**BIOL 4510: EPIGENETICS SYLLABUS Spring, 2018**

**INSTRUCTOR(S):**

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Invited guest lecturers from Georgia Tech and other universities.

**CLASS HOURS:** Monday/Wednesday 3pm - 4:15 pm

**LOCATION:** Cherry Emerson 204

**COURSE DESCRIPTION:**

Epigenetics has become a significant field with ever expanding landscapes. This seminar and lecture course intends to introduce basic concepts and mechanisms of epigenetics and to discuss the central and emerging roles of epigenetic regulation in stem cell biology, development and human disease, as well as the analysis tools used for studying epigenetics and epigenomes. The course will consist of diverse topics in epigenetics, such as mechanisms in epigenetic regulation, chromatin biology, gene regulation, and current research of epigenetics in cell reprograming, regenerative medicine, and disease. The course is aimed to promote in-depth discussions of current topics and to enhance appreciation of how epigenetics regulates genome function. Prior basic background knowledge in DNA and molecular biology is recommended. The **FORMAT** of the course will consist of lectures, critical reading of the scientific literature, student oral presentations, as well as in class discussions and debates. This course will be of interest to students of all majors related to biomedical sciences, bioengineering and health.

**LEARNING OBJECTIVES:**

Upon completion of this course, students will be able to:

1. Understand the definition of epigenetics and recognize various epigenetic phenomena
2. Outline the major epigenetic mechanisms
3. Know current techniques developed to study epigenetics and epigenomes.
4. Appreciate the role of epigenetic regulation in normal development and in diseases.

**TEXTBOOK AND MATERIAL:**

Allis CD, Caparros M, Jenuwein T, Reinberg D, (ed.)

*Epigenetics* (2015) Second Edition, Cold Spring Harbor Laboratory Press

(ISBN-13: 978-1936113590 ISBN-10: 1936113597 Edition: 2nd)

Additional research papers to be discussed will be assigned in class.

**OFFICE HOURS:** By appointment. Please email or consult with instructor after class to set up a meeting.

**GRADING:**

Students will be evaluated on performances on oral presentation, quizzes, term report and class participation.

The final course grade is composed of:

1. In class quizzes - 25%

2. Mid-term exam – 25%

3. Paper presentation - 15%

4. Term-report: 20%

5. Class discussion and participation - 15%

**In class quizzes and Mid-term exam** will consist of multiple choices questions and/or short answer questions.

**Paper presentation** **and term report** will be based on research papers and assigned projects. The format and guidelines of oral presentation and term paper will be distributed in class.

**Class participation** will be judged by the extent to which each student participates in class discussions and debates (by asking questions, answering questions, comments, and debates, etc.).

**Grading Scale**

Your final grade will be assigned as a letter grade according to the following scale:

A 90-100%

B 80-89%

C 70-79%

D 60-69%

F 0-59%

**IMPORTANT GEORGIA TECH DATES**

Mon **Jan 8** CLASSES BEGIN

Fri **Jan 12** Last day to register and/or make schedule changes

(registration closes at 4PM)

Mon **Jan 15** OFFICIAL SCHOOL HOLIDAY

Wed **Mar 14** Last day to withdraw from individual courses with a grade of "W"

