



DEPARTMENT OF BIOCHEMISTRY

**Regulation of Eukaryotic Gene Expression
BCHM 610 – Syllabus
Spring 2020**

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Office hours: After March 9th, Wed 1-2pm, Fri 10-11am, or by appointment

COURSE OBJECTIVES

This course will provide students with a basic understanding of gene expression mechanisms with a specific focus on newly emerging topics. This course will be taught from primary literature, using a textbook as a background resource. Topics will include transcription, messenger RNA, microRNAs and connections between gene expression steps. Students will learn how to read, communicate, and interpret scientific literature through class presentations, discussions and take home assignments. Additionally, students will gain experience in developing and testing hypotheses and writing a research proposal.

LEARNING OUTCOMES

Basic knowledge of the molecular mechanisms in gene expression and regulation
An appreciation for post-transcriptional gene regulatory events
Enhancement of oral and written communication skills
Mastery of reading and interpreting scientific literature in gene expression fields
Development of critical thinking and creativity in scientific research

TEXTBOOK

Lewin's Genes XI, 11th ed.
Jocelyn E. Krebs, Stephen T. Kilpatrick, Elliott S. Goldstein, editors
ISBN 978-1-4495-5985-1
Jones and Bartlett Learning, LLC, an Ascend Learning Company, c. 2014

This textbook is recommended for this course especially if you have not been exposed to these topics and concepts. This book contains the necessary background information for

reading and interpreting primary literature. Students should read the appropriate chapters in this book prior to reading assigned papers.

Some of the material from this course may also be covered by reviews from the scientific literature. These are accessible free of charge and electronically through the Purdue Library.

LECTURE TIME AND PLACE

Tuesdays and Thursdays 9:00-10:15 am
Biochemistry (BCHM) Room 102

BLACKBOARD LEARN

The syllabus for the course and lecture notes will be available via the Purdue University Blackboard Learn site. Blackboard Learn is our course management system. You can access the course website at <http://mycourses.purdue.edu>. It is strongly suggested that you explore and become familiar not only with the site navigation, but with content and resources available for this course. <http://www.itap.purdue.edu/learning/tools/blackboard/>

ASSESSMENT

IN CLASS ASSESSMENT/ASSIGNMENTS

Grades will be assessed based on exams/quizzes, class participation, presentations, homework, and written proposal. There will be multiple opportunities for students to present or discuss literature or topics on gene expression during this semester. Class participation points will be determined through engaged discussions, contribution to student presentations, asking relevant questions, etc. Students are responsible for reading material prior to class. Dr. Briggs will provide guidance regarding objectives for each reading assignment and key 'take home' messages or concepts.

HOMEWORK/LITERATURE REVIEW/SPECIFIC AIMS

During this course, students will learn to read and critically review publications in the gene expression field. Homework assignments will require reading and describing assigned papers, finding papers on select topics, and/or preparing PowerPoint presentations to give brief presentations. Students will be individually selected to present figures or discuss current topics. The final assignments involve a literature review and specific aims for an original proposal where students will have the opportunity to design their own experimental goals and then evaluate the research ideas of their peers. The proposals should present a major question in the field, hypothesis and two aims (with two experiments per aim) to test this hypothesis.

The grading for this course will be as follows:

Participation	90	points (3 each)
Quizzes	100	points (variable)
homework	90	points (10 each)
"FISH"/"QTCR" and "PBL"	40	points (10 each)
Presentations	30	points (10 each)
Group Discussions	40	points (10 each)
Literature Review Outline	30	points
Literature Review	30	points
Specific Aims Outline	30	points
Specific Aims page and Research Plan	100	points
	580	total points

Class Participation and Attendance and Homework

Students should attend all scheduled classes since participation is required for the class. Students must participate and contribute during the class period (must ask or answer a reasonable and/or thoughtful question during class). If students are not participating, no participation points will be received. If significant unexcused absences occur participation points could be deducted. Participation points could be deducted for consistently arriving late for class.

The cutoff values for letter grades are as follows:

522 points	A
464 points	B
406 points	C
348 points	D
Below 348	F

Absence from class will count against your class participation grade unless the absence is excused by the instructor. Missing your class presentation will result in 0 points unless the absence is excused with reasonable justification. Any request to be excused from class must include **official documentation** (doctor's note, request from academic advisor, etc). Students are welcome to inform the instructor if they will be absent, but it will not be excused without a written note.

Student Presentations

All students will have opportunities to present in class. Presentations will be **randomly assigned** on the day of class. The presentation will consist of individual students describing a figure from an assigned paper and detailing the results and/or presenting assigned homework. Students should read all of the papers before class to ensure that they are prepared if selected to present and/or have their homework completed before class.

Late Work Policy

There is **no late work** accepted in this class. Final homework and/or written documents are due **on blackboard** on the specified due date. **Late papers will receive a zero.**

If you have any disagreements with the way you have been graded, please consult the grading scale and then discuss them with the instructor.

