

# BIOLOGY OF THE EUKARYOTIC CELL

Biology 4205

Fall 2009

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## COURSE INFORMATION AND POLICIES

**INSTRUCTOR:** Louise A. Russo, Ph.D.

**OFFICE:** Mendel 191C, tel: 610-519-4869; *email:* louise.russo@villanova.edu

**LAB:** Mendel G19

**OFFICE HOURS:** As posted and by appointment

### REQUIRED READING:

1. Cooper and Hausman, *The Cell: A Molecular Approach* (Fifth Edition), Sinauer Associates Publishing, Sunderland, MA
2. Instructor-prepared handout materials

**INTRODUCTION:** Cell Biology is a study of cell structure and functions that determine function of multicellular organisms as a whole. This field of study arose from a union of the disciplines of biochemistry, genetics, molecular biology as well as anatomical cell biology. As such, the discipline of cell biology will encompass a broad spectrum of investigative techniques and a vast base of knowledge. In this course, we will study structure and function of cell organelles and important macromolecules as well as cell biological processes and their regulation. This material should prove to be both interesting and challenging as we progress through the semester.

**ATTENDANCE:** Attendance is required at all laboratories but is not required at lectures. If an absence occurs on a day of a scheduled laboratory or a lecture examination, you must notify the instructor PRIOR to the absence to be officially excused. In addition to prior notification, excused absences may also require certification of the reason for the missed exam (i.e. doctor's note, official note from the University, police report etc.). **For students scheduling interviews for graduate or health professional degree programs, it is important to AVOID SCHEDULING such activities on the day we have laboratories. Material you miss during a laboratory session cannot be made-up. This is particularly critical for the labs in which oral discussions are scheduled.**

### EVALUATION OF PERFORMANCE:

1. **EXAMINATIONS:** There will be three hourly lecture examinations and a final. Dates for these examinations are listed on the course calendar. Examinations will not be rescheduled except in an emergency. If you receive an excused absence for an examination, a make-up exam will be scheduled at the instructor's discretion.
2. **LABORATORIES:** Evaluation of lab performance will be by a graded laboratory report, a short lab write-up. See *Laboratory Schedule Handout* for assigned value of each

laboratory element. *A deduction of 5 points will be taken for each day a lab report or other lab assignment is late past the official due date.* The laboratory report will be graded and returned to you for revision as appropriate. A revised version of that report will be resubmitted for the final grade assignment.

**3. RESEARCH PAPER:** One brief position paper will be completed for credit during the course of the semester. The paper is to be 4-6 pages of text in length (typed (12 point font/double spaced, 1 inch margins with cover page). Proper source/reference citations are required with an appropriate bibliography included. The format for the paper is as indicated in the *Guidelines for Writing Papers in Cell Biology* handout. The research paper is due at the beginning of the lecture period on the date indicated in the course calendar. A deduction of 5 points will be taken for each day late past the due date. Following submission of the written report, an oral discussion on the topic of the research paper will be conducted during scheduled laboratory sessions at the end of the semester. **NO papers will be accepted for credit if submitted after the date of the oral discussion.** The oral component of the paper will be graded and incorporated as part of the research paper assignment.

**ACADEMIC INTEGRITY:** You are expected to uphold the University policies on academic integrity and to conduct yourselves with honesty. Violations of these policies will not be tolerated. Please read the appropriate pages in the *Blue Book* (Student Handbook) and *Enchiridion* which give an explanation of the University's policies and penalties for dishonesty. If a violation is apparent, appropriate actions will be taken. I am prepared to assess the maximum penalty (an "F" for the course) if warranted.

**GRADING:** Letter grades for lecture examinations will be determined according to the grade distribution for each exam. Assignment of the final grade will be based upon the final grade distribution. The final grade will be based upon the total number of points accumulated in the course at the end of the term. The point value for each of the graded items for the semester is indicated below.

<b>GRADED ITEM</b>	<b>POINTS</b>
Lecture Exams:	
Exam I	100
Exam II	100
Exam III	100
Final Exam	100
 Paper:	
Final Written report	75
Oral discussion	25
 Laboratory:	
Lab report	125
Lab write-up	75
 <b>TOTAL POINTS</b>	 <b>700</b>

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# GUIDELINES for WRITING PAPERS in CELL BIOLOGY

You will be required to write several kinds of papers/reports in Cell Biology. Papers and lab reports also need to be carefully prepared and TYPED. Please follow these guidelines in preparing your papers.

