

JOHN JAY COLLEGE OF CRIMINAL JUSTICE
The City University of New York

College Name and Address: John Jay College of Criminal Justice, 524 West 59th Street, New York, NY 10019

Course Title and Section: Syllabus for Molecular Biology 1 BIO412 fall 2013, Lecture Portion

Professor's Name: Richard Li, PhD

Office Location: NB05.66.14

Contact Hours: 1:30 – 2:30 MT; 11-12W

Phone: (646)-557-4886

E-mail Address: rli@jjay.cuny.edu

Course Description

BIO412 consists of lectures and laboratory experiments. BIO412 is a prerequisite for BIO413 (forensic DNA analysis). Lecture topics of BIO412 include:

- Protein structure and function
- Molecular genetic mechanisms
- Molecular genetic techniques
- Genes, genomics and chromosomes
- DNA replication
- Transcriptional control of gene regulation
- Post-transcriptional gene regulation

Learning Outcomes

Reasoning

- *Determine appropriate conclusions based on scientific evidence*
- *Critically evaluate the molecular basis of various biological processes*
- *Recognize the significance of the scientific process in understanding mol bio-based problems.*
- *Apply critical thinking skills in solving problems of a scientific nature*
- *Critique scientific findings as related to molecular biological analysis*

Knowledge

- *Interpret molecular research findings as published in the popular media and primary scientific literature*
- *Describe basic concepts of Molecular Biology including macro-molecular structure and function, DNA replication, gene regulation, and biotechnology*
- *Explain the essential role of molecular biology in forensic science*

Practical skills

- *Apply basic laboratory skills and learn advanced experimental techniques including recombinant DNA analysis, microbial cell culture, transformation, and DNA sequencing*
- *Consider the importance of Quality Assurance/Quality Control in laboratory-based research*
- *Apply experimental design and analytic skills to molecular biological problems*
- *Describe how science is used in the criminal justice system*

Communication

- *Use sound scientific reporting techniques*

Course Pre-requisites or Co-requisites

BIO315

Requirements / Course Policies

Attendance and participation: You are required to attend and participate in class. An attendance sheet will be circulated during class. It is your responsibility to sign the sheet during class. You will not be permitted to sign the attendance sheet after the class has been dismissed. More than four (4) unexcused absences are considered excessive and you will receive a grade of "F".

Texts

- Required reading: reading list will be provided in class.
- Suggested background text:
 - Lodish, H. *et al.*, (2012) *Molecular Cell Biology*, W. H. Freeman and Company
 - Alberts, B. *et al.*, (2007) *Molecular Biology of the Cell*. Garland Science
 - Krebs, J. *et al.*, (2011) *Lewin's GENES X*, Jones & Bartlett Learning
 - Cox, M. (2012) *Molecular Biology: Principles and Practice*, W. H. Freeman and Company

Grading

Your grade in the lecture portion of this course is worth 40% of your course grade and the laboratory section is worth 60% of your course grade. The lecture portion of your grade will be based upon your performance in:

- Three lecture exams (10 % each). There are no make-up exams.
- One in-class oral presentation (5 %): reviewing of primary literature (or case studies)
- Assignments (5%)

Course Calendar

DATE	TOPIC		LEC
Wednesday, August 28, 2013	Introduction	Central Dogma; Ethics	1
Monday, September 09, 2013	Methods in Molecular Biology and Genetic Engineering	Recombinant DNA; Cloning	2
Wednesday, September 11, 2013		Macromolecule Blotting; Probing; Microarray	3
Monday, September 16, 2013		Expression Vectors and Systems	4
Wednesday, September 18, 2013		Gene Inactivation Techniques	5
Monday, September 23, 2013		Electrophoresis; DNA Sequencing; PCR	6
Wednesday, September 25, 2013		Macromolecule Structure and Function	Protein Structure and Function
Monday, September 30, 2013	Regulating Protein Function; Proteomics		8
Wednesday, October 02, 2013		Review	
Monday, October 07, 2013		Exam 1 (covering Lec 1 - 8)	
Wednesday, October 09, 2013	DNA Replication	Structure of Nucleic Acids	9
Tuesday, October 15, 2013		DNA Replication; DNA Repair; Recombination	10
Wednesday, October 16, 2013		Viruses: Parasites of the Cellular Genetic System	11
Monday, October 21, 2013	The Content of the Genome	Special Topics	12
Wednesday, October 23, 2013		Gene Structure; Noncoding DNA; Mobile DNA Elements	13
Monday, October 28, 2013		Organelle DNAs	14
Wednesday, October 30, 2013		Genomics	15
Monday, November 04, 2013		Structural Organization of Chromosomes	16
Wednesday, November 06, 2013			Exam 2 (covering Lec 9 - 16)
Monday, November 11, 2013	Transcription and Gene Regulation	Prokaryotic Transcription	17
Wednesday, November 13, 2013		Eukaryotic Transcription	18
Monday, November 18, 2013		Gene Regulation Mechanisms	19
Wednesday, November 20, 2013		Molecular Mechanisms of Transcription Repression and Activation	20
Monday, November 25, 2013	Post-Transcriptional Gene Regulation and Translation	RNA Splicing and Processing	21
Monday, December 02, 2013		Transport of mRNA Across The Nuclear Envelope; Translation	22
Wednesday, December 04, 2013		Regulatory RNA	23
Monday, December 09, 2013		Cytoplasmic Mechanisms of Post-transcriptional Regulation	24
Wednesday, December 11, 2013		Review	
Wednesday, December 18, 2013	10:15 - 12:15 p.m.	Final Exam (covering Lec 17 - 24)	

