DEPARTMENT OF BIOCHEMISTRY

Regulation of Eukaryotic Gene Expression
BCHM 610 – Syllabus
Spring 2015

INSTRUCTOR:  Dr. Scott Briggs
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  Phone:  494-0112
  e-mail:  sdbriggs@purdue.edu

  Office hours:  Immediately following class or by appointment.

LECTURE TA:  Yueping Zhang
  office:  HANS 233
  TEL:  494-3722
  e-mail:  zhang446@purdue.edu

  Office hours:  By appointment only. Please see the TA if you need assistance with
  assignments or have questions about your grades.

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 current 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 and interpret scientific literature
through class presentations, discussions and take home assignments. Additionally,
students will gain experience in developing and testing hypotheses, 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 highly recommended for this course. It contains 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 change and electronically through the Purdue Library.

LECTURE TIME AND PLACE

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

BLACKBOARD

The syllabus for the course and lecture notes will be available via the Purdue University Blackboard site at: http://www.itap.purdue.edu/learning/tools/blackboard/

ASSESSMENT

IN CLASS ASSESSMENT/ASSIGNMENTS
Grades will be assessed based on class participation, presentations, take home quizzes and a specific aims document. There are a total of 400 points available in this course. There will be multiple opportunities for students to present during this semester. Class participation points will be determined through engaged discussions, contribution to student presentations, asking 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/mini-proposal
During this course, students will learn to read and critically review publications in the gene expression field. The first homework assignment will require reading and describing an assigned paper using the standardized classroom format. Students will then use this format to present figures in class individually. Then, students will be asked to give group presentations where they will present papers. The final assignments involve original proposals 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:

- Class participation/attendance 100 points (max 70/30)
- Student Presentations 60 points
- Homework 30 points
- Group Presentation 40 points
- Aims Outline 30 points
- Introduction Outline 30 points
- Mini-Proposal 80 points
- Summary Statements 30 points
Class Participation and Attendance
To obtain participation points, students must ask or answer a question during class. Multiple questions in the same class period will count as one question. Full participation credit requires students to ask/answer questions in 22 of the 28 classes following the first week (80%). Attendance will be taken after the first week. 100% attendance is necessary for all attendance points after the first week.

The cutoff values for letter grades are as follows:

- 360 points  A
- 320 points  B
- 280 points  C
- 240 points  D
- 239 points and below  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 at least two 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. Students should read all of the papers before class to ensure that they are prepared if selected to present.

Late Work Policy
There is no late work accepted in this class. Final written documents are due by the end of class 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 lecture TA. In the event this does not resolve your concerns, please take them up 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).

The lecture TA will hold office hours for at least 1 hour per week, and will be able to answer additional questions by appointment.

ACADEMIC MISCONDUCT
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"

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.

If you are ill with flu-like symptoms, please do not attend class. Course materials will be provided to you.
**LECTURE SCHEDULE**

The format of this course is as follows:

