

BS1560/1561 ~ Seminar in Cell and Developmental Biology

Course Syllabus

Spring 2017

202 Langley Hall

Thursday 1:00 - 2:50 P.M.

INSTRUCTOR:

Dr. Deborah L. Chapman, 102 LSA, 624-0774, dlc7@pitt.edu

Office Hours: Please phone or e-mail to arrange a suitable time to meet.

#	DATE	Paper Topics	Introductory presentation
	Jan. 5	Introduction	-
1	Jan. 12	A little bit of cell biology: Feeling the road under our feet	
2	Jan. 19	I have a gut feeling about those cells – 2 short papers	
3	Jan. 26	Making decisions early on	
4	Feb. 2	Getting organized to see clearly	
5	Feb. 9	A short tale	
6	Feb. 16	Colorful development	
7	Feb. 23	Thank goodness for the loss of enhancers!!!	
8	Mar. 2	Forcing decisions: Stuck between a ROCK and a hard place	
-	Mar. 9	Spring Break	
9	Mar. 16	Fish get cancer too	
10	Mar. 23	HIPPOs wearing Sox and making decisions	
11	Mar. 30	Branching out	
12	Apr. 6	The importance of taking things off	
			Student presentations
13	Apr. 13	Student selected papers – Group Presentations x2	
14	Apr. 20	Student selected papers – Group Presentations x2	

Papers for BIOSC1560/1561: Senior Seminar in Cell and Developmental Biology

#	Date	Paper to be presented and discussed
1	Jan. 12	Bae YH, Mui KL, Hsu BY, Liu SL, Cretu A, Razinia Z, Xu T, Puré E, Assoian RK. (2014) A FAK-Cas-Rac-lamellipodin signaling module transduces extracellular matrix stiffness into mechanosensitive cell cycling. <i>Sci Signal.</i> 7(330):ra57.
2	Jan. 19	Barker N, van Es JH, Kuipers J, Kujala P, van den Born M, Cozijnsen M, Haegebarth A, Korving J, Begthel H, Peters PJ, Clevers H. (2007) Identification of stem cells in small intestine and colon by marker gene Lgr5. <i>Nature</i> 449(7165):1003-7. Sato T, Vries RG, Snippert HJ, van de Wetering M, Barker N, Stange DE, van Es JH, Abo A, Kujala P, Peters PJ, Clevers H. (2009) Single Lgr5 stem cells build crypt-villus structures in vitro without a mesenchymal niche. <i>Nature</i> 459(7244):262-5.
3	Jan. 26	Nishioka N, Inoue K, Adachi K, Kiyonari H, Ota M, Ralston A, Yabuta N, Hirahara S, Stephenson RO, Ogonuki N, Makita R, Kurihara H, Morin-Kensicki EM, Nojima H, Rossant J, Nakao K, Niwa H, Sasaki H. (2009) The Hippo signaling pathway components Lats and Yap pattern Tead4 activity to distinguish mouse trophectoderm from inner cell mass. <i>Dev Cell</i> 16(3):398-410.
4	Feb. 2	Eiraku M, Takata N, Ishibashi H, Kawada M, Sakakura E, Okuda S, Sekiguchi K, Adachi T, Sasai Y. (2011) Self-organizing optic-cup morphogenesis in three-dimensional culture. <i>Nature</i> 472(7341):51-6.
5	Feb. 9	Zhu J, Kwan KM, Mackem S. (2016). Putative oncogene Brachyury (T) is essential to specify cell fate but dispensable for notochord progenitor proliferation and EMT. <i>Proc Natl Acad Sci U S A.</i> 113(14):3820-5.
6	Feb. 16	Tabansky I, Lenarcic A, Draft RW, Loulier K, Keskin DB, Rosains J, Rivera-Feliciano J, Lichtman JW, Livet J, Stern JN, Sanes JR, Eggan K. (2013) Developmental bias in cleavage-stage mouse blastomeres. <i>Curr Biol.</i> 23(1):21-31.
7	Feb. 23	Kvon EZ, Kamneva OK, Melo US, Barozzi I, Osterwalder M, Mannion BJ, Tissières V, Pickle CS, Plajzer-Frick I, Lee EA, Kato M, Garvin TH, Akiyama JA, Afzal V, Lopez-Rios J, Rubin EM, Dickel DE, Pennacchio LA, Visel A. (2016) Progressive Loss of Function in a Limb Enhancer during Snake Evolution. <i>Cell</i> 167(3):633-642.e11.
8	Mar. 2	Samuel MS, Lopez JI, McGhee EJ, Croft DR, Strachan D, Timpson P, Munro J, Schröder E, Zhou J, Brunton VG, Barker N, Clevers H, Sansom OJ, Anderson KI, Weaver VM, Olson MF. (2011) Actomyosin-mediated cellular tension drives increased tissue stiffness and β -catenin activation to induce epidermal hyperplasia and tumor growth. <i>Cancer Cell</i> 19(6):776-91.
Mar. 9		SPRING BREAK
9	Mar. 16	Kaufman CK, Mosimann C, Fan ZP, Yang S, Thomas AJ, Ablain J, Tan JL, Fogley RD, van Rooijen E, Hagedorn EJ, Ciarlo C, White RM, Matos DA, Puller AC, Santoriello C, Liao EC, Young RA, Zon LI. (2016) A zebrafish melanoma model reveals emergence of neural crest identity during melanoma initiation. <i>Science</i> 351(6272).
10	Mar. 23	Wicklow E, Blij S, Frum T, Hirate Y, Lang RA, Sasaki H, Ralston A. (2014) HIPPO pathway members restrict SOX2 to the inner cell mass where it promotes ICM fates in the mouse blastocyst. <i>PLoS Genet.</i> 10(10):e1004618.
11	Mar. 30	Kuure S, Cebrian C, Machingo Q, Lu BC, Chi X, Hyink D, D'Agati V, Gurniak C, Witke W, Costantini F. (2010) Actin depolymerizing factors cofilin1 and destrin are required for ureteric bud branching morphogenesis. <i>PLoS Genet.</i> 6(10):e1001176.
12	Apr. 6	Dai HQ, Wang BA, Yang L, Chen JJ, Zhu GC, Sun ML, Ge H, Wang R, Chapman DL, Tang F, Sun X, Xu GL. (2016) TET-mediated DNA demethylation controls gastrulation by regulating Lefty-Nodal signalling. <i>Nature</i> 538(7626):528-532.
13	Apr. 13	Student selected papers – Group Presentation
14	Apr. 20	Student selected papers – Group Presentation