College Wide Policies for Undergraduate Courses (see the *Undergraduate Bulletin*, Chapter IV Academic Standards)

- A. Incomplete Grade Policy
- B. Extra Work During the Semester
- C. Americans with Disabilities Act (ADA) Policies

Qualified students with disabilities will be provided reasonable academic accommodations if determined eligible by the Office of Accessibility Services (OAS). Prior to granting disability accommodations in this course, the instructor must receive written verification of a student's eligibility from the OAS which is located at 1233N (212-237-8144). It is the student's responsibility to initiate contact with the office and to follow the established procedures for having the accommodation notice sent to the instructor.

Source: *Reasonable Accommodations: A Faculty Guide to Teaching College Students with Disabilities*, 4th ed., City University of New York, p.3.

(http://www.jjay.cuny.edu/studentlife/Reasonable_Accommodations.pdf)

Statement of the College Policy on Plagiarism

Plagiarism is the presentation of someone else's ideas, words, or artistic, scientific, or technical work as one's own creation. Using the ideas or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations require citations to the original source. Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism. It is the student's responsibility to recognize the difference between statements that are common knowledge (which do not require documentation) and restatements of the ideas of others. Paraphrase, summary, and direct quotation are acceptable forms of restatement, as long as the source is cited. Students who are unsure how and when to provide documentation are advised to consult with their instructors. The Library has free guides designed to help students with problems of documentation. (*John Jay College of Criminal Justice Undergraduate Bulletin*, <http://www.jjay.cuny.edu/academics/654.php>, see Chapter IV Academic Standards)

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Grading

Your grade in the lecture portion of this course is worth 40% of your course grade and the laboratory section is worth 60% of your course grade. The lab portion of your grade will be based upon your performance in:

- Four lab reports (45 % total)
- Quizzes/attendance (15 %)

Lab Calendar

Lab	Date	Experiment	
1	9/3/2013	Course overview, report writing	
2	9/9/2013	Lab 1 and 2: Pipettor exercises	
3	9/10/2013	Lab 9: SNP: DNA extraction and PCR	Report 1 (10 %)
4	9/16/2013	Lab 10A:SNP: Restriction Digest and DNA Gel	
5	9/17/2013	Lab 10C: SNP: BLAST	
6	9/23/2013	Lab 11: pGLO Transformation	Report 2 (15%)
7	9/24/2013	Lab 12:pGLO Transformation Analysis and Bacterial Cultures	
8	9/30/2013	Lab 13A and 13B: pGLO isolation and quantification	
9	10/1/2013	Lab 14 A: pGLO mutagenesis	
10	10/7/2013	Lab 14 B: pGLO DpnI digest and second transformation	
11	10/8/2013	Lab 15 A: pGLO Transformation Analysis and Bacterial Cultures	
12	10/15/2013	Lab 15B: pGLO isolation and quantification	
13	10/21/2013	Lab 16A: pGLO cycle sequencing PCR	Report 3 (10%)
14	10/22/2013	Lab 16B and 16C: pGLO DNA clean-up and sequencing analysis	
15	10/28/2013	Lab 17: Proteomics Protein Extraction	
16	10/29/2013	Lab 18 and 19: Proteomics SDS-PAGE and Transfer (8 students)	
17	11/4/2013	Lab 18 and 19: Proteomics SDS-PAGE and Transfer (8 students)	Report 4 (10%)
18	11/5/2013	Lab 20: Proteomics detection	
19	11/11/2013	Lab 3A and 3B: RFLP DNA gel and probe preparation	
20	11/12/2013	Lab 4: RFLP Restriction Digest and probe verification	
21	11/18/2013	Labs 5 and 6: RFLP DNA gel and southern blotting (8 students)	
22	11/19/2013	Labs 5 and 6: RFLP DNA gel and southern blotting (8 students)	
23	11/25/2013	Lab 7 A: Probe labeling (overnight)	
24	11/26/2013	Lab 7A (cont.): Probe testing	
25	12/2/2013	Lab 7B: RFLP Pre-hybridization and hybridization	
26	12/3/2013	Lab 8: RFLP DNA detection	

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