BIO102: CELL BIOLOGY AND PHYSIOLOGY (WITH LABS!)

Meeting Mondays and Thursdays, 6-8:50pm, in room 505 (Monday)/roomLL210 (Thursday) or in Kanbar Center on select dates (see schedule). (3 credits)

Instructor:

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Course:

Taking up where BIO101 left off, we will move beyond cells as individual units of life and explore how cells communicate and combine with one another to form complex multi-cellular life forms. We'll unravel the exquisitely tuned organ systems that maintain balance against the harsh external environment, such as the immune and nervous systems. We will also look at mechanisms that underlie the breakdown of these normal processes; cells that go rogue and no longer choose to interact with one another in a healthy manner, as in various cancers; when cells' normal internal processes are taken over and subverted by genetic intruders such as viruses. During the semester we'll explore breakthrough technologies that are being developed to circumvent these problems, such as iPS cells (induced pluripotent stem cells) for organ regeneration and drug screening.

This course involves lectures, problem sets (15% of final grade), a writing assignment based on primary scientific literature (15%), a participatory journal club session (15%) and 4 laboratory sessions (20%) held in the Kanbar Center (held during the final weeks of scheduled class time). There will also be 2 take home Exams worth 15% apiece.

Lectures will also be, on occasion, supplemented with additional material outside of the required textbook readings.

Textbooks:

Biology
2nd Ed ISBN 978-0-07-353221-9
Authors: Brooker, Widmaier, Graham, Stiling.
(Available as PDF file)

Molecular Cell Biology
7th Ed
Authors: Lodish, Berk, Kaiser, Krieger, Scott, Bretscher, Ploegh, Matsudaira.
(Available as PDF file)

Grading:

EXAMS 40%	Exam 1 (October 22) Exam 2 (December)	15% 15%	**Details:** Exams not intentionally cumulative, but material builds on prior chapters. (There may be bonus points on exams.)
LABS 15%	Post-Lab 1 Post-Lab 2 Post-Lab 3 Pre-Lab 4	5% 5% 5% 5%	Pre-lab/Post-labs (lab write-ups) will be due by 6pm on the next scheduled day. Pre-lab 4 is due during the beginning of Lab#4.
New and Views Article 15%	**1st Draft** **Final Draft**	**2.5%** **12.5%**	The News and Views article is a writing assignment based on a journal article that you select from a posted list of scientific articles that you will also be presenting as a group journal club article. The articles have been chosen to reflect advanced topics related to the lecture material. However, the articles will be much more sophisticated than what is presented in lecture. The purpose of this assignment (and the journal club) is to get you introduced and used to reading primary scientific literature. If you are intending for a career in science or medicine there is no way around this, you will be reading a lot of articles! The best way to start is to just dive in. It will be difficult at first and I strongly encourage you to take advantage of my office hours and to contact me with questions via email throughout the semester. Another good place to post question is directly on the class Moodle, so that everyone can view questions and their respective answers.
Problem sets 15%	**Pset 1** **Pset2** **Pset3** **Pset4** **Pset5**	**3%** **3%** **3%** **3%** **3%**	Unlike the exams and post-labs, problem sets will be graded solely on completeness of answers, rather than correct answers, i.e. you won't get points off for a wrong answer as long as you at least attempt to answer the question! The main goal of the problem sets is to help you prepare for the exams and reinforce concepts learned in lecture and in lab.
Class Participation 5%		**5%**	
Scientific Paper Presentations 15%		**15%**	
Total 100%	**Total**	**100%**	A: 100-90, B: 89.9-80, C: 79.9-70, D: 69.9-65, F<65. Come to all classes, be engaged with lectures, ask good questions; Study in groups but <u>P-sets should be done alone.</u>

SYLLABUS:
BIOLOGY 102. MONDAY AND THRUSDAY 6-8:50PM ROOM 505 (MONDAY), ROOM LL210 (THURSDAY)
SCHEDULED LABS ARE AT THE KANBAR CENTER, ROOM 704 (FINALS WEEKS OF SEMESTER)
PROF MEDVEDIK.