EXTRA CREDIT

Extra credit will be at the discretion of the instructor.

OBTAINING EXTRA HELP

Dr. Briggs will be available to answer your questions immediately after class or by appointment (by e-mail).

ACADEMIC MISCONDUCT

"As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue." Purdue's Honor Pledge

Academic misconduct of any kind will not be tolerated in any course offered by the Department of Biochemistry. Assignments with evidence of academic misconduct will **receive zero credit**. The student will also be reported to the Dean of Student Affairs.

Information on Purdue's policies with regard to academic misconduct can be found at http://www.purdue.edu/studentregulations/student_conduct/regulations.html

To provide you with an unambiguous definition of academic misconduct, the following text has been excerpted from "Academic Integrity: A Guide for Students", written by Stephen Akers, Ph.D., Executive Associate Dean of Students (1995, Revised 1999, 2003), and published by the Office of the Dean of Students in cooperation with Purdue Student Government, Schleman Hall of Student Services, Room 207, 475 Stadium Mall Drive West Lafayette, IN 47907-2050.

"Purdue prohibits "dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty." [Part 5, Section III-B-2-a, [Student Regulations](#)] Furthermore, the University Senate has stipulated that "the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest." [University Senate Document 72-18, December 15, 1972]

More specifically, the following are a few examples of academic dishonesty, which have been discovered at Purdue University.

- substituting on an exam for another student
- substituting in a course for another student
- paying someone else to write a paper and submitting it as one's own work
- giving or receiving answers by use of signals during an exam
- copying with or without the other person's knowledge during an exam
- doing class assignments for someone else
- plagiarizing published material, class assignments, or lab reports
- turning in a paper that has been purchased from a commercial research firm or obtained from the internet
- padding items of a bibliography
- obtaining an unauthorized copy of a test in advance of its scheduled administration
- using unauthorized notes during an exam
- collaborating with other students on assignments when it is not allowed
- obtaining a test from the exam site, completing and submitting it later
- altering answers on a scored test and submitting it for a regrade
- accessing and altering grade records
- stealing class assignments from other students and submitting them as one's own
- fabricating data
- destroying or stealing the work of other students

Plagiarism is a special kind of academic dishonesty in which one person steals another person's ideas or words and falsely presents them as the plagiarist's own product. This is most likely to occur in the following ways:

- using the exact language of someone else without the use of quotation marks and without giving proper credit to the author
- presenting the sequence of ideas or arranging the material of someone else even though such is expressed in one's own words, without giving appropriate acknowledgment

- submitting a document written by someone else but representing it as one's own"

If you are ill with flu-like symptoms, please do not attend class. Course materials will be provided to you or available on Blackboard Learn.

CAPS Information: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765)494-6995 and <http://www.purdue.edu/caps/> during and after hours, on weekends and holidays, or through its counselors physically located in the Purdue University Student Health Center (PUSH) during business hours.

Nondiscrimination Policy Statement: Purdue University is committed to maintaining a community, which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. Purdue's nondiscrimination policy can be found at: http://www.purdue.edu/purdue/ea_eou_statement.html.

Accessibility and Accommodations: Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.

Violent behavior policy: Purdue University is committed to providing a safe and secure campus environment for members of the university community. Purdue strives to create an educational environment for students and a work environment for employees that promote educational and career goals. Violent Behavior impedes such goals. Therefore, Violent Behavior is prohibited in or on any University Facility or while participating in any university activity. See the University's website for additional information: <http://www.purdue.edu/policies/facilities-safety/iva3.html>

Copyright materials: Students are expected, within the context of the Regulations Governing Student Conduct and other applicable University policies, to act responsibly and ethically by applying the appropriate exception under the Copyright Act to the use of copyrighted works in their activities and studies. The University does not assume legal responsibility for violations of copyright law by students who are not employees of the University.

A Copyrightable Work created by any person subject to this policy primarily to express and preserve scholarship as evidence of academic advancement or academic accomplishment. Such works may include, but are not limited to, scholarly publications, journal articles, research bulletins, monographs, books, plays, poems, musical compositions and other works of artistic imagination, and works of students created in the course of their education, such as exams, projects, theses or dissertations, papers and articles. University Regulations on copyright policies: <http://www.purdue.edu/policies/academic-research-affairs/ia3.html>

Emergency Preparedness: In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. To get information about changes in this course consult the class Blackboard site or e-mail or phone the instructor.

Disclaimer: This syllabus is subject to change.

LECTURE SCHEDULE

The format of this course is as follows:

Students are encouraged to seek assistance from Dr. Briggs or TA with assignments and concepts. Students are responsible for reading all assigned chapters and papers prior to class.

