Biosc 2100: MECHANISMS OF CELLULAR COMMUNICATION, STRUCTURE AND MORPHOLOGY
Spring, 2015

A course offered by:

The Department of Biological Sciences, University of Pittsburgh

Time: Thursday, 2:00-3:50 p.m.

Place: 241 Crawford Hall, University of Pittsburgh

Instructor:

Name	Address	Phone	Email
Jeffrey Hildebrand	University of Pittsburgh Dept. of Biological Sciences 103 Life Sciences Annex	624-6987	jeffh@pitt.edu

Course web site to access syllabus and pdfs: https://blackboard7.cssd.pitt.edu/

Course Design:
Topics for this course have been selected for discussion. These topics include research that has provided particularly novel ways of thinking about and investigating how cells control their characteristics and behavior and how these contribute to complex morphogenesis. Each specific topic will be introduced by a lecture, but the focus of the course is on **discussion** of original scientific papers. Generally, the instructor will present the lecture and direct the discussions related to each paper. Students should feel free to contact the instructor with questions about assigned readings or background material.

Grading:
Each student's grade will be based on their participation in class discussion (50%), written assignments (10%), oral presentations (40%; 5% each for introduction and Who knew, presentations and 20% for final presentation).

Class Participation: **Active participation in class is required of all students!! It is expected that each student will have read all assigned papers before each class session.** Students may wish to read or review a textbook chapter or other material to provide them with the background necessary to understand the assigned papers. All students should come prepared to discuss the overall rationale, design, findings, and significance of the experiments in the assigned papers. Students should think about: the hypothesis behind the experiment, the methodology used, and did the data support the authors' conclusions.

writing assignment (5 total): For 5 of the discussion sessions, students will be required to produce a 1-2 page (12 point, single space) written document that is designed to be a follow-up to the papers. These are to be in the format of the front page of a grant application that would be the continuation of the work described in the paper. It should contain a succinct introduction to the question being asked, the significance of the biological problem, a hypothesis, a specific aims, and experiment you might do to address that aim. Assignments should be brought to class and turned in prior to the start of class.

Who Knew?? Assignments (3 total): These are to be short, 5-10 minute oral presentations (no Powerpoint slides, please) in which you give us the highlights of a recent paper you read that has to do with the course content. Should include the overall goals, hypotheses, maybe a method or two, and the results. You are welcome to use the chalkboard in the room.

Short introductory presentation: The first presentation will occur as part of the faculty-lead discussions of the assigned research papers. During or after the first class, students will be assigned a specific paper for which they will prepare an introductory presentation. It is

expected that this will be in Powerpoint and will introduce the paper(s) being discussed and should cover the following material: what was known in the field before the paper(s) was published, relevant pathways being studied, the questions being asked/hypothesis being tested by the authors, and perhaps a brief description of the methodology used. Students should contact the professor in charge of the particular discussion session if questions arise or if they would like to go over their presentation prior to class. (5% of final grade)

End of the semester oral presentation: At the end of the semester, each student will choose a paper related (loosely) to one of the topics covered during the semester and will give a short (~30 minute) oral presentation to the class with 5 additional minutes for questions. See below for additional instructions. (20% of final grade)

Figure Facts. While I will not require students to use figure facts for the papers, it is highly recommended. This will help you understand the paper and will likely prove invaluable when it comes to the in class discussions. The figure facts template can be found on the courseweb site for the course.

Instructions for final oral presentations:

The final oral presentations begin April 9th and should be in the form of a Powerpoint presentation. Each student will choose a paper related to the topics covered during the course. So that we don't have duplicate presentations, please inform Dr. Hildebrand at least two weeks in advance which paper you with to present. If someone has already chosen that paper, you must find a new paper. This ensures adequate time for approval, posting on Courseweb, and for the other participants to read the papers.

The presentations are ~30-40 minutes plus 5 minutes of discussion/questions. During the presentation, you should cover the following:

1) Why you chose the paper and how it relates to the topics that we've studied.
2) Enough background information should be given to place the paper in the larger context of the field as a whole.
3) You may not have time to go through all of the figures of the paper. Therefore choose the most important/significant figures that support the important conclusions of the paper.
4) Identify the broader significance of the work (i.e. how does this work extend our knowledge in this field).
5) Identify any weaknesses in the paper.
6) Identify what you think might be the next series of experiments that could/should be done.

