

BCH 6415
Advanced Molecular and Cellular Biology
3 credits
5th Period, MWF, 11:45 am - 12:35 pm
ARB Room R3-265
Spring 2024

Course Description: This course is designed for advanced graduate students and highly advanced undergraduates who already have taken a one semester graduate level survey course in molecular biology (such as BCH 5413, or the BMS core course, GMS 6001) and desire a course on current state-of-the-art aspects of molecular biology. Lectures and discussions will be based entirely upon the current scientific literature on nuclear structure and organization, transcription, RNA processing, protein synthesis, post-translational regulation, DNA replication, DNA repair, and DNA recombination, and emphasize experimental approaches to understanding these cellular processes. Students should have a good working knowledge of molecular biology and be able to comprehend articles on these topics in journals such as *Cell*, *Science*, *Nature*, *Nature Genetics*, etc. No general molecular biology textbook covers the current topics in this course in sufficient detail and depth, though introductory background information may be available in textbooks such as: Lodish et al., *Molecular Cell Biology*; Alberts et al., *Molecular Biology of the Cell*; Krebs et al., *Lewin's Genes XII*; Cox et al., *Molecular Biology: Principles & Practice*; Weaver, *Molecular Biology*

Ample use will be made of PowerPoint lecture notes and reading lists of relevant scientific articles throughout the course; much of the material in the lecture notes are taken from assigned articles in the current scientific literature. Each instructor lectures in areas of his/her research expertise. Students are responsible for obtaining their own copies of the assigned (and optional) reading from scientific journals. The PowerPoint slides from each lecture are available on the UF e-Learning on Canvas website under "BCH 6415" in the "Modules" link.

Pre-requisites: Students should have taken an introductory biochemistry course (e.g. BCH 4024) and an advanced undergraduate/introductory graduate level molecular biology course (e.g. BCH 5413).

Course objectives: This is an advanced graduate level course designed to expose students to state-of-the-art techniques in molecular biology and to provide students with a working knowledge of the current state of the field. After taking this course, students should be able to read the literature and understand how new findings advance our current understanding of the field.

Course Coordinator: Dr. Linda Bloom, Dept. of Biochem. & Mol. Biol., ARB R3-165, 294-8379, lbloom@ufl.edu

Course Instructors:

Dr. Linda Bloom (Coordinator)
Dept. Biochem. & Mol. Biol.
ARB, R3-165, 294-8379
lbloom@ufl.edu

Dr. Jörg Bungert
Dept. Biochem. & Mol. Biol.
CGRC 361, 273-8098
jbungert@ufl.edu

Dr. Melike Çağlayan
Dept. Biochem. & Mol. Biol.
ARB, R3-226A, 294-8383
caglayanm@ufl.edu

Dr. Kotaro Fujii
Dept. Mol. Genetics & Micro.
CGRC 206, 273-7279
kotaro.fujii@ufl.edu

Dr. Michael Kladde
Dept. Biochem. & Mol. Biol.
CGRC 359, 273-8142
kladde@ufl.edu

Dr. Jianrong Lu
Dept. Biochem. & Mol. Biol.
CGRC 357, 273-8200
jrlu@ufl.edu

Dr. Mingyi Xie
Dept. Biochem. & Mol. Biol.
CGRC 263, 273-8171
mingyi.xie@ufl.edu

Exams: There will be four exams and each will cover material from roughly 1/4 of the course. Exams are scheduled on the evenings on *February 5, February 29, April 4, April 29* from *6:00 to 8:00 pm*. Please reserve these dates and times for the exams on your calendar. *Exams will be given in person on paper*. If you have a legitimate conflict, for example, an exam in another course, please discuss this with the course coordinator at least one week prior to the scheduled exam date. If you are ill or injured and cannot take an exam on the scheduled date, please contact the course coordinator ahead of time, if possible. A medical excuse will be *required* to take a make-up exam ([Attendance Policies](#)). There will *NOT* be a cumulative final.

Grades: Grades will be based on the scores for the four exams (400 points total) and the four assignments (40 points total). The exams and assignments will be weighted equally, 100 points for each exam and 10 points for each assignment. Please see the description of the assignments on the lecture schedule. Final grades will be based on the class average. Letter grades and grade points are assigned according to University policy ([Grades and Grading Policy](#)).

Course Location: Lectures and review sessions will be given in-person in the Academic Research Building, 3rd Floor, Room R3-265.

Attendance Policy and Class Expectations: Class *attendance is strongly encouraged*. Students are expected to participate in class by asking questions and by actively participating in the paper discussions. Students are expected to take an active role in learning by keeping up with course material, asking questions, and seeking help when they need it.

Illness: If you are ill and need to miss class, lecture notes will be posted on Canvas. You can ask classmates about what you missed in class and ask the faculty about anything that you don't understand in the lecture notes.

Students Requiring Accommodations: Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the [Disability Resource Center](#). It is important for students to share their accommodation letter with the course coordinator, Dr. Bloom, and discuss their access needs, as early as possible in the semester.

University Honesty Policy: UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." [The Honor Code](#) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Course Evaluation: Students are expected to provide feedback on the quality of instruction in this course by completing [online evaluations](#). We will give students time to complete evaluations at each review session. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students on the [Gator Evals page](#).

Student Privacy: There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see the [Notification to Students of FERPA Rights](#).

Campus Resources

Academic Resources

- [E-learning technical support](#) 352-392-4357 (select option 2) or e-mail helpdesk@ufl.edu
- [Library Support](#), Various ways to receive assistance with respect to using the libraries or finding resources.
- [Teaching Center](#), Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
- [Writing Studio](#), 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers

Health and Wellness

- *U Matter, We Care:* If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit [U Matter, We Care website](#) to refer or report a concern and a team member will reach out to the student in distress.

