# Course Syllabus: MCB 5895 Special Topics – Spring 2022
## 3D Genome in Development, Disease, and Evolution

### Course and Instructor Information

**Course Title:** MCB 5895 Special Topics: 3D Genome in Development, Disease, and Evolution
**Credits:** 3
**Format:** In-person
**Prerequisites:** Solid background in genetics (2410 or equivalent) and cell biology

**Instructor:** Jelena Erceg, Ph.D.
Assistant Professor, University of Connecticut
Dpt. of Molecular and Cell Biology & Institute for Systems Genomics
Dpt. of Genetics and Genome Sciences, UConn School of Medicine
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**Office Hours:** Thursdays 3:00 pm – 4:00 pm and by appointment

### Course Materials

The course will include lecture-based material, readings, and related in-class activities. Lectures, readings, and associated media will be posted on HuskyCT. There is no required textbook, though, optional, supplementary references will be provided for more in-depth understanding of general concepts. Attendance is strongly encouraged to facilitate note-taking and active student involvement in activities including, but not limited to active learning and open discussion.

### Calendar and Class Meeting Schedule

Tue/Thur 11:00 am – 12:15 pm, classroom #
For more detail please check the course schedule on HuskyCT and the academic calendar.

**Subject to Change Statement:** Syllabus information may be subject to change with advance notice, as deemed appropriate by the instructor. The most up-to-date syllabus is located within the course in HuskyCT.

### Course Description

This course will cover principles underlying 3D genome organization and function in multicellular organisms. It will provide an insight into classical as well as cutting-edge genomics and imaging approaches such as single-cell and spatial omics used to achieve key, fundamental breakthroughs. Throughout the course, students will explore 3D genome organization and gene regulation in health and disease states as well as during developmental progression. Finally, students will gain evolutionary perspective on genome structure and function across distantly related species.

### Course Objectives

Upon completing this course, students should be able to: (**i**) *develop* in-depth *understanding* of principles behind 3D genome organization and function; (**ii**) *identify, discuss,* and *critically think* about related primary literature; (**iii**) *explain*, *interpret* and *compare* various classical and cutting-edge approaches; (**iv**) *present, connect,* and *summarize* key concepts and findings; and (**v**) *apply* their knowledge by *designing* approaches to address new avenues in the 3D genome field.

## Course Outline

Module 1: 3D Genome Organization and Gene Regulation – General Concepts
Module 2: Classical and Cutting-edge Technologies for Assessing Genome Organization
Module 3: Mechanisms of Genome Folding
Module 4: 4D Genomics during Development
Module 5: Genome Structure and Function in Health and Disease
Module 6: Evolutionary Aspects of Genome Organization and Function

## Course Requirements and Grading

**Summary of Course Grading:**

| Course Components | Weight |
|---|---|
| Quizzes | 60% |
| Group Presentation | 20% |
| Participation | 20% |

**Quizzes**

There will be 6 quizzes covering each of 6 modules as indicated in the course schedule. No make-up quizzes will be available. Quizzes may be on any content covered in class and assigned materials for a designated module. Since concepts are related and build on each other from previous lectures, it is recommended to keep up to date and review assigned material regularly to perform well in subsequent quizzes. Quiz format may be variable ranging from multiple choice questions to those requiring elaborate explanations. Although quizzes are open notes, prior preparation is essential to timely complete a quiz. Students should complete quizzes independently and are expected to comply with academic policies (see section termed 'Student Responsibilities and Resources' below). All quizzes will be administered on HuskyCT and will be due by 5 pm on the scheduled due date. No midterms or final exams will be administered.

**Group Presentation**

Students will be assigned to groups of two or three. As a group, you will prepare and deliver a presentation on selected topics connected to lectures. The presentation will be based on a research paper you identified highlighting: a) background and significance of addressed questions in the paper; b) approach and findings with a summary of major advances for the field; c) future research directions. The presentation should be 10-15 min long and delivered on your assigned day.

**Participation**

Discussion will be encouraged on hotly debated topics in the scientific community related to lectures. Relevant articles will be posted on HuskyCT. You should be familiar with these articles to participate in scheduled discussions as indicated in the course schedule. Active participation in discussion will aid in making this course highly dynamic and interactive. The grade will be determined based on frequency and qualitative content of participation to spur further thought at discretion of the instructor.

Rubrics for assignments will be posted on Husky CT.

**Grading Scale:**

| Grade | Letter Grade | GPA |
|---|---|---|
| 93-100 | A | 4.0 |
| 90-92 | A- | 3.7 |
| 87-89 | B+ | 3.3 |
| 83-86 | B | 3.0 |
| 80-82 | B- | 2.7 |
| 77-79 | C+ | 2.3 |

| | | |
|---|---|---|
| 73-76 | C | 2.0 |
| 70-72 | C- | 1.7 |
| 67-69 | D+ | 1.3 |
| 63-66 | D | 1.0 |
| 60-62 | D- | 0.7 |
| <60 | F | 0.0 |

**Due Dates and Late Policy**
All course due dates are identified on HuskyCT. Deadlines are based on Eastern Time unless otherwise specified. The instructor reserves the right to change dates as the semester progresses if needed. All changes will be clearly communicated to students.
Any late assignments will be subject to -10% per day following the deadline. Please contact the instructor in case of any extenuating circumstances.

