SYLLABUS FOR BIO 301 INTERMEDIATE CELL BIOLOGY SPRING, 2018

Instructor: Dr. Ron Berezney
Office: Cooke 637 **Phone:** 645-4956
Office Hours: T and W, 4:00 to 5:00 pm or contact me for an appointment
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Lectures: T/T 11:00 -12:20 pm in COOKE 127B. The power point slides for the lectures and readings will be available on BIO301 UBLearns (https://ublearns.buffalo.edu/index.html).

Course description and goals: This course will cover a wide range of topics in cell biology. Students who successfully complete this course will acquire in depth understanding of basic concepts in cell biology and the experimental approaches that led to these concepts. The lectures will be presented at an intermediate cell biology textbook level supplemented by selected research articles which expand upon the lectures and focus on the role of cell biology in biomedical research. Overall ~ 40% of the course will be devoted to discussion and analysis of past and current research which illustrate and expand upon the concepts, experimental details and applications to medical issues.

Required textbook: Cell and Molecular Biology (7th Edition) by Gerald Karp, 2013
John Wiley & Sons, Inc., New York. (ISBN: 97811820673-7) .You can also use the 6th or 8th edition. Copies of the 6th edition are on reserve in the UG library along with one copy of Alberts MBC. An assortment of research review articles will be covered in Section 3 and provided to you on UBLearns.
Course requirements and activities: (1) attend lectures, (2) lecture preparation including review of power point lecture slides, textbook and article assignments, (3) written reports of research articles, (4) group presentations of assigned research articles, (5) reviewing of student class presentations, (6) two in class written exams

Course Lectures and Information: All power point slides for the lectures and other important information concerning this course including readings will be placed on **UBLearns under Bio 301**

Overall course organization and grading: The course is divided into three separate sections. **Sections 1 and 2** cover major topics in cell biology (see attached **Course Outline**). For each section there will be one written exam in class. Written exams will be a combination of "fill in the blanks" and short essay questions.**Sample exams will not be available. Section 3** is devoted to classroom discussions of major advances in cell biology research and biomedical applications. Each student will be involved in power point presentations of research review articles and a written report on a specific topic **(see Instructions for Powerpoint Presentations and Written Reports).** Students will also serve as **presentation reviewers.**

Grading: The final grade will be based on the **final average score** achieved from the two written exams of Sections 1 and 2 (60% of the final average score) and 40% from Section 3 consisting of the power point presentations (20%) and written reports (20%). Students are required to hand in their student presentation reviews on time. Failure will result in a deduction of one point from the final average for each late or absent review. Handing in both presentation reviews will result in a bonus of 2 points for the student.

Grade Scale based on overall average % scores

A's – 90-100
B's – 80 -89
C's - 70-79
D's - 60-69
F – less than 60

Plus and minus grades will be assigned depending on the distribution of scores within each letter grade. The instructor may lower the grade scale (cut-offs for each grade) depending on the overall performance of the class after all the scores are available.

All student in BIO 301 must take the two written exams without exception. Failure to take an exam will result in a zero score. Failure to participate in an assigned discussion and/or to hand in the written report on the due date will result in zero points for that assignment. **Attendence at the Discussions is required. One percentage point will be deducted from your final class average for each absence.**

Policies: *No extra credit* will be given.

Incompletes will only be given to students in good standing (not failing the course). Arrangements to receive an incomplete grade must be requested and approved by the instructor before the end of the semester. See the University Policy on Incompletes for more information at:
http://undergrad-catalog.buffalo.edu/policies/grading/explanation.shtml
No make-up exams will be given unless the student produces a valid, written, excuse with a doctor's (MD) signature (or equivalent) explaining why the student missed the exam.

Regrades of exams must be requested **by email only up to one week after the exam is returned.**

Excused absences must be approved by Dr. Berezney at least 1 week in advance.

Last day to drop courses without "R" - **2/5/18**.
Last day to resign ("R") a course - **4/20/18**

Academic Integrity: The University at Buffalo and this Instructor takes this issue very seriously. Every student should read the detailed information and regulations concerning academic dishonesty at:

http://undergrad-catalog.buffalo.edu/policies/course/integrity.shtml

In brief, academic dishonesty includes copying the work of another individual, using unauthorized materials and giving or receiving unauthorized assistance during an exam or on an assignment. All work for this course must be completed independently unless you are explicitly told to work together with other individuals. Not to do so would be an example of dishonesty in this course. Another example would be to make changes in exams or assignments that have already been graded. Any sort of academic dishonesty is unacceptable and will result in course failure.