Dr. Briggs will present introductory material on Tuesdays and oral presentations will be on Thursdays. Students are encouraged to seek assistance from Dr. Briggs and/or the TA for assistance with assignments and concepts. Students are responsible for reading all assigned chapters and papers prior to class.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Lecture</th>
<th>Date</th>
<th>Lecture Focus</th>
<th>Reading Assignment</th>
<th>Corresponding Book Chapter(s)</th>
<th>Presenter/Homework</th>
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<tbody>
<tr>
<td><strong>Introduction</strong></td>
<td>1 - T</td>
<td>Jan 13</td>
<td>Introduction to the course</td>
<td>Quiz in class</td>
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<tr>
<td>2 - Th</td>
<td>Jan 15</td>
<td>Central Dogma</td>
<td>Chapter 2</td>
<td>Chapter 2 (1&amp;4-4.8 if needed)</td>
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<tr>
<td><strong>Molecular Biology</strong></td>
<td>3 - T</td>
<td>Jan 20</td>
<td>Tools Part I: Model Systems, Genetics, RNAi</td>
<td>Chapter 3</td>
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<tr>
<td>4 - Th</td>
<td>Jan 22</td>
<td>Tools Part II: Molecular Biology Techniques</td>
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<td>Chapter 3</td>
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<tr>
<td><strong>Eukaryotic Transcription</strong></td>
<td>5 - T</td>
<td>Jan 27</td>
<td>Cis-acting Transcriptional Elements and &quot;How to read a scientific paper&quot;</td>
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<td>Chapters 20</td>
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<tr>
<td>6 - Th</td>
<td>Jan 29</td>
<td>&quot;How to read a scientific paper&quot; cont. and introduction to Homework (Due Feb 3)</td>
<td>Paper: Homework assigned</td>
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<td><strong>Transcription Initiation</strong></td>
<td>7 - T</td>
<td>Feb 3</td>
<td>Discussion of Homework / Introduction into RNA Pol II</td>
<td>Homework due IN CLASS</td>
<td>Chap 28</td>
<td>Class discussion</td>
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<td>8 - Th</td>
<td>Feb 5</td>
<td>RNA Pol II CTD (promoter clearance and elongation)</td>
<td>Review paper: Buratowski 2009</td>
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<td>9 - T</td>
<td>Feb 10</td>
<td>Paper:</td>
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<td>Chap 20.7-20.8</td>
<td>Student Presentation I</td>
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<td>Date</td>
<td>Day</td>
<td>Topic</td>
<td>Notes</td>
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<td>10 - Th</td>
<td>Feb 12</td>
<td>&quot;Histone Code&quot;</td>
<td>Two Reviews: &quot;Histone Code&quot; Review &quot;Readers of Histones&quot; Review</td>
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<td>11 - T</td>
<td>Feb 17</td>
<td>Guest Lecture: Dr. Humaira Gowher</td>
<td>DNA Methylation</td>
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<td>12 - Th</td>
<td>Feb 19</td>
<td>Paper:</td>
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<td>13 - T</td>
<td>Feb 24</td>
<td>Review: Berretta and Morillion 2009.</td>
<td>Chapter 22.1-22.3; 22.8; 22.10 and 30.3)</td>
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<td>14 - Th</td>
<td>Feb 26</td>
<td>ncRNA</td>
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<tr>
<td>16 - Th</td>
<td>Mar  5</td>
<td>Paper:</td>
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<tr>
<td>17 - T</td>
<td>Mar 10</td>
<td>Termination, 3' end formation and splicing</td>
<td>Chapter 21</td>
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<tr>
<td>18 - Th</td>
<td>Mar 12</td>
<td>Paper:</td>
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<tr>
<td>19 - T</td>
<td>Mar 24</td>
<td>Discussion of Final Project Graph and Outline Handouts Student group assignments</td>
<td>Open discussion.</td>
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<td>Mar 17 &amp; 19</td>
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<td><strong>SPRING BREAK</strong></td>
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<td>20 - Th</td>
<td>Mar 26</td>
<td>In class group workshop</td>
<td>Discussion of specific aims</td>
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<td>21 - T</td>
<td>Mar 31</td>
<td>Hypothesis and Aims Graphical Outline Due</td>
<td>Chapter 24; 22.5-22.9</td>
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<td>22- Th</td>
<td>Apr  2</td>
<td>Paper:</td>
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<td>23 - T</td>
<td>Apr 7</td>
<td>Trans-acting RNAs Guest Lecture: Dr. Andrea Kasinski - miRNAs</td>
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<td>Review: Eulalio et al. 2008 Introduction Outline Due (fully referenced)</td>
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<td>Chapters 22.6; 30.5-30.8</td>
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<td>24 - Th</td>
<td>Apr 9</td>
<td>Paper:</td>
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<td>25 - T</td>
<td>Apr 14</td>
<td>P Bodies</td>
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<td>Review: Parker, R. and Sheth, U. P 2007 Chapter 22.10</td>
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<td>26 - Th</td>
<td>Apr 16</td>
<td>Paper:</td>
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<td><strong>Mini-proposals due.</strong></td>
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<td>27 - T</td>
<td>Apr 21</td>
<td>Read/Review mini proposals</td>
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<tr>
<td>28 - Th</td>
<td>Apr 23</td>
<td>Read/Review mini proposals</td>
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<td>29 - T</td>
<td>Apr 28</td>
<td>Write summary</td>
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<td>30 - Th</td>
<td>Apr 30</td>
<td>Summary statement due and discussion of graduate student success</td>
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<td>No Lecture</td>
<td>May 4-9</td>
<td>Finals week:</td>
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