficulties complying with this requirement, they should email the instructor of the class explaining why, so the instructor may consider whether to grant an exception, and on what terms. For more information on how to get the most out of your zoom sessions visit: https://elearn.ucalgary.ca/guidelines-for-zoom/.

If you are unable to attend a Zoom session, please contact your instructor to arrange an alternative activity (where available). Please be prepared, as best as you are able, to join class in a quiet space that will allow you to be fully present and engaged in Zoom sessions. Students will be advised by their instructor when they are expected to turn on their webcam (such as for group work, presentations, etc).

The instructor may record online Zoom class sessions for the purposes of supporting student learning in this class – such as making the recording available for review of the session or for students who miss a session. Students will be advised before the instructor initiates a recording of a Zoom session. These recordings will be used to support student learning only.

Conduct During Lectures

The classroom should be respected as a safe place to share ideas without judgement - a community in which we can all learn from one another. Students are expected to frame their comments and questions to lecturers in respectful and appropriate language, always maintaining sensitivity towards the topic. Students, employees, and academic staff are also expected to demonstrate behaviour in class that promotes and maintains a positive and productive learning environment.

As members of the University community, students, employees and academic staff are expected to demonstrate conduct that is consistent with the University of Calgary Calendar, the Code of Conduct and Non-Academic Misconduct policy and procedures, which can be found at https://www.ucalgary.ca/policies/forms/title.

Equity, Diversity and Inclusion
The Cumming School of Medicine recognizes that equity, diversity, and inclusion benefits and strengthens all communities, including the medical community and those served by it. We aim to actively engage all learners, particularly those from equity seeking groups including women, Indigenous peoples, visible/racialized minorities, persons with disabilities, and LGBTQ+. While our faculty continues to learn about more equitable, diverse, and inclusive approaches to education, we welcome and appreciate suggestions to help us ensure that all learners are well served by our courses. To help cultivate learning environments that support diverse and inclusive perspectives and lived experiences, learners are invited to let instructors know if: - they have names and/or pronouns they would prefer to use that differ from those that appear on official records   - scheduled class meetings conflict with religious events so that alternative arrangements can be made   If they are not already, learners are also encouraged to become familiar with the various opportunities for diverse engagement, learning, and support on campus, including, but not limited to the following resources: **The Office of Equity, Diversity and Inclusion** https://www.ucalgary.ca/equity-diversity-inclusion **The Q Centre** https://www.su.ucalgary.ca/programs-services/student-services/the-q-centre/ **The Writing Symbols Lodge** https://www.ucalgary.ca/student-services/writing-symbols/home

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/acceptable-use-of-electronic-resources-and-information-policy.pdf

MEDIA AND RECORDING IN LEARNING ENVIRONMENTS

Media recording for lesson capture

Please refer to the following statement on media recording of students: https://elearn.ucalgary.ca/wp-content/uploads/2020/05/Media-Recording-in-Learning-Environments-OSP_FINAL.pdf

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/visual 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 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

INSTRUCTOR INTELLECTUAL PROPERTY

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

COPYRIGHT LEGISLATION
All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright-policy.pdfand requirements of the copyright act (https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html) to ensure they are aware of the consequences of unauthorised sharing of course materials (including instructor notes, electronic versions of textbooks etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy

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 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 (www.ucalgary.ca/student-services/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, at www.ucalgary.ca/wellnesscentre/services/mental-health-services and the Campus Mental Health Strategy website at 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: 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: 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 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.