

**BIOCHEMISTRY 408 – Chromatin & Epigenetics**  
**Course Outline: Spring 2019**

**Place:** Elliot 162  
**Time:** Tuesday, Wednesday, Friday: 8:30 am - 9:20 am  
**Textbook:** None  
**Web site:** CourseSpaces

**Instructors:** **Dr. Juan Ausió (Jan 8,9; Feb 26 - April 5)**

Email: [jausio@uvic.ca](mailto:jausio@uvic.ca)

Office: Petch 260

Office hours: 9:00am-5:00pm \*

**Dr. Chris Nelson (Jan 11-Feb 15; Mar 26-April 5)**

Email: [cjin@uvic.ca](mailto:cjn@uvic.ca)

Office: Petch 192

Office hours: W 1:00-3:00pm \* (or by appointment)

\* 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. The course is heavily focused on primary research papers that utilize a diversity of model organisms to demonstrate the contributions of epigenetics to development and disease. 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 formal lectures that introduce essential background material, and key concepts in Chromatin and Epigenetics. There is a strong emphasis on the understanding of experimental methods and their application to test hypotheses. Each lecture will conform approximately to the attached course outline, however some changes are possible. Students are responsible for the lecture material and *Companion papers* in examinations.

*Companion papers* are assigned to the class to compliment the lecture material. These papers will be the subject of discussion and Group Assignments (see course outline). Each paper will be accompanied with a set of assignment questions that encourage students to fully understand the data, and the utility of experimental methods. A portion of the questions will be marked and make up the Discussion Group Assignment Grade.

*Group presentations* will take place at the end of the course (Mar 26-April 5). 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 1-3 research papers will be the basis of the lecture. Group composition and presentation guidelines will be announced in class. Each group will post

possible exam questions with their presentation. These questions may appear on the Final Exam, but will not be worth more than 10% of the course grade (or 25% of the Final Exam).

### **Evaluation and marking policy**

There will be two exams. The first covers material from Jan 3<sup>th</sup> to Feb 7<sup>th</sup> and will be held on Feb 9<sup>th</sup> outside of regular class time. It is worth 30% of the final grade, and there will be no lecture on this date. The second exam, covering material from Feb 7<sup>th</sup> to Mar 21<sup>st</sup>, will be held during the final exam period and is worth 40% of the final grade. Students are expected to thoroughly read and understand companion papers as approximately 25% of exam questions will be focused on this material. The mark breakdown is thus as follows:

Discussion Group Assignments (Jan 25, Feb 1)	10
Mid-term Exam (Feb 15 <sup>th</sup> )	30
Group Presentations	15
Class Participation	5
<u>Final Exam</u>	<u>40</u>
<b>TOTAL</b>	<b>100</b>

## Lecture Content: Chromatin & Epigenetics Course Outline:

Week	Instructor	Date	Topic
1	Ausio	Jan. 8	Introduction I- The basic structural proteins of chromatin
1	Ausio	9	Introduction II- Histone post-translational modifications (PTMs)
1	Nelson	11	Introduction III - Epigenetic regulation in development and disease
2	Nelson	15	The stochastic nature of heterochromatin
2	Nelson	16	The stochastic nature of heterochromatin
2	Nelson	18	<i>Sperling paper discussion</i>
3	Nelson	22	Histone modifications of euchromatin I
3	Nelson	23	Histone modifications of euchromatin II
3	Nelson	25	<i>*Group work: Du et al paper questions</i>
4	Nelson	29	Histone modifications of heterochromatin I
4	Nelson	30	Histone modifications of heterochromatin II
4	Nelson	Feb. 1	<i>*Group work: Margeron paper questions</i>
5	Nelson	5	DNA methylation I
5	Nelson	6	DNA methylation II
5	Nelson	8	3D Genome Organization
6	Nelson	12	Environment-Epigenome interactions I
6	Nelson	13	Environment-Epigenome interactions II
6	Nelson	15	<b>Exam (30%) - outside of class time</b>
		Feb. 18-22	<b>Reading Break</b>
7	Ausio	26	Structural implications of histone variants (PAPER 1)
7	Ausio	27	Histone structure and interactions
7	Ausio	Mar.1	Nonhistone chromosomal proteins (PAPER 2)
8	Ausio	5	The nucleosome
8	Ausio	6	Structure of the nucleosome I
8	Ausio	8	Structure of the nucleosome II (PAPER 3)
9	Ausio	12	The chromatin fiber I
9	Ausio	13	The chromatin fiber II
9	Ausio	15	The chromatin fiber III
10	Ausio	19	The fundamental characteristics of transcriptionally active chromatin (PAPER 4)
10	Ausio	20	The basic structural organization of interphasic and metaphasic chromatin
10	Ausio	22	The basic structural organization of interphasic and metaphasic chromatin
11	Ausio/Nelson	26	Group Presentations
11	Ausio/Nelson	27	Group Presentations
11	Ausio/Nelson	29	Group Presentations
12	Ausio/Nelson	Apr. 2	Group Presentations
12	Ausio/Nelson	3	Group Presentations
12	Ausio/Nelson	5	Group Presentations
		TBD	<b>Final Exam (40%)</b>

**Conversion of Marks to Final Letter Grades:** Total marks from exams and assignments will be calculated, weighted and converted to a percentage and letter grade as follows:

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

## **\*\* N grades**

Only students who have completed i) the Mid-term Exam, ii) a Group Presentation, and iii) the Final Exam, will be considered to have completed the course and will be assigned a final grade.

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 unless being used for a purpose relevant to the class. Students having a cell phone, tablet, or computer on their person during an exam will be assumed to have it for the purpose of cheating.
3. **Any recordings of lectures may only be performed with written permission of the instructor, and are for personal use only. The instructor retains copyright to such recordings and all lecture materials provided for the class (electronic and otherwise); these materials must not be shared or reposted on the Internet.**
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 present for the midterm and final exams. Instructors may grant deferrals for midterm examinations for illness, accident, or family affliction, and students must provide appropriate documentation 48 hours after the midterm exam. 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 a deferred examination are considered to be in violation of the University of Victoria policy on academic integrity (see current University Calendar). 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 for 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. Multiple choice scan sheets for machine scoring (bubble sheets) are considered the authentic exam answer paper and will be retained by the department for 1 year.
7. Professors may refuse to review/remark exams not written in indelible ink. In addition, requests for review/remark of a midterm exam must be made within one week of the exam being returned. Students are expected to promptly pick up midterm exams after marking has been completed, either in class or from the instructor.
8. Examination papers that have pages removed, or are mutilated will not be marked.
9. The instructor reserves the right to use plagiarism detection software or other platforms to assess the integrity of student work.”

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, approach the Centre for Accessible Learning (CAL) as soon as possible in order to assess your specific needs.

<https://www.uvic.ca/services/cal/index.php>

### **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 me regarding the course and my 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. I will remind you nearer the time but please be thinking about this important activity