BIOCHEMISTRY 408 – Chromatin & Epigenetics
Course Outline: **Spring 2021**

Place: **Zoom**
Time: Tuesday, Wednesday, Friday
Textbook: None
Web site: Brightspace

Instructors: **Dr. Juan Ausió**
Email: jausio@uvic.ca
Office: Petch 260

Office hours: Every other Friday 12:30 to 1:20 pm via Zoom (see course outline).
email: jausio@uvic.ca

* No office hours will be offered the day before, or day of, an exam.

Course Description

BIOC 408 introduces students to the properties of chromatin and molecular mechanisms underlying epigenetic inheritance. In addition to introductory lectures, an important part of the course focuses on the analysis of research papers related to different topics in chromatin and epigenetics. The course requires a familiarization with nucleic acid and protein chemistry; therefore, students should be familiar with the fundamental aspects of transcription and gene structure. Students should also review basic cell biology in preparation for this course. Students must complete BIOC 300B before taking BIOC 408.

Format

The course consists of a set of formal lectures that introduce essential background material, and key concepts in Chromatin and Epigenetics. Each lecture will conform approximately to the attached course outline, however, some changes are possible. Asynchronous lectures will be posted on Brightspace on each of the days indicated in the accompanying table below. Lectures will be available for two weeks after their release. Students should take notes based on these lectures and are responsible for the lecture material and *Companion papers* in examinations.

Students in the course will be assigned to seven different groups. Results for 'companion papers', 'recent breakthroughs' and 'group presentations' will be prepared and sent to the instructor using these group arrangements according to the instructions that follow.

'Companion papers' are assigned to the class to compliment the lecture material. These papers (5) will be posted together with a set of accompanying questions on the dates indicated in the table of "lecture content" below. All members in each group should answer questions in the report before meeting with their group to discuss them, and come to a consensus for each. A collated version with the agreed upon answers should then be e-mailed to jausio@uvic.ca by the dates indicated on the syllabus table. A marked version will be returned to the group representative one week later. A different member of the group will act as the representative for successive paper submissions. One question will be chosen from *one* of these five papers to be part of the formal course exam on March 16.

'Recent breakthroughs'. Two students each in a group will be assigned one topic of the material covered in the course (a list of the corresponding 2 students and assigned topic will be posted in Brightspace). The students will then identify a 'hot' paper published between 2019-2020 on their assigned topic (more details on the selection process/ TA help will be provided in the new year). Between the two of them they will then prepare a short synopsis abstract (no more than 100 words) that tells the main 'gist' of the paper, as if it would make an entry into a textbook on "chromatin and epigenetics", and frame it within the context of what was learned in the course on this topic. In preparing this short description, the students should use their own words and not simply 'cut and paste' a sentence from the paper abstract (NO plagiarism) (worth **15 marks**). An original image should also be prepared (using power point etc…) (worth **10** marks). This does not need to be a professional image but simply a sketch depicting the written message. Several basic chromatin elements will be provided in a power point format at the beginning of the course. You can alter/combine them in any way you want while working on your image.

'Group presentations' will take place at the end of the course (Mar 24-April 7). These presentations should be considered mini-lectures. The objective is for members of the group to extend the content of the course by summarizing a recent advance, new topic or paradigm shift in Chromatin and Epigenetics. It is expected that material from ONE 'core' research paper will be the basis of the lecture. A list of papers to choose from will be posted on Brightspace and each group will choose one of them on the 'first come first served basis' and communicate their choice to jausio@uvic.ca . Given the current COVID19 situation and the inability to carry out formal face to face presentations, the scheduled group presentations will be submitted (in PDF format) to jausio@uvic.ca for grading, but there will be no opportunity to actually present to your peers. Instead, your score, worth **30%** of the course grade, will be determined by two equally weighted components: 1) The quality of the PowerPoint style presentation. This grade will be common to all group members, and the criteria regarding presentation evaluation will be posted in Brightspace. 2) The quality of your part (each member of the group) of the presentation, which will take the form of a type-written 'script' that clearly outlines what you WOULD say for your set of slides if you were presenting. This is a running transcript of your talk. The dates for the submission of each presentation will be by the end of the corresponding presentation date for each group.