Topic	Lecture	Date	Lecture Focus	Homework Assignment	Corresponding Book Chapter(s)	Presenter/Homework
<i>Introduction</i>	1 - T	Jan 14	<i>Introduction to the course</i>	For Jan 21: Identify a model system and determine the pros, cons and nomenclature – prepare a PPT slide.		
	2 - Th	Jan 16	<i>Brief Overview of Central Dogma</i>	For Jan 30: Identify a tool/technique used for gene expression analysis - prepare a PPT slide.	Chapter 2 (Chapters 1&4 if needed)	
<i>Molecular Biology</i>	3 - T	Jan 21	<i>Model Systems and Databases</i>	Discuss model systems that students identified.		Presentations (10 pts)
<i>Computational Analysis</i>	4 - Th	Jan 23	Guest Lecture: Dr. Nadia Atallah Lanman			
	5 - T	Jan 28	No Class	For Feb 4: Find your favorite Transcription factor – prepare a PPT slide.		
	4 - Th	Jan 30	<i>Tools and Techniques</i>	Discuss tool/techniques used for gene expression analysis. For Feb 6: assigned paper	Chapter 3	Presentations (10 pts)

<i>Eukaryotic Transcription</i>	7 - T	Feb 4	<i>Cis-acting Transcriptional Elements and "How to read a scientific paper"</i> <i>Intro/Discussion: "FISH"</i> <i>Figures: "QTCR"</i>	Discuss Transcription factors that students identified. <i>Find and Read Review: enhancers</i>	Chapters 20 and 28.7	Presentations (10 pts)
	8 - Th	Feb 6	<i>"How to read a scientific paper" cont. and go over assigned paper</i>	Go over assigned paper with students This is the format students will have to bring to class.		FISH-QTCR (10 pts)
	9 - T	Feb 11	Enhancers	<i>Find and Read Review: RNA pol II CTD</i>	20.9-20.12 29.1, 29.7-29.8	Group Discussion (10 pts)
<i>Transcription Initiation</i>	10 - Th	Feb 13	<i>Introduction into RNA Pol II</i>			
	11 - T	Feb 18	<i>RNA Pol II CTD (promoter clearance and elongation)</i>	<i>Find and Read Review: Histone Code</i> Discuss PBL	Chapters 20.7-20.8; 28	
	12 - Th	Feb 20		Problem Based Learning "PBL"		PBL (10 pts)
<i>Histone modifications and the genome</i>	13 - T	Feb 25	<i>"Histone Code"</i>	<i>Find and Read Review: Cryptic Transcription</i>	Chapters 28.8-28.13; 29; 10.1-10.5	

	14 - Th	Feb 27	<i>Histone Code Readers</i>	For Mar 5: assigned paper "James Bradner"		
<i>Cryptic transcription</i>	15 - T	Mar 3	<i>Aberrant Transcripts</i>	<i>Find and Read Review: lncRNA</i>	Chapters 22.1-22.3; 22.8; 22.10 and 30.3	
	16 - Th	Mar 5		"FISH" and "QTCR" of assigned paper		FISH-QTCR (10 pts)
	17 - T	Mar 10	lncRNA	Group paper Discussion		Group Discussion (10 pts)
	18 - Th	Mar 12		Discussion of Literature Review and Specific Aims page. <i>Find and Read Review: Termination or 3' end formation</i>	Open Discussion	
No Class		Mar 16-20	SPRING BREAK			
<i>mRNA Processing</i>	19 - T	Mar 24	<i>Termination, 3' end formation and splicing</i>		Chapter 21	
	20 - Th	Mar 26	In class group workshop	Discussion of specific aims <i>Find and Read Review: RNA transport</i>	Open discussion.	

	21 - T	Mar 31	In class group workshop	Discussion of specific aims	Open discussion.	
<i>Nuclear Transport</i>	22 - Th	Apr 2	<i>RNA transport</i>	Literature Review Outline Due and show evidence of using reference manager software. <i>Find and Read Review: mRNA stability</i>		Introduction Outline and reference Due (30 pts)
	23 - T	Apr 7		Problem Based Learning "PBL" For Apr 14: <i>Identify paper for group discussion</i>		PBL (10 pts)
<i>Translation and mRNA stability</i>	24 - Th	Apr 9	<i>Translation and mRNA stability</i>	Hypothesis and Aims Graphical Outline Due	Chapters 24; 22.5-22.9	Hypothesis and Aims Graphical Outline Due (30 pts)
	25 - T	Apr 14		Group paper Discussion		Group Discussion (10 pts)
<i>Regulatory RNAs</i>	26 - Th	Apr 16	Trans-acting RNAs		Chapters 22.6; 30.5-30.8	
	27 - T	Apr 21	No class – Work on proposal	Work on Literature review or specific aims For Apr 28: <i>Identify paper for group discussion</i>		

	28 - Th	Apr 23	No class – Work on proposal		Chapter 22.10	
	29 - T	Apr 28		Proposal Due: Literature Review, Specific Aims and Research Plan Due Group paper discussion		Group Discussion (10 pts) Proposal Due: Literature Review, Specific Aims, and Research Plan Due (130 pts)
	30- Th	Apr 30	<i>graduate student success</i>			
	No Lecture	May 4-9	Finals week:	No Class and no exam		