**1. LAB REPORT:** you will be provided a handout for the lab report that will clearly indicate the information you need to include and how to approach writing each section of the report. All reports will contain the following sections:

The **INTRODUCTION:** should contain pertinent background information as well as the objectives of the study. Much of this information can be gleaned from lab hand-outs and your text.

The **METHODS:** should contain a **BRIEF synopsis** of the experiment in general terms in addition to specifics on last minute changes to the protocol as presented to you in pre-lab lectures. **DO NOT SIMPLY REPEAT the lab hand-out** or go into extensive effort to rewrite the entire protocol.

The **RESULTS:** should contain the raw data from your experiments and any calculations, graphs, tables, drawings, or photos obtained. **Label all Figures and Tables clearly and include thorough legends!** Figures and Tables should deliver all relevant information independent from the text.

The **DISCUSSION:** should contain an analysis of the importance of your experiments, the implications of your results, and place your work in perspective with what is known from the literature (your text or primary sources). Also include any possible sources of error, and any ideas for further experiments which might resolve some question in your work. Be sure to answer/address any specific questions posed in the lab hand-outs. "I enjoyed/hated the lab" belongs in your conversation, not your written work.

The **REFERENCES:** should include those sources which provided information for your report. These may include texts, reference works, primary literature, material information from biotechnology companies, perhaps even newspaper/magazine articles or Web sites. *If including material from a Web source, please give the correct address (http) as well as the DATE you accessed the information as web sites change frequently over time.* All sources should be presented with complete bibliographic information as detailed below. **You will be expected to provide at least THREE references for each lab report.**

All this should be accomplished in a relatively brief format - remember that many references articles are only a few pages long. **I suggest a maximum of TEN pages of double-spaced text** excluding Figures, Tables, and Bibliography.

**II. RESEARCH PAPER:** This composition will essentially be a short position paper on a selected topic. The paper topic will be assigned early in the semester. The paper is due approximately one month after the original assignment date. The nature of this composition differs from a lab report and will require more extensive literature review and assimilation of materials for your writing. **This composition need not be divided into sections but should contain the following features:**

1. **Introduction** which gives information that relates background information in general to put the entire paper in perspective and establish the scope of your work.
2. **Body** of the paper which clearly and logically develops your ideas. Include primary literature sources in support of the material you develop, use proper citation technique (*see section on Attribution*). Each paragraph should build, extend from the previous one. Use introductory statements at the beginning of a paragraph to smoothly transition between ideas developed in the previous paragraph. Use summary/global concluding statements at the end of a paragraph to tie together the work presented and clearly relate the significance of the material. These elements add to the readability of the paper and enhance reader comprehension. Ideas should be developed logically as the paper progresses so that a story is developed which is meaningful to the reader.

When using information from a literature source in the text of your paper, use the following as a "guide" for melding another's work and ideas into your story: "In order to determine if \_\_\_\_\_, Smith and Jones isolated \_\_\_\_\_ from \_\_\_\_\_ treated with \_\_\_\_\_, and characterized its \_\_\_\_\_ using \_\_\_\_\_. They observed \_\_\_\_\_ which suggested the possibility that \_\_\_\_\_. To confirm this hypothesis, they analyzed the \_\_\_\_\_ from \_\_\_\_\_ which showed \_\_\_\_\_ (Smith and Jones, 1976). Include the citation reference at the end of the initial sentence where an investigator's work is presented. If you continue to discuss ideas from the same source within the extended paragraph, subsequent reference citations need not be included as long as it is clear that you are discussing work from the same source throughout the paragraph.

You should also include information on the importance of the selected works you use in your review, and what questions remain unanswered. Try to include your assessment of the work presented, is there debate on a topic/alternate viewpoints and which you favor in light of the materials you read. Are there any obvious oversights in the published literature?

3. **Future directions and outlook** section should finish the composition. Include your thoughts on what is known, its significance, what work should be done to further understanding of the topic. This may include societal as well as scientific considerations. However, try not to belabor philosophy or moral issues in a science paper.
4. **References: you will be expected to provide a minimum of FIVE references**, at least two of which are primary literature sources. Secondary literature sources including review articles, Web sites, texts, etc. are excellent resources but should not be exclusively used for this paper. All references listed must be cited in the text of the paper, if not referenced it is assumed that they were not used and should not be listed in the bibliography.

