

**MDSC 545  
Genomics**

**Instructors:**

Dr. Bob Argiropoulos  
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**Office Hours/Policy on Answering Student Emails**

No recurring office hours have been scheduled but meetings can be arranged by emailing the course instructors or teaching assistant.

**Teaching Assistants:**

Nerea Jimenez Tellez

[nerea.jimeneztell1@ucalgary.ca](mailto:nerea.jimeneztell1@ucalgary.ca)

**Time and Location:**

Tuesdays and Thursdays, 1:30 pm to 2:50 pm; Health Science Centre G384

Guest lecturers will be given the option of attending their lecture in person or to Zoom in.

**Prerequisite/Co-Requisite:**

Medical Science 408 or Cellular, Molecular and Microbial Biology 413.

**Course Description:**

This course examines the strategies and techniques used in genomic and genetic studies. Reviews how genome editing is used in model systems to establish the functional consequences of genomic variation. Students can expect to gain a comprehensive understanding and broad appreciation of the significance of genomic information in the context of rare and common human diseases and genome biology.

**Overarching Theme**

This course will introduce you to the concepts and techniques currently used in genomics and the applicability and ethical implications of genomic information.

**Global Objectives**

To appreciate the impact the field of genomics has had in the sciences and how it has impacted and refined our knowledge of basic biology and medicine.

**Course Learning Objectives**

By the end of this course, students will be able to:

1. Recognize how genomic information has been used to identify the underlying cause of genetic disorders and enhance our understanding of biological systems.
2. Be familiar with current genomic methodologies and databases and develop an appreciation for the quantitative and qualitative concepts underlying these processes.

3. Appreciate the complex ethical, legal and social issues that accompany genomic data and its applicability.

### Required Textbooks

There is no assigned textbook for this course.

### Recommended Textbooks/Readings

A list of required readings will be outlined on D2L and links and documents will be made available, where possible. Required readings have been chosen carefully to inform you and enhance the lecture material. Students are **REQUIRED** to complete assigned readings **BEFORE** each lecture. Instructors will proceed in class on the assumption that students have read completely the assigned readings. Students should be aware that many of the readings they will be assigned may be of an unfamiliar nature and style. Students should allot sufficient time to allow for several reads of the assigned material.

### Learning Technology Requirements

Brightspace (by D2L) is located on the University of Calgary server and will be used extensively for communication with students. **It is the student's responsibility to ensure that they receive all posted communications and documents and that they receive emails sent by instructors or fellow students through D2L.** Only your @ucalgary.ca email address may be linked to D2L. Please ensure that you are regularly checking your @ucalgary.ca account.

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.

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/>.

### Evaluation

The University policy on grading and related matters is described in section F of the 2021-2022 Calendar.

In determining the overall grade in the course, the following weights will be used:

Topic (20%) and Article (20%) review oral presentations: 40%	
Assignment 1: 10%	Due on Sept. 23 <sup>th</sup> , 1:30 pm
Assignment 2: 10%	Due on Oct. 7 <sup>th</sup> , 1:30 pm
Assignment 3: 5%	Due on Oct. 28 <sup>th</sup> , 1:30 pm
Assignment 4: 5%	Due on Nov. 23 <sup>rd</sup> , 1:30 pm
Term paper abstract: 5%	Due on Nov. 11 <sup>th</sup> , 1:30 pm
Term paper: 20%	Due on Dec. 4 <sup>th</sup> , anytime
Participation: 5%	

There is no final exam for this course.

A passing grade on a particular component is not essential to pass the course as a whole, however, students who do not complete the two major components of the course will be considered as not having completed the course; this will be reflected on the students' official transcript as 'Incomplete'. Major components of the course include the Topic and Article review presentation and the Term Paper. In the absence of medical or other documented reasons, the instructor reserves the right to award an 'Incomplete'."

#### **Note regarding Writing Assignments:**

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 2021-22 Calendar), writing is emphasized, and the grading thereof in determining a student's mark in this course. The Bachelor of Health Sciences 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.

#### **Grading Scheme:**

<b>Letter Grade</b>	<b>Description</b>	<b>Percentage</b>
<b>A+</b>	Outstanding performance	96-100
<b>A</b>	Excellent performance	90-95
<b>A-</b>	Approaching excellent performance	85-89
<b>B+</b>	Exceeding good performance	80-84
<b>B</b>	Good performance	75-79
<b>B-</b>	Approaching good performance	70-74
<b>C+</b>	Exceeding satisfactory performance	65-69
<b>C</b>	Satisfactory performance	60-64
<b>C-</b>	Approaching satisfactory performance	57-59
<b>D+</b>	Marginal pass	54-56
<b>D</b>	Minimal pass	50-53
<b>F</b>	Did not meet course requirements	0-49

#### **Missed Components of Term Work:**

At each instructor's discretion, late assignments will not be accepted and will automatically receive a mark of zero. Students who miss an assignment will receive a mark of zero unless the instructors have been previously notified. There will be NO exceptions to this policy.