**Weekly Time Commitment**
You should expect to dedicate approximately 9 hours a week to this course. This expectation is based on the various course activities, assignments, and assessments and the University of Connecticut's policy regarding credit hours. More information related to hours per week per credit can be accessed at the Online Student website.

## Student Responsibilities and Resources

As a member of the University of Connecticut student community, you are held to certain standards and academic policies. In addition, there are numerous resources available to help you succeed in your academic work. Review these important standards, policies and resources, which include:

- The Student Code
  - Academic Integrity
  - Resources on Avoiding Cheating and Plagiarism
- Copyrighted Materials
- Credit Hours and Workload
- Netiquette and Communication
- Adding or Dropping a Course
- Academic Calendar
- Policy Against Discrimination, Harassment and Inappropriate Romantic Relationships
- Sexual Assault Reporting Policy

## Correspondence

All students are expected to check and respond to their email on a regular basis. Students will be contacted at their UConn email address (firstname.lastname@uconn.edu). It is the student's responsibility to have UConn email forwarded to personal email accounts. The instructor is not responsible for undelivered email. Students must retain a copy of important emails sent to the instructor for documentation purposes (including date, time, and address sent to). Please allow a minimum of 2 business days for email replies from your instructor.

## Students with Disabilities

The University of Connecticut is committed to protecting the rights of individuals with disabilities and assuring that the learning environment is accessible. If you anticipate or experience physical or academic barriers based on disability or pregnancy, please let me know immediately so that we can discuss options. Students who require accommodations should contact the Center for Students with Disabilities, Wilbur Cross Building Room 204, (860) 486-2020 or http://csd.uconn.edu/.

Blackboard measures and evaluates accessibility using two sets of standards: the WCAG 2.0 standards issued by the World Wide Web Consortium (W3C) and Section 508 of the Rehabilitation Act issued in the United States federal government. (Retrieved March 24, 2013 from Blackboard's website)

## Software/Technical Requirements (with Accessibility and Privacy Information)

The software/technical requirements for this course include:

- Equipment Recommendations
- HuskyCT/Blackboard (HuskyCT/Blackboard Accessibility Statement, HuskyCT/Blackboard Privacy Policy)
- Adobe Acrobat Reader (Adobe Reader Accessibility Statement, Adobe Reader Privacy Policy)
- Microsoft Office (free to UConn students through uconn.onthehub.com) (Microsoft Accessibility Statement, Microsoft Privacy Statement)
- Dedicated access to high-speed Internet with a minimum speed of 1.5 Mbps (4 Mbps or higher is recommended)

For information on managing your privacy at the University of Connecticut, visit the University's Privacy page. NOTE: This course has NOT been designed for use with mobile devices.

## Help

Technical and Academic Help provides a guide to technical and academic assistance.
This course uses the learning management platform, HuskyCT. If you have difficulty accessing HuskyCT, you have access to the in person/live person support options available during regular business hours through the Help Center.You also have 24x7 Course Support including access to live chat, phone, and support documents.

## Minimum Technical Skills

To be successful in this course, you will need the following technical skills:

- Use electronic mail with attachments.
- Save files in commonly used word processing program formats.
- Copy and paste text, graphics or hyperlinks.
- Work within two or more browser windows simultaneously.
- Open and access PDF files.

## Evaluation of Course Experience

Students will be given an opportunity to provide feedback on their course experience and instruction using the University's standard procedures, which are administered by the Office of Institutional Research and Effectiveness (OIRE).
The University of Connecticut is dedicated to supporting and enhancing teaching effectiveness and student learning using a variety of methods. The Student Evaluation of Teaching (SET) is just one tool used to help faculty enhance their teaching. The SET is used for both formative (self-improvement) and summative (evaluation) purposes.
Additional informal formative surveys and other feedback instruments may be administered within the course.

| Week | Module | Dates | Topic | Quiz |
|---|---|---|---|---|

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|---|---|---|---|---|
| 1 | 1 | 1/18, 1/20 | 3D Genome Organization and Gene Regulation – General Concepts I | |
| 2 | | 1/25, 1/27 | 3D Genome Organization and Gene Regulation – General Concepts II | |
| 3 | 2 | 2/1, 2/3 | Classical and Cutting-edge Technologies I – Omics | **1.** on Module 1 - due **1/31** |
| 4 | | 2/8, 2/10 | Classical and Cutting-edge Technologies II – Imaging | |
| 5 | 3 | 2/15, 2/17 | Mechanisms I – Loop Extrusion | **2.** on Module 2 - due **2/14** |
| 6 | | 2/22, 2/24 | Mechanisms II – Condensates | |
| 7 | | **3/1, 3/3** | **Discussion I** *(mechanisms)* | |
| 8 | 4 | 3/8, 3/10 | Development I – Differentiation, Monoallelism | **3.** on Module 3 - due **3/7** |
| 9 | | 3/15, 3/17 | Spring Recess | |
| 10 | 4 | 3/22, 3/24 | Development II – MZT, X-inactivation | |
| 11 | 5 | 3/29, 3/31 | Health and Disease I – Structural Variation | **4.** on Module 4 - due **3/28** |
| 12 | | 4/5, 4/7 | Health and Disease II – Cancer | |
| 13 | 6 | 4/12, 4/14 | Evolutionary Aspects of Genome Organization and Function | **5.** on Module 5 - due **4/11** |
| 14 | | **4/19, 4/21** | **Discussion II** *(structure vs function)* | **6.** on Module 6 - due **4/18** |
| 15 | | **4/26, 4/28** | **Group Presentations** | |