Your **grade** for the presentation will be based on your:

1) choice of paper
2) organization of presentation
3) understanding of experiments
4) identification of important conclusions and broader significance of the paper
5) ability to answer questions

5 minute question period ~ Non-presenting students

For any student not presenting on a particular day, you will be expected to have read the paper(s) and have one or two insightful question for each presenter. You will be graded on your preparation for this question period as well!

Syllabus at-a-glance

	Date	Topic	Introduction
1	Jan. 8	Organizational Meeting	NA
2	Jan. 15	Paper discussion	Hildebrand
3	Jan. 22	Paper discussion	Hillary
4	Jan. 29	Paper discussion **and Who knew??**	NA
5	Feb. 5	Paper discussion	John
6	Feb. 12	Paper discussion	Sam
7	Feb. 19	Paper discussion **and Who knew??**	Kurt
8	Feb. 26	Paper discussion	
9	Mar. 5.	Paper discussion	
	Mar. 12	NO CLASS: SPRING BREAK	
10	Mar. 19	Paper discussion	
11	March 26	Paper discussion **and Who knew??**	NA
12	April 2	Paper discussion	Rachel
13	April 9	Student presentations	
14	April 16	Student presentations	
15	April 23	Student presentations	

Papers for discussion in class

Week	Date	Paper(s) to be presented and discussed
2	Jan. 15	Bear et al . (2002) Antagonism between Ena/VASP Proteins and Actin Filament Capping Regulates Fibroblast Motility. *Cell,* 109, 509–521
3	Jan. 22	Provenzano et al. (2009) Matrix density-induced mechanoregulation of breast cell phenotype, signaling and gene expression through a FAK–ERK linkage. *Oncogene* 28, 4326–4343
4	Jan. 29	Musah et al. (2014) Substratum-induced differentiation of human pluripotent stem cells reveals the coactivator YAP is a potent regulator of neuronal specification. *PNAS,* 111, 13805–13810
5	Feb. 5	Barriga EH, Maxwell PH, Reyes AE, Mayor R (2013) The hypoxia factor Hif-1α controls neural crest chemotaxis and epithelial to mesenchymal transition. *J Cell Biol.* 201(5):759-76 Buckley et al. (2014) Cell adhesion. The minimal cadherin-catenin complex binds to actin filaments under force. *Science.* 346(6209):1254211.
6	Feb. 12	Haigo and Bilder (2011) Global tissue revolutions in a morphogenetic movement controlling elongation. *Science.* 331(6020):1071-4 Cetera et al. (2014) Epithelial rotation promotes the global alignment of contractile actin bundles during Drosophila egg chamber elongation. *Nat Commun*. 5:5511.
7	Feb. 19	Okada et al. (2014) The Rho GTPase Rnd1 suppresses mammary tumorigenesis and EMT by restraining Ras-MAPK signaling. *Nature Cell Biology*.
8	Feb. 26	Burke et al, (2014) Chibby promotes ciliary vesicle formation and basal body docking during airway cell differentiation. *J. Cell Biol.* 207, 123–137 Das and Storey (2014) Apical Abscission Alters Cell Polarity and Dismantles the Primary Cilium During Neurogenesis. *Science*, 343, 200-204
9	Mar. 5.	Nishimura T, Honda H, Takeichi M (2012) Planar Cell Polarity Links Axes of Spatial Dynamics in Neural Tube Closure. *Cell.* 149(5):1084-97.
	Mar. 12	NO CLASS
10	Mar. 19	Lecaudey et al. (2008) Dynamic Fgf signaling couples morphogenesis and migration in the zebrafish lateral line primordium. *Development* 135, 2695-2705. Dona et al. (2013) Directional tissue migration through a self-generated chemokine gradient. *Nature.* 503, 285-289.
11	Mar. 26	Bryant et al. (2014) A Molecular Switch for the Orientation of Epithelial Cell Polarization. *Developmental Cell* 31, 171–187
12	April 2	Xue et al. (2013) Loss of Par3 promotes breast cancer metastasis by compromising cell-cell cohesion. *Nat Cell Biol.* 15(2):189-200.
13	April 9	Student presentations
14	April 16	Student presentations
15	April 23	Student presentations