



**CUMMING SCHOOL OF MEDICINE  
GRADUATE COURSE OUTLINE**

<b>COURSE TITLE: Nucleic Acids, DNA Replication, Transcription and RNA Signalling</b>			
<b>Course</b>	MDGE 722		
<b>Pre/Co-Requisites</b>	Course Coordinator Permission		
<b>Faculty</b>	Cumming School of Medicine, Graduate Science Education		
<b>Instructor Name(s)</b>	Drs. James McGhee & Susan Lees-Miller	<b>Email</b>	Dr. McGhee: <a href="mailto:jmcghee@ucalgary.ca">jmcghee@ucalgary.ca</a> Dr. Lees-Miller: <a href="mailto:leesmill@ucalgary.ca">leesmill@ucalgary.ca</a>
<b>Office Location</b>	Dr. McGhee: n/a Dr. Lees-Miller: HRIC 2A22	<b>Office Hours</b>	By Appointment only
<b>Instructor Email Policy</b>	Emails from students will receive responses within two business days, or ASAP under normal circumstances.		
<b>Telephone No.</b>	Dr. McGhee: n/a Dr. Lees-Miller: 220-7628		
<b>Class Term, Days</b>	Fall 2020, Sep 8, 10, 15, 17, 22, 24, 29, Oct 1		
<b>Class Times</b>	15:00 PM - 16:30 PM, T/R		
<b>Class Location</b>	Online		

This course will take place **online** via Desire2Learn (D2L) and Zoom via synchronous instruction. To best succeed in the course, students are encouraged to participate in the synchronous Zoom sessions. When unable to participate live due to the time difference or unforeseen circumstances, inform the instructor in advance and propose and implement propose an alternative participation activity.

<b>COURSE INFORMATION/DESCRIPTION OF THE COURSE</b>
MDGE722 will discuss the detailed structure and basic biochemical features of DNA, as it is folded and as it functions inside the eukaryotic nucleus. Topics will include how the 2-metre long human genome is packaged by “chromatin”, how transcription factors are able to choose particular DNA sequences and how this choice leads to active transcription of specific genes, how various classes of transcribed RNA are synthesized and processed, and how the entire genome is replicated in eukaryotic cells. Discussions will begin with detailed 3D structures of the various macromolecules, will emphasize how these structures then give rise to the important biochemical features of transcription and replication, and will attempt to explain the biological complexity and specificity that emerge from these processes.
<b>LEARNING RESOURCES/REQUIRED READING</b>
Primary literature and reviews as indicated in the lectures.



#### **COURSE OBJECTIVES/LEARNING OUTCOMES**

- Understand how information is coded in structural features of DNA and patterns of DNA sequence
- Understand how the conformation of the genome is experimentally probed inside the eukaryotic nucleus
- Understand how genome packaging is controlled by the large variety of “chromatin” proteins
- Understand how transcription factors interact with DNA to select individual genes for transcription
- Understand how bound transcription factors interact with and engage downstream machinery, i.e. co-regulators / mediators, chromatin modifiers and remodelers, general transcription factors and ultimately RNA Polymerase II.
- Understand the basic types and properties of RNA molecules, including rRNA, tRNA, mRNA and non-coding RNAs
- Understand how pre-mRNA is processed in the nucleus and exported to the cytoplasm
- Understand the current models of eukaryotic DNA replication and control of replication

#### **Communication**

Brightspace (By D2L) is located on the University of Calgary server and will be used extensively for communication with Students. A link to the zoom class will be provided on D2L. It is the student’s responsibility to ensure that they receive all posted communications and documents and that they receive e-mails send by instructors of fellow students through D2L. Only your @ucalgary.ca e-mail address maybe linked to D2L. 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/>

A laptop, desktop, tablet or mobile device is required for D2L access. If you need help accessing or using D2L, please visit the Desire2Learn resource page for students: <http://elearn.ucalgary.ca/d2l-student/>.

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 <a href="#">2019-2020 Calendar</a> .			
Assessment Methods	Description	Weight %	Due Date and Time
Written Assignment #1	Mini-review on how the transcription of a gene of your choice is regulated. Format: 2-3 pages (double-spaced), 1-3 figures, 5-10 references.	10	Due 4pm Tues Sept 22 <sup>nd</sup> by email.
Oral Assignment # 1	2-4 Powerpoint™ slides, 5-10 minute presentation on the topic of written assignment #1. Format: to be presented in class via Zoom.	10	Presented in class by Zoom Sept 17 <sup>th</sup>
Written Assignment #2	Grant proposal on transcriptional regulation of a gene of your choice. Format: 5 -7 pages text (double-spaced) plus 2-3 figures and references	30	Due 4pm Oct 8 <sup>th</sup> by email.
Written Assignment #3	Mini-review on regulation of protein of your choice by non-coding RNA (lncRNA or miRNA). Format: 2-3 pages, 1-3 figures (double-spaced), 5-10 references	10	Due 4 pm Thurs Oct 1 by email.
Oral Assignment #2	2-4 Powerpoint™ slides, 5-10 minute presentation on the topic of written assignment #3.	10	Presented in class by Zoom, Tues Sept 29 <sup>th</sup>



	Format: To be presented in class via Zoom.		
Written Assignment #4	Grant proposal on DNA replication. Format: 5-7 pages text (double-spaced), plus 2-3 figures and references	30	Due 4 pm Thursday Oct 8 <sup>th</sup> by email.