Week #	Lecture Topic:	Assignments
January 20/22	Info + Interests Poll. Overview of course Assigned Weekly Readings: **(Brooker)** Ch 2: **The chemical basis of life (review)** Ch 3: **Organic molecules (review)** Ch 4: **General Features of Cells (review)** Ch 1: **An Introduction to Biology**	**Check weekly for problem set uploads!**
Monday January 26	**Monday class cancelled, Snow Day**	
Thursday January 29	**(Lodish)** Ch17.1-17.4, also 17.7: **Cell organization and movement I: Microfilaments** Ch18.1-18.5, also 18.7-18.8: **Cell organization and movement II: Microtubules and Intermediate Filaments** Ch 20: **Integrating Cells into Tissues**	
Monday February 2	**(Lodish)** Ch17.1-17.4, also 17.7: **Cell organization and movement I: Microfilaments** Ch18.1-18.5, also 18.7-18.8: **Cell organization and movement II: Microtubules and Intermediate Filaments** Ch 20: **Integrating Cells into Tissues**	

Thursday February 5	**(Brooker)** Ch 9: **Cell communication** **(Lodish)** Ch 15.1-15.6: **Signal Transduction and G-protein coupled receptors** Ch 16.1-16.4: **Signaling pathways that control gene expression**	**Journal Club 1** **Problem set #1 due**
Monday February 9	**(Brooker)** Ch 9: **Cell communication** **(Lodish)** Ch 15.1-15.6: **Signal Transduction and G-protein coupled receptors** Ch 16.1-16.4: **Signaling pathways that control gene expression**	**Journal Club 1** **Problem set #1 due**
Thursday February 12	**(Brooker)** Ch 15: **The Eukaryotic Cell cycle and Mitosis** **(Lodish)** Ch18.6: **Cell organization and movement II: Microtubules and Intermediate Filaments** Ch 19: **The Eukaryotic Cell Cycle**	**Problem set #2 due**
Monday February 16	**Presidents Day, No Monday Class**	
Thursday February 19	**(Brooker)** Ch 14: **Mutation, DNA Repair and Cancer** **(Lodish)** Ch 24: **Cancer**	**Journal Club 2** **Problem set #2 due**
Monday February 23	**(Brooker)** Ch 15: **The Eukaryotic Cell cycle and Mitosis** **(Lodish)** Ch18.6: **Cell organization and movement II: Microtubules and Intermediate Filaments** Ch 19: **The Eukaryotic Cell Cycle**	**Journal Club 2** **Problem Set #2 due**

Thursday February 26	**(Brooker)** Ch 15.3- 15.4: **The Eukaryotic Cell Cycle: Meiosis** Ch 16: **Simple Patterns of Inheritance** Ch 17: **Complex Patterns of Inheritance** **(Lodish)** Ch 5.4: **Molecular Genetic Techniques** Ch 19.8: **The Eukaryotic Cell Cycle:Meiosis**	**Problem set #3 due**
Monday March 2	**(Brooker)** Ch 14: **Mutation, DNA Repair and Cancer** **(Lodish)** Ch 24: **Cancer**	**Problem set #3 due**
Thursday March 5	**(Brooker)** Ch 10: **Multi-cellularity** Ch 32: **Animal Diversity** Ch 19.1, 19.3: **Developmental Genetics** Ch 52: **Animal Development** Ch 51: **Animal Reproduction** **Ch 50.5-50.6 and 50.8: Endocrine System** **(Lodish)** **Ch 5.5: Molecular Genetic Techniques** Ch 21: **Stem Cells, Cell Asymmetry and Cell Death**	**Journal Club #3** **Take Home Exam 1 posted**
Monday March 9	**(Brooker)** Ch 15.3- 15.4: **The Eukaryotic Cell Cycle: Meiosis** Ch 16: **Simple Patterns of Inheritance** Ch 17: **Complex Patterns of Inheritance** **(Lodish)** Ch 5.4: **Molecular Genetic Techniques** Ch 19.8: **The Eukaryotic Cell Cycle:Meiosis**	**Journal Club #3** **Choose a primary scientific research article from the assigned journal club list for which to write a "News and Views" style article. Email me your choice.**
Thursday March 12	**(Brooker)** Ch 47: **Circulatory Systems** Ch 48: **Respiratory Systems** Ch 49: **Excretory Systems and Salt and Water Balance** Ch 50.4: **Endocrine System** **(Lodish)** Ch 11.2 and 11.6: **Transmembrane transport of ions and small molecules**	**Problem Set 4 due (both sections)** **Choose a primary scientific research article from the assigned journal club list for which to write a "News and Views" style article. Email me your choice.**