Computer aided literature review is easy here on campus. You can now access Medline, Index Medicus, and BIOSIS on-line in Falvey library. Other search sources are available as well. **I will provide a few excellent database search engines to access pertinent literature for your papers and lab reports.**

**STYLE:** Good writing skills are very important in scientific writing. Papers must be grammatically correct as well as scientifically accurate. Pronouns must agree with their antecedents and verbs with their subjects. **AVOID flowery language and metaphors;** these are okay for English and history compositions but not for scientists. Replace such compositional elements with brevity and clarity. Do not use eight words when two will do (i.e. use "we observed" instead of "it was observed in the course of the experiment"). **Do not assign living properties to inanimate objects;** do not say "the protein possesses an ability to bind to DNA" as a protein itself is not living nor can it own anything. Simply say "the protein binds DNA."

Most papers are written in the third person, although the first person is perfectly acceptable in experimental reports. The present tense should be used when stating a previously published fact ("E.

*coli grows* on medium supplemented with mannose”) whereas the past tense should be used when presenting the results of your experiments (“*E. coli grew* on medium supplemented with mannose”). Thus a lab report may switch frequently between the present and past tenses.

**ATTRIBUTION:** The ideas and words which you get from others must be acknowledged, and in scientific papers, the place to do it is immediately after the statement, in parentheses. The references may be cited by author and date (**Chirgwin *et al.*, 1979**), or by number (**1**) where the numbers are in order of appearance or alphabetical by the last name of the first author. **Direct quotes are frowned upon; paraphrase in your own words, not their words rearranged!** If an idea is in very common usage, you do not have to cite a reference, but if it is merely popular in a particular area, cite a review article to substantiate your statements (*i.e.* for a review, see ref. 25). Plagiarism is a particularly disagreeable academic crime, one which can cost you your career (in college and beyond), so it is better to over-reference than to omit an important work. Get an idea of how and when to cite references by reading the literature (articles in *Cell*, *Molecular and Cellular Biology* have appropriate formats). The references which are cited in your paper should be fully described in a reference section. Use a standard format for all your references. Give a complete citation, including the last name and initials of all authors, the year of publication, the title of the article, the journal, volume, and complete pagination. Collected works should include the names of all editors, and references to texts should give the pages on which the topic is discussed. A few examples are given below. Follow this format in your reference sections.

1. Chirgwin, J.M., A.E. Przybyla, R.J. MacDonald and W.J. Rutter. Isolation of biologically active ribonucleic acid from sources enriched in ribonuclease. Biochemistry 18: 5294-5299, 1979.
2. Maniatis, T., E.F. Fritsch and J. Sambrook. Molecular Cloning: a laboratory manual. Cold Spring Harbor, New York, 1982.
3. Miller, H. Practical aspects of preparing phage and plasmid DNA: growth, maintenance, and storage of bacteria and bacteriophage. In: Guide to molecular cloning techniques. S.L. Berger and A.R. Kimmel. New York, Academic Press, Inc., 1987.

If you have questions or concerns related to writing papers for this course or any other course in Biology, I have additional resource books that are available to help you in composition and organization of written papers. Please request to borrow these resources if you feel they may be of assistance to you. These include: The Craft of Scientific Writing (3rd Edition) by Michael Alley and Writing Papers in the Biological Sciences (2nd Edition) by Victoria E. McMillan





**ACKNOWLEDGEMENT OF COURSE POLICIES**

Please read and sign this form after you have examined the course syllabus. Detach the signed form and return to your instructor. Your form must be received by the beginning of the first laboratory session of the semester.

I have read the course outline and syllabus for this course and understand all of the policies explained therein. Further, I agree to abide by the policies of the course, and understand that, if I do not, I will be subject to the consequences as stated.