Disabilities: If you have a disability (physical or psychological) and require accommodations to participate in this course (e.g., note-takers, readers, extended time for exams, etc.), contact the **Accessibility Resources Office at 25 Capen Hall (645-2608)** during the first week of class. They will evaluate your situation and recommend the appropriate accommodation to me and your other professors. I cannot make accommodations for students who are not registered with the Accessibility Resources Office.

HOW TO DO WELL IN BIO 301

KEEP IN MIND THAT THE TOP PRIORITY IN THIS COURSE IS TO UNDERSTAND EVERYTHING IN THE LECTURE MATERIAL. THIS IS A LECTURE COURSE. THE TEXTBOOK IS THERE TO HELP YOU TO UNDERSTAND THE LECTURE MATERIAL, NOT THE OTHER WAY AROUND.

I. Skim the assigned readings ahead of time. Don't outline the reading material and don't take notes YET. That's right, don't take notes yet. Wait for the lectures to tell you what's important, then go back to the textbook and read the relevant sections in relation to the power point slides.

II. Attend all of the lectures. **Take notes in class**. Listen and think about the lectures in class instead of taking detailed notes. If you miss some detail, you can get it from reviewing the power point slides on BIO 301 UBLearns.

III. Listen for main ideas, "Big Pictures" and "What's the Point?" concepts. Write down these concepts when possible.

IV. Very Important ! Keep up with the information each week. Don't put it off to cram at the end of the section. Understanding new information requires that you understood the previous information. If you don't keep up, you might get confused. If this happens, go back and review the previous information to get back up to speed. This applies as well to your group presentations in class and your written reports (see below).

V. Work together early and as often as possible with your discussion teammate to develop your power point presentations. Submit your presentations to Dr B early to give yourself more time to make improvements.

VI. Meet with your teammate to decide on subtopics for written reports and start the research and writing as soon as possible.

VII. PLEASE INFORM YOUR TEAMMATE AND DR B ASAP IF YOU DECIDE TO RESIGN FROM THIS COURSE [R GRADE]

Bio 301 Lecture Outline & Readings, Spring, 2018

Date --	Topic	Readings (KARP)
SECTION 1		
1/30	Course Orientation, Membrane Organization & Function 1	Chapter 4
2/1	Membrane Organization & Function 2	Chapter 4
2/6	Cell Receptors and Signal Transduction 1	Chapter 15 (Alberts MBC)
2/8	Cell Receptors and Signal Transduction 2	Chapter 15 (Alberts, MBC)
2/13	Cell Receptors and Signal Transduction 3	Chapter 15 (Alberts, MBC)
2/15	Extracellular Matrix and Signaling	Chapter 7
2/20	Endoplasmic Reticulum and Protein Secretion	Chapter 8
2/22	ER Protein Synthesis and Insertion	Chapter 8
2/27	**Exam 1**	
SECTION 2		
3/1	Glycosylation & Trafficking	Chapter 8
3/6	Trafficking and Receptor Mediated Endocytosis	Chapter 8
3/8	Cytoskeletal Dynamics and Cell Function 1	Chapter 9
3/13	Cytoskeletal Dynamics and Cell Function 2	Chapter 9
3/15	Cell Nucleus Organization and Function 1	Chapters 10-12
3/19-3/25	**SPRING BREAK**	
3/27	Cell Nucleus Organization and Function 2	Chapters 10-12
3/29	Cell Cycle Regulation and Cancer 1	Chapters 14/16
4/3	Cancer 2; Cell Biology Methods	Chapters 14/16
4/5	**Exam 2**	

SECTION 3: CLASS PRESENTATIONS****

4/10 **Discussion 1:** *Class V Myosins as Cargo Transporters; Arf Proteins and Membrane Trafficking;*
4/12 **Discussion 2:** *Cell Biology of Extracellular Vesicles; Mechanisms of Ephrin-Eph Signaling*
4/17 **Discussion 3:**, *Intermediate Filament Architecture & Dynamics; Actin Dynamics & Motility*
4/19 **Discussion 4:** *Mechanotransduction in Cell Biology; Mechanobiology in Physiology & Disease*
4/24 **Discussion 5:** *Cytoskeleton Regulation of Translation; Specialized Ribosomes & Regulation*
4/26 **Discussion 6:** *Nuclear Mechanotransduction; NPC Structure & Function,*
5/1 **Discussion 7:** *Remodeling CRISPR-CAS; CRISPR-CAS-Muscular Dystrophy*
5/3 **Discussion 8:** *Insulin Receptor Signaling; REDOX Dependent Signaling,*
5/8 **Discussion 9:** *The Integrin Adhesome; Adult Cell Plasticity*
5/10 **Discussion 10:** *Colorectal Cancer Models; 3D Culture Models; Mending Broken Hearts,*