It is the agreement of all Faculty and Staff involved in MDSC 545 that **extensions will NOT be granted** on any assignment or quizzes. The only exceptions to this are those in keeping with the University Calendar (illness, religious conviction, or 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, meetings and 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>).

### **Course Evaluations and Student Feedback**

Student feedback will be sought at the end of the course through the Universal Student Rating of Instruction (USRI) and a qualitative student evaluation. Students are welcome to discuss the process and content of the course at any time with the instructor. Students may also address any concerns they may have with Dr. Ebba Kurz, Associate Dean (Undergraduate Health and Science Education) in the Cumming School of Medicine ([kurz@ucalgary.ca](mailto:kurz@ucalgary.ca)).

### **Attendance**

As 5% of your final mark is based on participation, we strongly advise that you show up to all teaching sessions, if physically capable.

### **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>.

**Students are expected to take notes during each session and should not rely solely on material supplied by the instructors.**

### **Use of Internet and Electronic Communication Devices in Class**

The Bachelor of Health Sciences program aims to create a supportive and respectful learning environment for all students. The use of laptop and mobile devices is acceptable when used in a manner appropriate to the course and classroom activities. However, research studies have found that inappropriate/off-topic use of electronic devices in the classroom negatively affects the learning of others during class time.

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-communications-policy.pdf>.

## **UNIVERSITY OF CALGARY POLICIES AND SUPPORTS**

### **Copyright**

All students are required to reach the University of Calgary policy on Acceptable Use of Material Protected by Copyright (<https://www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright-policy.pdf>) and 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 unauthorized 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 <https://www.ucalgary.ca/pubs/calendar/current/k.html>.

### **Instructor Intellectual Property**

Course materials created by instructors (including course outlines, presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the instructor. 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 Accommodations**

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The Student Accommodations policy is available at <https://ucalgary.ca/student-services/access/prospective-students/academic-accommodations>. Students needing an accommodation based on disability or medical concerns should contact Student Accessibility Services (SAS) in accordance with the Procedure for Accommodations for Students with Disabilities (<https://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities.pdf>). SAS will process the request and issue letters of accommodations 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 Dr. Ebba Kurz ([kurz@ucalgary.ca](mailto:kurz@ucalgary.ca)), Associate Dean (Undergraduate Health and Science Education).

### **Academic Misconduct**

The University of Calgary is committed to the highest standards of academic integrity and honesty. The University of Calgary has created rules to govern all its members regarding the creation of knowledge and the demonstration of knowledge having been learned.

Academic Misconduct refers to student behaviour that compromises proper assessment of a student's academic activities and includes (but is not limited to): cheating, fabrication, falsification, plagiarism, unauthorized assistance, failure to comply with an instructor's expectations regarding conduct required of students completing academic assessments in their courses, and failure to comply with exam regulations applied by the Registrar. **It also includes using of third-party websites/services to access past/current course material, essay/assignment writing services, or real-time assistance in completing assessments, seeking answers to assessment questions and similar, whether paid, bartered or unpaid.**

For information of the Student Academic Misconduct Policy and Procedures, please visit: <https://ucalgary.ca/policies/files/policies/student-academic-misconduct-policy.pdf>  
<https://ucalgary.ca/policies/files/policies/student-academic-misconduct-procedure.pdf>

Additional information is available on the Academic Integrity website at: <https://ucalgary.ca/student-services/student-success/learning/academic-integrity>.

### **Recording of Lectures**

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

### **Freedom of Information and Protection of Privacy Act**

Student information will be collected in accordance with typical (or usual) classroom practice. Students' assignments will be accessible only by the authorized course faculty. Private information related to the individual student is treated with the utmost regard by the faculty at the University of Calgary

### **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 I of the University Calendar. Students must follow the official reappraisal/appeal process and may contact the Student Ombuds' Office (<http://www.ucalgary.ca/ombuds>) for assistance with this and with any other academic concerns, including academic and non-academic misconduct. Students should be aware that concerns about graded term work may only be initiated **within 10 business days** of first being notified of the grade. <https://www.ucalgary.ca/pubs/calendar/current/i-2.html>

### **Media Recording**

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](https://elearn.ucalgary.ca/wp-content/uploads/2020/05/Media-Recording-in-Learning-Environments-OSP_FINAL.pdf)

#### **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 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.

#### **Media recording for the 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.

### **Sexual Violence Policy**

The University recognizes that all members of the University Community should be able to learn, work, teach and live in an environment where they are free from harassment, discrimination, and violence. The University of Calgary's sexual violence policy guides us in how we respond to incidents of sexual violence, including supports available to those who have experienced or witnessed sexual violence, or those who are alleged to have committed sexual violence. It provides clear response procedures and timelines, defines complex concepts, and addresses incidents that occur off-campus in certain

circumstances. Please see the policy available at <https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>