In order not to unnecessarily overburden the course load during this COVID19 situation, there will be no more lectures after the exam. Students should use this time space to prepare their 'recent breakthroughs' and 'group presentations'.

Evaluation and marking policy

There will be one 2 hour final exam. It will cover the lecture material from Jan 12 to Mar 5 and will be held on Mar 16 through Brightspace (see below). Students are expected to thoroughly read and understand companion papers as approximately 10-20% of exam questions will be focused on this material. The mark breakdown is thus as follows:

Companion papers	5
Recent breakthroughs	25
Group Presentations	30
Final Exam	40
This will be written through Brightspace. The evaluation will be open for 24 hours and students will have 90 minutes to complete the evaluation	
TOTAL	**100**

Lecture Content: Chromatin & Epigenetics Course Outline:

Week	Instructor	Date	Topic
1	Ausio	Jan. 12	Introduction I- The basic structural proteins of chromatin
1	Ausio	13	Introduction II- Histone post-translational modifications (PTMs)
1	Ausio	15	Structural implications of histone variants (PAPER 1)
2	Ausio	19	Histone structure and interactions
2	Ausio	20	Nonhistone chromosomal proteins (PAPER 2)
2	Ausio	22	The nucleosome **(Office hour zoom 12:30 p.m.-1:20 p.m.)**
3	Ausio	26	Structure of the nucleosome I **(PAPER 1 REPORT DUE)**
3	Ausio	27	Structure of the nucleosome II (PAPER 3)
3	Ausio	29	The chromatin fiber I **(PAPER 2 REPORT DUE)**
4	Ausio	Feb 2	The chromatin fiber II (the linking number paradox)
4	Ausio	3	The chromatin fiber III (LLPS)
4	Ausio	5	The fundamental characteristics of transcriptionally active chromatin (PAPER 4) **(Office hour zoom 12:30 p.m.-1:20 p.m.) (PAPER 3 REPORT DUE)**
5	Ausio	9	The basic structural organization of interphasic and metaphasic chromatin (MARs, SARs, TADs)
5	Ausio	10	Transcriptionally active chromatin **(PAPER 4 REPORT DUE)**
5	Ausio	12	Introduction to Epigenetics
6	Ausio	15-19	**Reading Break**
6	Ausio	23	Histone acetylation/histone methylation writers and erasers
6	Ausio	24	DNA methylation
	Good	26	Non-coding RNA (PAPER 5) **(Office hour 12:30 p.m. – 1:20 p.m.)**
7	Ausio	Mar 2	Euchromatin/heterochromatin/ basic techniques
7	Ausio	3	Cancer epigenetics/epigenetics and metabolism **(PAPER 5 REPORT DUE)**
	Ausio	5	Environmental epigenomics (two examples) Epigenetics: Cause? Or effect
8		9	Preparation of recent breakthroughs/group presentations
8		10	Preparation of recent breakthroughs/group presentations
8		12	Preparation of recent breakthroughs/ group presentations **(Office hour 12:30 p.m. – 1:20 p.m.)**
9		16	**Exam (40%) (2 hours)**
9		17	Preparation of recent breakthroughs/ group presentations
9		19	Preparation of recent breakthroughs/ group presentations (ALL 'RECENT BREAKTHROUGHS' DUE)
10		23	Group 1 presentation
10		24	Group 2 Presentation
10		26	Group 3 Presentation **(Office hour 12:30 p.m. – 1:20 p.m.)**
11		30	Group 4 Presentation
11		31	Group 5 Presentation
12		Ap 6	Group 6 Presentation
12		7	Group 7 Presentation

<u>UVic Grading Scheme</u>

A+	90 -100	**B+**	77 - 79	**C+**	65 - 69	**F**	< 50
A	85 - 89	**B**	73 - 76	**C**	60 - 64	**N ****	< 50
A-	80 - 84	**B-**	70 - 72	**D**	50 - 59		

** N grades

Students who have completed the following elements will be considered to have completed the course and will be assigned a final grade:

All assignments and tests

Failure to complete one or more of these elements will result in a grade of "N" regardless of the cumulative percentage on other elements of the course. An N is a failing grade, and it factors into a student's GPA as 0. The maximum percentage that can accompany an N on a student's transcript is 49.

