

**BCH 6415**  
**Advanced Molecular and Cellular Biology**  
**3 credits**  
**5<sup>th</sup> Period, MWF, 11:45 am - 12:35 pm**  
**ARB Room R3-265**  
**Spring 2022**

**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](mailto:lbloom@ufl.edu)

**Course Instructors:**

Dr. Linda Bloom (Coordinator) Dept. Biochem. & Mol. Biol. ARB, R3-165, 294-8379 <a href="mailto:lbloom@ufl.edu">lbloom@ufl.edu</a>	Dr. Jorg Bungert Dept. Biochem. & Mol. Biol. CGRC 361, 273-8098 <a href="mailto:jbungert@ufl.edu">jbungert@ufl.edu</a>	Dr. Melike Çağlayan Dept. Biochem. & Mol. Biol. ARB, R3-226A, 294-8383 <a href="mailto:caglayanm@ufl.edu">caglayanm@ufl.edu</a>
Dr. James B. Flanagan Dept. Biochem. & Mol. Biol. ARB, R3-295, 294-8384 <a href="mailto:flanegan@ufl.edu">flanegan@ufl.edu</a>	Dr. Michelle Gumz Dept. Physiology & Aging M543, 273-6887 <a href="mailto:michelle.gumz@medicine.ufl.edu">michelle.gumz@medicine.ufl.edu</a>	Dr. Michael Kladde Dept. Biochem. & Mol. Biol. CGRC 359, 273-8142 <a href="mailto:kladde@ufl.edu">kladde@ufl.edu</a>
Dr. Jianrong Lu Dept. Biochem. & Mol. Biol. CGRC 357, 273-8200 <a href="mailto:jrlu@ufl.edu">jrlu@ufl.edu</a>	Dr. Mingyi Xie Dept. Biochem. & Mol. Biol. CGRC 263, 273-8171 <a href="mailto:mingyi.xie@ufl.edu">mingyi.xie@ufl.edu</a>	

**Exams:** There will be three exams and each will cover material from roughly 1/3 of the course. Exams are scheduled in the evenings on *February 15, March 27, May 1* 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, but may make use of the assignment function of eLearning on Canvas.* If you have a legitimate conflict, for example, an exam in another course, please discuss this with the course director 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 director 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 three exams. The exams will be weighted equally, 100 points each. 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 Room R3-265.

**Attendance Policy and Class Expectations:** Class *attendance is strongly encouraged*. Students who miss lectures and review sessions will not be able to participate in the class discussions of the material that enhances learning. Students should come to class prepared and should ask questions. 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, the lectures will be recorded using Zoom and made available students at the end of each week.

**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](#). 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](mailto: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](mailto: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 352-273-4450.

## BCH 6415 – Spring 2023 Lecture Schedule

<u>DATE</u>	<u>DAY</u>	<u>TOPIC</u>	<u>INSTRUCTOR</u>	
Jan 9	Mon	Basal Transcription/RNA Pol II	Dr. Bungert	
Jan 11	Wed	Technology/Methodology	Dr. Lu	
Jan 13	Fri	Nucleosomes & Chromatin	Dr. Lu	
Jan 16	Mon	<b>NO CLASS - MARTIN LUTHER KING DAY</b>		
Jan 18	Wed	Transcription Elongation I	Dr. Bungert	
Jan 20	Fri	Transcription Elongation II	Dr. Bungert	
Jan 23	Mon	Chromatin Remodeling I	Dr. Kladde	
Jan 25	Wed	Chromatin Remodeling II	Dr. Kladde	
Jan 27	Fri	Histone Modifications I	Dr. Lu	
Jan 30	Mon	Histone Modifications II	Dr. Lu	
Feb 1	Wed	DNA Methylation & Epigenetic Regulation I	Dr. Lu	
Feb 3	Fri	DNA Methylation & Epigenetic Regulation II	Dr. Lu	
Feb 6	Mon	Transcription Activation/Co-Activators/Co-Repressors	Dr. Bungert	
Feb 8	Wed	Super Enhancers/Locus Control Regions	Dr. Bungert	
Feb 10	Fri	Nuclear Organization/TAD/Transcription Factories	Dr. Lu	<b>Exam 1 Lectures</b>
<b>Feb 13</b>	<b>Mon</b>	<b>Review Session for Exam 1</b>		
Feb 15	Wed	Gene Regulation by Long Non-Coding RNA's	Dr. Kladde	
<b>Feb 15</b>	<b>Wed</b>	<b><i>EXAM 1 – 6:00-8:00 p.m.; Lectures 1/9 through 2/10 (14 lectures)</i></b>		
Feb 17	Fri	Pol I and Pol III Transcription	Dr. Kladde	
Feb 20	Mon	RNA Processing I – Capping, Polyadenylation	Dr. Flanegan	
Feb 22	Wed	RNA Processing II – RNA Stability and Turnover	Dr. Flanegan	
Feb 23	Fri	RNA modifications/epitranscriptome	Dr. Flanegan	
Feb 27	Mon	RNA Splicing I	Dr. Xie	
Mar 1	Wed	RNA Splicing II	Dr. Xie	
Mar 3	Fri	Protein Synthesis I	Dr. Gumz	
Mar 6	Mon	Protein Synthesis II	Dr. Gumz	
Mar 8	Wed	Post-Translational Regulation	Dr. Gumz	
Mar 10	Fri	RNAi & Micro RNA's	Dr. Xie	
<b>Mar 11 - 18</b>		<b>NO CLASS - SPRING BREAK</b>		
Mar 20	Mon	RNA Virus Replication I	Dr. Flanegan	
Mar 22	Wed	RNA Virus Replication II	Dr. Flanegan	<b>Exam 2 Lectures</b>
<b>Mar 24</b>	<b>Fri</b>	<b>Review Session for Exam 2</b>		
Mar 27	Mon	DNA Replication: DNA synthesis and fidelity	Dr. Bloom	
<b>Mar 27</b>	<b>Mon</b>	<b><i>EXAM 2 – 6:00 – 8:00 p.m.; Lectures 2/15 through 3/24 (13 lectures)</i></b>		
Mar 29	Wed	DNA Replication: Polymerases at the fork	Dr. Bloom	
Mar 31	Fri	DNA Replication: Unwinding DNA	Dr. Bloom	
Apr 3	Mon	DNA Replication: Replicating chromatin and ends	Dr. Bloom	
Apr 5	Wed	DNA Replication: Initiation of Replication	Dr. Bloom	
Apr 7	Fri	DNA Repair: DNA Base Damage & Base Excision Repair	Dr. Çağlayan	
Apr 10	Mon	DNA Repair: Mismatch Repair	Dr. Çağlayan	
Apr 12	Wed	DNA Repair: Nucleotide Excision Repair	Dr. Çağlayan	
Apr 14	Fri	DNA Repair: Double-Strand Breaks & DSB Repair	Dr. Çağlayan	
Apr 17	Mon	DNA Repair: Homologous Recombination	Dr. Çağlayan	
Apr 19	Wed	DNA Damage Response	Dr. Çağlayan	
Apr 21	Fri	DNA Damage Tolerance I	Dr. Bloom	
Apr 24	Mon	DNA Damage Tolerance II	Dr. Bloom	<b>Exam 3 Lectures</b>
<b>Apr 26</b>	<b>Wed</b>	<b>Review Session for Exam 3</b>		
<b>May 1</b>	<b>Mon</b>	<b><i>EXAM 3 - 6:00 - 8:00 p.m.; Lectures 3/22 through 4/24 (13 lectures)</i></b>		