### **Resources for Support of Student Learning, Success, Safety and Wellness**

Student Success Centre	<a href="http://www.ucalgary.ca/ssc/">http://www.ucalgary.ca/ssc/</a>
Student Wellness Centre	<a href="http://www.ucalgary.ca/wellnesscentre/">http://www.ucalgary.ca/wellnesscentre/</a>
Distress Centre	<a href="http://www.distresscentre.com/">http://www.distresscentre.com/</a>
Library Resources	<a href="http://library.ucalgary.ca">http://library.ucalgary.ca</a>

### **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 (<https://www.ucalgary.ca/wellnesscentre/services/mental-health-services>) and the Campus Mental Health Strategy (<http://www.ucalgary.ca/mentalhealth/>).

### **Student Ombuds' Office**

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)

### **BHSc Student Faculty Liaison Committee (SFLC)**

The BHSc SFLC, with elected representatives from all majors, serves to raise issues of interest to BHSc students to the program administration, including items pertaining to curriculum, scheduling and events. A list of current representatives can be found on the BHSc website.

### **Student Union (SU) Information**

The SU Vice-President Academic can be reached at (403) 220-3911 or [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca); the SU representatives for the Cumming School of Medicine can be reached at [medrep1@su.ucalgary.ca](mailto:medrep1@su.ucalgary.ca) or [medrep2@su.ucalgary.ca](mailto:medrep2@su.ucalgary.ca).

### **Student Success Centre**

The Student Success Centre provides services and programs to ensure students can make the most of their time at the University of Calgary. Our advisors, learning support staff, and writing support staff assist students in enhancing their skills and achieving their academic goals. They provide tailored learning support and advising programs, as well as one-on-one services, free of charge to all undergraduate and graduate students. For more information visit: <https://www.ucalgary.ca/student-services/student-success>

### **Emergency Evacuation/Assembly Points**

As part of the University of Calgary Emergency Evacuation plan, students, faculty, and staff should locate the closest Assembly Point in case of Fire Alarm. Safety signage is posted throughout the campus showing the locations and the possible route to these locations. All students, faculty, and staff are expected to promptly make their way to the nearest Assembly Point if the Fire Alarm is activated. No one is to return into campus facilities until an all clear is given to the warden in charge of the Assembly Area. For more information, see <https://www.ucalgary.ca/emergencyplan/building-evacuation/assembly-points>

**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.



## 2021 Class Schedule

The following is a list of topics for class and dates of student oral presentations. Please note that unforeseen circumstances may cause changes to the schedule with respect to the timing of topics. Students will be notified of all changes in a timely manner by way of email and D2L announcements.

\*\*\*Due to an unanticipated conflict, the first class is on Thursday, September 9, 2021\*\*\*

Thurs. Sept. 9	Course overview and historical perspective	Dr. Bob Argiropoulos
Tues. Sept. 14	Anatomy of the Genome	Dr. Bob Argiropoulos
Thurs. Sept. 16	Genomic Technologies I	Dr. Bob Argiropoulos
Tues. Sept. 21	Sequence Analysis – Bioinformatics	TBA
Thurs. Sept. 23	Genomic Variant Analysis	Dr. Ryan Lamont
Tues. Sept. 28	Genomic Technologies II	Nerea Jimenez
Thurs. Sept. 30	National Day for Truth and Reconciliation	No Lecture
Tues. Oct. 5	Genome Editing	Dr. Sarah Childs
Thurs. Oct. 7	Cancer Genomics	Dr. Tara Spence
Tues. Oct. 12	Cell free DNA	TBA
Thurs. Oct. 14	Cytogenomics	Dr. Tamas Revay
Tues. Oct. 19	Genomic Medicine	Dr. Bob Argiropoulos
Thurs. Oct. 21	Comparative Genomics	Dr. Tamas Revay
Tues. Oct. 26	Epigenomics	Dr. Bob Argiropoulos
Thurs. Oct. 28	Mitochondrial Genomics	Dr. Tim Shutt
Tues. Nov. 2	Topic Presentations	Drs. Argiropoulos & Revay
Thurs. Nov. 4	Article Presentations	Drs. Argiropoulos & Revay
Tues. Nov. 9 and Thur. Nov. 11	Term Break	No Lectures
Tues. Nov. 16	Topic and Article review presentations	Student led
Thurs. Nov. 18	Topic and Article review presentations	Student led
Tues. Nov. 23	Topic and Article review presentations	Student led
Thurs. Nov. 25	Topic and Article review presentations	Student led
Tues. Nov. 30	Topic and Article review presentations	Student led
Thurs. Dec. 2	Topic and Article review presentations	Student led
Tues. Dec. 7	Topic and Article review presentations	Student led
Tues. Dec. 9	Ethics in Genomic Medicine	Amy Davis and Natasha Lemiski Genetic counsellors