******Students will organize into teams of 2, and rank in order of preference (1 highest, 10 lowest) the Discussion Periods on the Discussion Period Ranking Sheet. One person from each team will provide the names and email addresses of each team member and transmit your electronically filled in ranking sheet to Dr B. [see "Instructions on Powerpoint Presentations and Written Reports" at UBLearns]. Two teams will present at each Discussion Period. Dr. B will decide on which paper each team presents. The deadline for choosing to be on a team and submitting a ranking sheet is Tuesday, February 13th. After that date, Dr B will divide the remaining students into teams of two and assign them to an unfilled discussion period. Dr. B will then construct the final Discussion Period schedule for the entire class.**

SOME DATES WILL LIKELY CHANGE DUE TO STUDENT RESIGNATIONS IN MARCH AND APRIL. Dr. B WILL MAKE THESE SCHEDULE ADJUSTMENTS AS EARLY AS POSSIBLE. STUDENTS WHO "LOSE" THEIR TEAM MEMBER SHOULD CONSULT WITH DR B AND EITHER PRESENT ALONE OR JOIN ANOTHER TEAM THAT IS ALSO MISSING A PRESENTER. A FEW ARTICLES MAY NOT BE COVERED DUE TO THESE DEVELOPMENTS.

NOTE: You must have a team member to submit a ranking sheet. Without this you will be arbitrarily assigned both a team member and a Discussion paper. There is a written report associated with each paper covered. Team members will select different topics and submit their choices to Dr B for approval. Details concerning these reports are found on UBLearns in the Powerpoint/Report Instructions. The reports are due within 5 days of your oral presentation or 10 days for Discussion teams 1 and 2.

ALL STUDENTS ARE REQUIRED TO ATTEND ALL THE DISCUSSION PERIODS. ONE POINT WILL BE DEDUCTED FROM YOUR FINAL AVERAGE SCORE FOR EACH ABSENCE. MORE THAN 10 MINUTES LATE TO CLASS WILL RESULT IN A SIMILAR POINT DEDUCTION.

4 STUDENT GRADERS WILL BE ASSIGNED TO EACH PRESENTATION. GRADERS MUST SUBMIT A SPEAKER REVIEW FORM FOR EACH SPEAKER TO DR B. AT THE NEXT DISCUSSION PERIOD. THE REVIEW FORMS COVER 4 MAIN TOPICS AND HAVE POINT VALUES OF 1-5 POINTS EACH WITH A TOTAL SCORE UP TO 20 POINTS FOR EACH PRESENTATION. ALONG WITH A SCORE, A 2-3 SENTENCE EXPLANATION OF THE SCORE IS TO BE PROVIDED FOR EACH TOPIC. REVIEW FORMS ARE AVAILABLE ON UBLEARNS. FAILURE TO SUBMIT THE SCORES AND WRITTEN REVIEWS ON TIME WILL RESULT IN A ONE POINT DEDUCTION FROM YOUR FINAL GRADE FOR EACH INCIDENT. DR. B WILL THEN DETERMINE A FINAL SCORE WITH THE STUDENT SCORES AND COMMENTS SERVING IN AN ADVISORY CAPACITY. EACH DISCUSSION TEAM WILL RECEIVE FEEDBACK ON BOTH THEIR SCORES AND THE STUDENT REVIEWS.

STUDENTS WHO SUCCESSFULLY SUBMIT ALL THEIR ASSIGNED SPEAKER REVIEWS AND SCORES WILL RECEIVE 2 POINT BONUSES ON THEIR FINAL CLASS AVERAGE.

Reviewer Name:

SPEAKER REVIEW SHEET Speaker Name _____

Discussion # ___; Paper # ___; Total Score _____

1. **Was this a well organized and clearly presented talk? (0-5 points) _____points**

2. **Did the speaker present enough background information to understand the presentation? (0-5 points) _____ points**

3. **Did the speaker clearly explain the major concept(s) covered in the presentation (0-5 points) _____ points**

4. **Did the speaker clearly explain how the experimental data supported the concepts (0-5 points) _____ points**

5. **Additional Comments**

Bio 301 SECTION III DISCUSSION SCHEDULE & PAPERS

Discussion 1 [4/10]

Paper 1 – *Class V Myosins as Cargo Transporters,* **Hammer & Sellers, Nat Rev MCB 13 (2012)13**

Paper 2 – *Arf Proteins and Membrane Trafficking,* **D'Souza & Chavrier, Nat Rev MCB 7 (2006) 347**

Discussion 2 [4/12]

Paper 3 –*Cell Biology of Extracellular Vesicles,* **van Niel et al., Nat Rev MCB 19 (2018) 1 (Adv Pub)**