DEPARTMENT INFORMATION AND POLICIES

1. The Department of Biochemistry and Microbiology upholds and enforces the University's policies on academic integrity. These policies are described in the current University Calendar. All students are advised to read this section.

2. Cell phones, computers, and other electronic devices must be turned off at all times during live class sessions unless being used for the purpose of connecting and engaging with the class.

3. No recordings of live lectures are permitted without permission of the instructor. Many online courses will be recorded by the instructor for accessibility for students unable to attend. If you do not wish to be recorded, contact your instructor to determine if alternative arrangements can be made.

4. Course materials, such as notes, problem sheets, quizzes, examinations, example sheets, or review sheets, may not be redistributed without the explicit written permission of the instructor.

5. Students are expected to be available for all exams. Instructors may grant deferrals for midterm examinations for illness, accident, or family affliction. Although students do not require documentation, students must contact their instructor and BCMB office (**biocmicr@uvic.ca**) with the reason for their absence within 48 hours after the midterm exam. The Department will keep a record of the absences. It is the responsibility of the student to ensure all required components are complete, and to arrange deferred exams/assignments with the instructor, which normally should occur within one week of the original exam date.

6. The Department of Biochemistry and Microbiology considers it a breach of academic integrity for a student taking a deferred examination to discuss the exam with classmates. Similarly, students who reveal the contents of an examination to students taking an examination are considered to be in violation of the University of Victoria policy on academic integrity (see current University Calendar). Students must abide by UVic academic regulations and observe standards of scholarly integrity (no plagiarism or cheating). Online exams must be taken individually and not with a friend, classmate, or group, nor can you access notes, course materials, the internet, or other resources without the permission of the instructor. You are prohibited from sharing any information about the exam with others. Use of unauthorized electronic devices and accessing the internet and class material during exams is prohibited unless permission is granted by the instructor. Instructors may use Browser Lockdown Software to block access during classes and exams.

7. Deferral of a final exam must be requested with an Academic Concession form and submitted directly to Undergraduate Records. Deferred final exams for fall term courses will be arranged by the instructor. Deferred

final exams or spring term courses will be arranged through Undergraduate Records and must be written before the end of the summer term as stipulated in the University Calendar.

6. Requests for review/remark of an assignment or midterm exam must be made within one week of the exam being returned.

7. The instructor reserves the right to use plagiarism detection software or other platforms to assess the integrity of student work.

8. Supplemental exams or assignments will not be offered to students wishing to upgrade their final mark.

9. Anonymous participation in online classes is not permitted without permission of the instructor.

The current pandemic is placing added stressors- financial, mental, and physical- on everyone. Your wellbeing is of foremost importance. If you are experiencing difficulties coping, the University has resources to help. Reach out to Counselling Services, the Centre for Academic Communication, or Learning Assistance Program for assistance.

Course Experience Survey (CES)
We value your feedback on this course. Towards the end of term you will have the opportunity to complete a confidential course experience survey (CES) regarding your learning experience. The survey is vital to providing feedback to us regarding the course and our teaching, as well as to help the department improve the overall program for students in the future. When it is time for you to complete the survey, you will receive an email inviting you to do so. If you do not receive an email invitation, you can go directly to your CES dashboard. You will need to use your UVic NetLink ID to access the survey, which can be done on your laptop, tablet or mobile device. We will remind you nearer the time but please be thinking about this important activity.