#### ASSESSMENT AND EVALUATION INFORMATION

**ATTENDANCE AND PARTICIPATION EXPECTATIONS:** 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 conduct themselves in a mature and courteous manner during ALL lectures. Students are expected to frame their comments and questions to lecturers in respectful and appropriate language, always maintaining sensitivity towards the topic.

**To be successful, students are expected to attend ALL CLASSES and take notes during class, and should not rely solely on material supplied by the instructors. Missing two or more lectures may jeopardize your ability to pass / achieve a good grade this course.**

**GUIDELINES FOR SUBMITTING ASSIGNMENTS:** Assignments must be submitted according to the specific instructions provided to you by the instructor at the beginning of the course.

**FINAL EXAMINATIONS:** There are no Registrar-Scheduled final examinations for this course.

**EXPECTATIONS FOR WRITING:** Writing skills are important to academic study in all disciplines. In keeping with the University of Calgary's emphasis on the importance of academic writing in student assignments (section E.2 of 2018-19 Calendar), writing is emphasized, and the grading thereof in determining a student's mark in this course. The University of Calgary values excellence in writing. Competence in writing entails skills in crafting logical, clear, coherent, non-redundant sentences, paragraphs and broader arguments, as well as skills with the mechanics of writing (grammar, spelling, punctuation). The University of Calgary offers a number of instructional services through the Students' Success Centre's Writing Support Services (<http://www.ucalgary.ca/writingsupport/>) for students seeking feedback on assignments or seeking to improve their general writing skills. Students are strongly encouraged to take advantage of these programs.

**LATE AND/OR MISSING ASSIGNMENTS:** As a general rule, late assignments will not be accepted and will automatically receive a mark of zero. Students who miss a quiz/test will receive a mark of zero unless the instructor has been notified prior to the start of the class. There will be NO exceptions to this policy.

It is the agreement of all Faculty involved in MDGE courses that extensions will NOT be granted. The only exceptions to this are those in keeping with the University Calendar (debilitating illness, religious conviction, or severe domestic affliction) that are received in writing and with supporting documentation. Traffic jams and late or full buses are common events in Calgary and are NOT acceptable reasons for late arrivals to class or examinations. Please note that while absences are permitted for religious reasons, students are responsible for providing advance notice and adhering to other guidelines on this matter, as outlined in the University Calendar (<https://www.ucalgary.ca/pubs/calendar/current/e-4.html>). In this case, alternative arrangements will be made.

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

		COURSE TIMETABLE	
Course Schedule Date	Topic & Reading	Instructor	Assignments Due Dates & Times
September 8	Lecture by Zoom: DNA Structure and Chromatin	McGhee	n/a
September 10	Lecture by Zoom: Eukaryotic Transcription # 2	McGhee	n/a
September 15	Lecture by Zoom Eukaryotic Transcription # 2	McGhee	n/a
September 17	Student presentations by Zoom. 5-10 minutes each.	McGhee	Student presentations in class by Zoom
September 22	Lecture by Zoom RNA Structure and Function	Lees-Miller	n/a
September 22	Written assignment #1 due.	McGhee	Written assignment #1 due by 4 pm by email.
September 24	Lecture by Zoom Non-coding RNA	Lees-Miller	n/a
September 29	Lecture by Zoom DNA replication	Lees-Miller	n/a
October 1	Student presentations by Zoom. 5-10 minutes each.	Lees-Miller	Student presentations in class by Zoom
October 1	Written Assignment #3 due	Lees-Miller	Written assignment #3 due by 4 pm by email.
October 8	Written assignment #2 due	McGhee	Written assignment #2 due by 4pm by email
October 8	Written assignment #4 due	Lees-Miller	Written assignment #4 due by 4 pm by email

### 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>.

<b>INTERNET AND ELECTRONIC COMMUNICATION DEVICE INFORMATION</b>
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/](http://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](http://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](http://www.ucalgary.ca/facultyofgraduatestudies/academicregulations)

### **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/](http://www.ucalgary.ca/ombuds/) or email [ombuds@ucalgary.ca](mailto:ombuds@ucalgary.ca)

**Student Union:** The SU Vice-President Academic can be reached at (403) 220-3911 or [suvpaca@ucalgary.ca](mailto: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](mailto: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.