March 14-22	**Spring Recess**	
Monday March 23	**(Brooker)** Ch 47: **Circulatory Systems** Ch 48: **Respiratory Systems** Ch 49: **Excretory Systems and Salt and Water Balance** Ch 50.4: **Endocrine System** **(Lodish)** Ch 11.2 and 11.6: **Transmembrane transport of ions and small molecules**	**Take Home Exam 1 Due in office or class**
Thursday March 26	**(Brooker)** Ch 40: **Animal Bodies and Homeostasis** Ch 45: **Nutrition, Digestion and Absorption** Ch 46: **Control of Energy Balance, Metabolite Rate, And Body Temperature.** Ch 50.1-50.3 and 50.7: **Endocrine Systems** (Lodish) Ch 16.6-16.7: Signaling pathways that control gene expression	**Problem Set 5 Due** **Guest Lecturer**
Monday March 30	**(Brooker)** Ch 40: **Animal Bodies and Homeostasis** Ch 45: **Nutrition, Digestion and Absorption** Ch 46: **Control of Energy Balance, Metabolite Rate, And Body Temperature.** Ch 50.1-50.3 and 50.7: **Endocrine Systems** (Lodish) Ch 16.6-16.7: Signaling pathways that control gene expression	**Problem Set 5 Due** **Guest Lecturer**
Thursday April 2	**(Brooker)** Ch 53: **Immune Systems** **(Lodish)** Ch 23: **Immunology**	**First draft due of News and Views Article Due**
Monday April 6	**(Brooker)** Ch 53: **Immune Systems** **(Lodish)** Ch 23: **Immunology**	**First draft due of News and Views Article Due**

Thursday April 9	**(Brooker)** Ch 41: **Cells of the Nervous System** Ch 42: **Evolution and function of the Brain and Nervous System** Ch 43: **Sensory Systems** Ch 44: **Muscular-Skeletal systems and Locomotion (Lodish)** Ch 22: **Nerve Cells** Ch 11.4: **Non-gated transport channels**	**Journal Club 5**
Monday April 13	**(Brooker)** Ch 41: **Cells of the Nervous System** Ch 42: **Evolution and function of the Brain and Nervous System** Ch 43: **Sensory Systems** Ch 44: **Muscular-Skeletal systems and Locomotion (Lodish)** Ch 22: **Nerve Cells** Ch 11.4: **Non-gated transport channels**	**Journal Club 5** **Take Home Exam 2 posted**
Thursday April 16	**Lab 1 (Kanbar): Bovine Calf Heart Dissection and Electrocardiogram Recordings**	
Monday April 20	**Lab 1 (Kanbar): Bovine Calf Heart Dissection and Electrocardiogram Recordings**	
Thursday April 23	**Lab 2 (Kanbar): Polymerase Chain Reaction Amplification of Genetic Loci; CCR5 Chemokine receptor and Mitochondrial DNA (mDNA).**	**Take Home Exam 2 Due in office or class**
Monday April 27	**Lab 2 (Kanbar): Polymerase Chain Reaction Amplification of Genetic Loci; CCR5 Chemokine receptor and Mitochondrial DNA (mDNA).**	**Final Draft of New And Views Article Due either in class or in course Dropbox.**
Thursday April 30	**Lab 3 (Kanbar): Action Potential Recordings**	
Monday May 4	**Lab 3 (Kanbar): Action Potential Recordings**	
Thursday May 7	**Scientific Paper Final Presentations/Teams of 2/Monday Section**	
Monday May 11	**Scientific Paper Final Presentations/Teams of 2/Thursday Section**	