Paper 4- *Mechanisms of Ephrin-Eph Signaling,* **Kania & Klein, Nat Rev MCB 17 (2016) 240**

Discussion 3 [4/17]

Paper 5 –*Intermediate Filament Architecture & Dynamics,* **Herrmann et al., Nat Rev MCB 8 (2007) 562**

Paper 6 – *Actin Dynamics and Motility Function***, Olson & Norheim, Nat Rev MCB 11 (2010) 353**

Discussion 4 [4/19]

Paper 7 –*Mechanotransduction in Cell Biology***, Iskratsch et al., Nat Rev MCB 15 (2014) 825**

Paper 8 –*Mechanobiology in Physiology and Disease,* **Panciera et al., Nat Rev MCB 18 (2017) 758**

Discussion 5 [4/24]

Paper 9 –*Cytoskeleton Regulation of Translation,* **Kim and Coulombe, Nat Rev MCB 11 (2010) 75**

Paper 10 – *Specialized Ribosomes & Gene Regulation,* **Xue & Barna, Nat Rev MCB 13 (2012) 355**

Discussion 6 [4/26]

Paper 11 –*,Nuclear Mechanotransduction,* **Uhler & Shivashankar, Nat Rev MCB 18 (2017) 717**

Paper 12 - *NPC Structure & Function,* **Beck and Hurt, Nat Rev MCB 18 (2017) 73**

Discussion 7 [5/1]

Paper 13 – *Remodeling CRISPR-CAS,* **Dominguez et al., Nat Rev MCB 16 (2015) 1 (Adv Pub)**

Paper 14– *CRISPR-CAS-Muscular Dystrophy,* **Ousterout et al., Nat Commun_ (2015) 1 (Adv Pub)**

Discussion 8 [5/3]

Paper 15 –*Insulin Receptor Signaling,* **Haeusler et al., Nat Rev MCB 19 (2018) 31**

Paper 16 – *REDOX Dependent Signaling,* **Holmstrom & Finkel, Nat Rev MCB 15 (2014) 411**

Discussion 9 [5/8]

Paper 17 – *The Integrin Adhesome,* **Winograd-Katz et al., Nat Rev MCB 15 (2014) 273**

Paper 18 – *Adult Cell Plasticity,* **Merrell & Stanger, Nat Rev MCB 17 (2016) 1 (Adv Pub)**

Discussion 10 [5/10]

Paper 19 – *Modeling Colorectal Cancer ,* **Crespo et al., Nature Medicine 23 (2017) 878**

Paper 20 – *3D Culture Models and Disease,* **Shamir & Ewald, Nat Rev MCB 15 (2014) 647**

Paper 21 – *Mending Broken Hearts,* **Xin et al., Nat Rev MCB 14 (2013) 529**

LEARNING OUTCOMES AND ASSESSMENT FOR BIO 301

	Program Learning Outcome	Methods of Assessing Student Achievement	Associated Student Activities
1	Students will obtain in depth knowledge within specialized areas that are in the forefront of current research in cell biology	Questions on each of the three written exams will evaluate knowledge and understanding of current research in the cell biology topics being tested. In addition, each student will be graded on oral presentations in class and a written report on research articles .	study lecture slides: textbook readings; attend lectures; write research report; participate in group presentations; three in class written exams
2	Students will be able to understand the experimental underpinnings of selected topics in cell biology	Questions on each of the three written exams will deal with the experimental basis of major advances in cell biology. In addition, the graded presentations of selected research articles by the students will have as one component, analysis of the experimental methods used to obtain the data that support the research findings.	study lecture slides: textbook readings; attend lectures; write research reports; participate in group presentations; three in class written exams
3	Students wlll be able to critical evaluate experimental findings in cell biology.	Questions on each of the three written exams will evaluate the ability of the students to understand the strengths and limitations of experimental data and their support of scientific conclusions. In addition, the graded oral presentations and written research reports will have as one component an analysis of the strengths and weaknesses of the conclusions of the article based on the presented experimental data.	study lecture slides: textbook readings; attend lectures; write research reports; participate in group presentations; three in class written exams
4	Students will develop their skills in scientific communication	Students will give oral presentations and write reports of research articles that are graded along with discussion among the students and the course instructor.	write research reports and participate in group presentations
5	Students will obtain a background in recent research findings in cell biology	At least one question on each written exam will deal with a recent research finding or an important new experimental approach used to understand cell structure and function. Many of the research articles selected for the students to present in class and analyze in written reports will deal with recent findings in the field.	study lecture slides: textbook readings; attend lectures; write reports; participate in group presentations; three in class written exams