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Name (printed)

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Signature

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Date

LECTURE	DATE	TOPIC	READING	ASSIGNMENTS
1	8/24	Introduction		
2	8/26	Chemistry of Cells	Chapters 1,2	
3	8/28	Chemistry of Cells	Chapters 1,2	
4	8/31	Biological Reactions	Chapter 3	
5	9/2	Methods: Molecular & Biochemical	Chapter 4	
6	9/4	Methods: Molecular & Biochemical	Chapter 4	
	9/7	<b>LABOR DAY</b>		
7	9/9	Methods: Microscopy	Chapter 1	
8	9/11	Membrane Structure & Composition	Chapter 13	
9	9/14	Membrane Transport: Passive	Chapter 13	
10	9/16	Membrane Transport: Passive	Chapter 13	
11	9/18	Membrane Transport: Active	Chapter 13	
12	9/21	Membrane Transport: Active	Chapter 13	
	9/23	<b>EXAM I</b>	<b>Ch. 1-4, 13</b>	
13	9/25	Cell Surface Receptors	Chapter 15	
14	9/28	Cell Receptors/Signaling	Chapter 15	
15	9/30	Cell Receptors/Signaling	Chapter 15	
16	10/2	Cell Receptors/Signaling	Chapter 15	<b>Select Paper Topic</b>
17	10/5	Cytoskeleton/Microtubules	Chapter 12	
18	10/7	Microtubules	Chapter 12	
19	10/9	Microfilaments	Chapter 12	
	10/12- 10/16	<b>SEMESTER BREAK</b>		
20	10/19	Microfilaments	Chapter 12	
21	10/21	Cell Adhesion	Chapter 14	
	10/23	<b>EXAM II</b>	<b>Ch. 12 &amp; 15</b>	
22	10/26	Cell Adhesion	Chapter 14	
23	10/28	Cell Adhesion	Chapter 14	
24	10/30	Cell Adhesion	Chapter 14	
25	11/2	Chromatin Organization	Chapter 7	
26	11/4	Transcriptional Regulation	Chapter 7	
27	11/6	Transcriptional Regulation	Chapter 7	<b>Paper Due</b>
28	11/9	Protein Sorting /Targeting: Nucleus	Chapter 9	
29	11/11	Protein Sorting /Targeting: ER	Chapter 10	
30	11/13	Protein Sorting /Targeting: ER	Chapter 10	
31	11/16	Protein Sorting /Targeting: Golgi	Chapter 10	
	11/18	<b>EXAM III</b>	<b>Ch. 7,9,14</b>	
32	11/20	Protein Sorting/Targeting: Golgi	Chapter 10	
33	11/23	Cell Cycle Phases	Chapter 16	
	11/25- 11/27	<b>THANKSGIVING RECESS</b>		
34	11/30	Cell Cycle: Regulation	Chapter 16	
35	12/2	Cell Cycle: Regulation	Chapter 16	
	12/4	<b>NO CLASS</b>		
36	12/7	Apoptosis	Chapter 17	
37	12/8	Cancer Cell Biology	Chapter 18	
38	12/9	Cancer Cell Biology	Chapter 18	
	12/14	<b>FINAL EXAM 10:45 am – 1:15 pm</b>	<b>Ch. 10, 16 - 18</b>	

## TENTATIVE LABORATORY SCHEDULE

Fall 2009

LABORATORY	DATE	TOPIC	GRADED ITEM	DATE ITEM DUE
1	8/27	Protein Gel Electrophoresis	<b>Write-up</b>	<b>10/1</b>
2	9/3	Immunoblotting/ICC part I		
3	9/10	Immunocytochemistry (ICC) part II		
4	9/17	Data Discussion and analysis		
5	9/24	Cell Culture/Extract preparation	<b>Lab Report</b>	<b>11/12 draft</b>
6	10/1	Protein Electrophoresis		<b>12/5 final</b>
7	10/8	Immunoblotting/ICC part I		
8	10/22	ICC part II/Transcription assay		
9	10/29	ICC part II/Transcription assay		
10	11/5	Data Discussion/Lab Report Prep		
11	11/12	<i>Oral Discussion I</i>		
12	11/19	<i>Oral Discussion II</i>		
13	11/25	<b>THANKSGIVING</b>		
14	12/5	NO LAB		

### LABORATORY ASSIGNMENTS: POINT VALUES

Lab Write-up (Labs 1-4)	75 points
Lab Report (Labs 5-10)	125 points

**NOTE:** All lab write-ups and reports are due on the dates specifically indicated on the calendar. A deduction of 5 points will be taken for each day a report is late past the due date. **Due dates will not be changed!** Ample time has been assessed for completion of these assignments. Reports may be submitted prior to the due date if finished but requests for change of due date or time extensions will not be granted to prevent excessive work at the end of the term. **The first version of the laboratory report will be graded and returned for revision as appropriate before the final grade for that report is assigned.** See the attached handout entitled *Guidelines for Writing Papers in Cell Biology* for the appropriate format for the lab reports.