- *Counseling and Wellness Center*: [Visit the Counseling and Wellness Center website](#) or call 352-392-1575 for information on crisis services as well as non-crisis services.
- *Student Health Care Center*: Call 352-392-1161 for 24/7 information to help you find the care you need, or [visit the Student Health Care Center website](#).
- *University Police Department*: [Visit UF Police Department website](#) or call 352-392-1111 (or 9-1-1 for emergencies).
- *UF Health Shands Emergency Room / Trauma Center*: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608.
- *GatorWell Health Promotion Services*: For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the [GatorWell website](#) or call 352-273-352-273-4450.

BCH 6415 Course Schedule Spring 2024
5th period, 11:45 – 12:45, ARB R3-265

DATE	DAY	LECTURE	TOPIC	INSTRUCTOR
		SECTION 1		
1/8	M	1	Basal Transcription/RNA polymerases	Bungert
1/10	W	2	Transcription elongation	Bungert
1/12	F	3	Phase separation	Bungert
1/15	M		Martin Luther King Holiday – No Class	
1/17	W	4	Nucleosomes & Chromatin	Lu
1/19	F	5	Chromatin Remodeling I	Kladde
1/22	M	6	Chromatin Remodeling II	Kladde
1/24	W	7	Histone Modifications I	Lu
1/26	F	8	Histone Modifications II	Lu
1/29	M	9	Paper 1 – I. Baek <i>et al.</i> , Mol. Cell 2021	Bungert
1/31	W	10	Exam 1 Review & Instructor Evaluation	
2/5	M	EXAM 1	6:00 – 8:00 pm, Lectures 1 - 9	
		SECTION 2		
2/2	F	11	DNA methylation & Epigenetic Regulation I	Kladde
2/5	M	12	DNA methylation & Epigenetic Regulation II	Kladde
2/7	W	13	Transcription Activation/Co-activators/Co-repressors	Bungert
2/9	F	14	Super-enhancers/LCRs	Bungert
2/12	M	15	Nuclear Organization/TAD/Transcription Factories	Lu
2/14	W	16	Gene Regulation by Inc's	Kladde
2/16	F	17	RNA Processing I - Capping and polyA	Xie
2/19	M	18	RNA Processing II - RNA Stability & Turnover	Xie
2/21	W	19	RNA Modifications/Epitranscriptome	Xie
2/23	F	20	Paper 2	Xie
2/26	M	21	Exam 2 Review & Instructor Evaluation	
2/29	Th	EXAM 2	6:00 – 8:00 pm, Lectures 11 - 20	
		SECTION 3		
2/28	W	22	RNA Splicing I	Xie
3/1	F	23	RNA Splicing II	Xie
3/4	M	24	DNA Polymerases & Fidelity	Bloom
3/6	W	25	The Replication Fork	Bloom
3/8	F	26	Replicating Chromatin & Ends	Bloom
3/11-15			Spring Break – No Class	
3/18	M	27	Initiation of DNA replication	Bloom
3/20	W	28	Protein Synthesis I	Fujii
3/22	F	29	Protein Synthesis II	Fujii
3/25	M	30	RNAi & microRNA	Xie

3/27	W	31	Post-Translational Regulation	Fujii
3/29	F	32	Paper 3	Bloom
4/1	M	33	Exam 3 Review & Instructor Evaluation	
4/4	Th	EXAM 3	6:00 – 8:00 pm, Lectures 22 - 32	
		SECTION 4		
4/3	W	34	Mismatch Repair	Çağlayan
4/5	F	35	DNA Damage & Base Excision Repair	Çağlayan
4/8	M	36	Nucleotide Excision Repair	Çağlayan
4/10	W	37	Double-stranded DNA Breaks and Repair	Çağlayan
4/12	F	38	Homologous Recombination	Çağlayan
4/15	M	39	CRISPR	Bungert
4/17	W	40	DNA Damage Response & Replication Blocks	Bloom
4/19	F	41	DNA Damage Tolerance	Bloom
4/22	M	42	Paper 4	Çağlayan
4/24	W	43	Exam 3 Review & Instructor Evaluation	
4/29	M	EXAM 4	6:00 – 8:00 pm, Lectures 34 - 42	

IN CLASS PARTICIPATION

Students are expected to participate in class by asking questions and contributing to paper discussions. Each student will be assigned a figure to be responsible for on the day of the paper discussion.

COURSE ASSESSMENTS (440 points total)

ASSIGNMENTS (10 points each) - Write an exam question with an answer key

DUE no later than 5pm on	Material covered by exam question
Tues, 1/30	Lectures 1 - 8
Sun, 2/25	Lectures 11 - 19
Sun, 3/31	Lectures 22 - 31
Tues, 4/23	Lectures 34 - 41

Write an exam question with an answer key. Questions should be short essay-style questions that require the test taker to apply the material discussed in the lectures. Examples of the scope of questions: interpret an experiment, design an experiment to test a hypothesis, predict what would happen if a gene were mutated or knocked down, etc. A comprehensive answer key should be provided with the question. Questions can be submitted at any time, but are due no later than the dates listed above for full credit. Questions and answers will be de-identified and shared with the other students in the course.

EXAMS (100 points each)

There will be 4 exams consisting of short answer and essay questions. Exams will cover material presented in the lectures as well as the paper discussions. Exam dates are on the course schedule.