Mon-Fri **Mar 19-23** 2018 Spring Break

Mon-Tues **Apr 23-24** Final Instructional Days

Wed **Apr 26**, Tues, **May 1**, Reading Period

Thurs – Thurs **Apr 26-May 3** FINALS WEEK

**TENTATIVE SCHEDULE/TOPICS**:

|  |  |  |  |
| --- | --- | --- | --- |
| **Week** | **DATE** | **TOPIC** | **LECTURER** |
| 1 | 8-Jan  10-Jan | Campus closed  Introduction and overview | Y. Fan/GT |
| 2 | 15-Jan  17-Jan | OFFICIAL SCHOOL HOLIDAY  Epigenetic mechanisms (I)- DNA methylation (I) | Y. Fan/GT |
| 3 | 22-Jan  24-Jan | Epigenetic mechanisms (I)- DNA methylation (II)  Epigenetics in social insects | Y. Fan/GT  M. Goodisman/GT |
| 4 | 29-Jan  31-Jan | Epigenetic mechanisms (II)- histone variants and nucleosomes (I and II) | Y. Fan/GT  Y. Fan/GT |
| 4 | 5-Feb  7-Feb | Epigenetic mechanisms (III)- histone modifications  Epigenetic Analysis | H. Wang/UAB  Y. Fan/GT |
| 6 | 12-Feb  14-Feb | Epigenetic mechanisms (IV)- Polycomb complex and Trithorax complex  Epigenetic mechanisms (V)- ncRNA | Y. Fan/GT  Y. Fan/GT |
| 7 | 19-Feb  21-Feb | Genomic imprinting in mammals; Dosage compensation  discussion of group projects | Y. Fan/GT  Y. Fan/GT |
| 8 | 26-Feb  28-Feb | Epigenetic regulation in stem cells and cell reprogramming  Review & Discussion | Y. Fan/GT  Y. Fan/GT |
| 9 | 5-Mar  7-Mar | Quiz  Epigenetic control in gametogenesis and development | Y. Fan/GT  R. De La Fuente/UGA |
| 10 | 12-Mar  14-Mar | Computational analysis of transcriptome and epigenomes  Epigenetic heterogeneity, Higher order chromatin structure | Y. Fan/GT  Y. Fan/GT |
| 11 | 19, 21-Mar | SPRING BREAK |  |
| 12 | 26-Mar  28-Mar | Epigenetics and diseases  New technologies in epigenetic analysis | Y. Fan/GT  R.Deal/ Emory Univ. |
| 13 | 2-Apr  4-Apr | Discussion & Student Presentation 1  Discussion & Student Presentation 2 |  |
| 14 | 9-Apr  11-Apr | Team Debate 1  Team Debate 2 |  |
| 15 | 16-Apr  18-Apr | Special topic “Epigenetic regulation in DNA replication”  Special topic “Drug Design Targeting Epigenetic Modifiers” | E.Bouhassira/ Einstein  Y. Oyelere/ GT |
| 16 | 23, 25-Apr | Review/Term report prep  (Final instructional days, Reading Period) | Y.Fan/GT |
| 16-17 | 4/26-5/3 | Final Exams Days |  |
| 17 | 2-May | Term report due at 5PM | Y.Fan/GT |

**COURSE EXPECTATIONS & GUIDELINES**

## Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit http://www.catalog.gatech.edu/policies/honor-code/ or <http://www.catalog.gatech.edu/rules/18/>.

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

## Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or <http://disabilityservices.gatech.edu/>, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

## Attendance and/or Participation

## Regular attendance and participation are expected. Please also see http://www.catalog.gatech.edu/rules/4/ for more information about institute expectations and restrictions around attendance, including information about excused absences.

## Extensions, Late Assignments, & Re-Scheduled/Missed Exams

Preparation of term paper and presentations involves long time effort, therefore the due date will not be extended. Rescheduling an exam due to an “approved Institute activities” (e.g. field trips and athletic events, and religious observances, see http://www.catalog.gatech.edu/rules/4/ for more information) must be done well in advance of the exam. Missed exam without prior approval will receive a zero. If you miss exam due to illness, proper documentation from The Office of Dean of Student is required for a make-up exam or another assessment mechanism for that portion of the final grade.

**Student-Faculty Expectations Agreement**

At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See http://www.catalog.gatech.edu/rules/22/ for an articulation of some basic expectation that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, we encourage you to remain committed to the ideals of Georgia Tech while in this class.

**Student Use of Mobile Devices in the Classroom**

This course will make usage of laptop computers and mobile devices in some classes, so they are not prohibited; however, they may not be used in a manner that would be distracting to other students in the class, such as to watch non-course related videos, facebook pages, etc.

**Statement of Intent for Inclusivity**

As members of the Georgia Tech community, we are committed to creating a learning environment in which all of our students feel safe and included. Because we are individuals with varying needs, we rely on your feedback to achieve this goal. To that end, we invite you to enter into dialogue with us about the things we can stop, start, and continue doing to make our classroom an environment in which every student feels valued and can engage actively in our learning community.

**Campus Resources for Students**

**Academic support**

•Center for Academic Success http://success.gatech.edu

•Residence Life's Learning Assistance Program

https://housing.gatech.edu/learning-assistance-program

•OMED: Educational Services (http://omed.gatech.edu/programs/academic-support)

•Communication Center (http://www.communicationcenter.gatech.edu)

•Academic advisors for your major (http://advising.gatech.edu/)

**Personal Support**

•The Office of the Dean of Students: http://studentlife.gatech.edu/content/services; 404-894-6367;

•Counseling Center: http://counseling.gatech.edu; 404-894-2575;

•Students’ Temporary Assistance and Resources (STAR): http://studentlife.gatech.edu/content/need-help

•Stamps Health Services: https://health.gatech.edu; 404-894-1420

•OMED: Educational Services: http://www.omed.gatech.edu

•Women’s Resource Center: http://www.womenscenter.gatech.edu; 404-385-0230

•LGBTQIA Resource Center: http://lgbtqia.gatech.edu/; 404-385-2679

•Veteran’s Resource Center: http://veterans.gatech.edu/; 404-385-2067

•Georgia Tech Police: 404-894-2500