Course Description:

This course focuses on current, primary research literature that investigates the cellular (and sometimes biochemical) mechanisms underlying fundamental processes in developmental biology. This semester we will examine broad aspects of cell fate decisions, stem cell biology, embryonic development and tissue morphogenesis. We will discuss different model systems and the various techniques that can be used in those model systems. The course will be divided into two parts; the first part consists of faculty-led discussions of a pre-assigned paper and the second part will be group presentations of student-chosen papers. The faculty-led classes are intended to be a discussion about all aspects of the paper and students are expected to fully participate (see grading below). For the second part of the course, student groups will pick papers for presentation. These group presentations should focus on main panels of figures, rather than in depth discussions of each panel, and should include a more thorough discussion of future studies (see below). As with the first half of the course, all students are expected have read the paper and to fully participate.

Coursework and Grades

Participation: 40%

Students must play an active part in the course by reading the papers in advance and contributing to the discussion during class. During the entire course you will be expected to participate in the paper discussions. This will include describing the hypotheses being tested, techniques used, results, and conclusions drawn from these results. It is expect that you will not be familiar with all the techniques and background information presented in the papers. Therefore, you are expected to ask relevant questions when you have them.

Homework: 30%

Short assignments will be given for specific classes. These will be posted on CourseWeb. For most paper discussion days, a Figure Facts template will be assigned. These are due by midnight on the Wednesday before the paper discussion class. Students should upload their assignments to the CourseWeb site under the specific assignments.

Presentations: 30%

****Short oral presentation:*** Each student will give one short introductory presentation as part of the faculty-lead discussions of the assigned research papers. These presentations are ~10-minute introductions to the assigned paper(s). The presenter will be responsible for preparing slides and presenting relevant background information for the paper. This should include knowledge about the topic at the time the paper was published, the goals of the paper, the hypothesis being tested, and may include a brief introduction to a new or interesting technique used. Students will volunteer for (or be assigned to) specific papers on the first day of class. For presentations, it is highly recommended that you meet with the instructor by **TUESDAY** before your presentation.

*****Group presentations:*** The class will be divided into four groups for the paper presentations that will occur in the second part of the course. The basic format is that each group will choose a paper related to one of the areas covered in the first half of the course, and, as early as possible, e-mail the instructor to have the paper approved. This paper should be no more than a year old. The group will then prepare a Powerpoint presentation for the paper. The presentation should be 30-35 minutes, which will give us ~10 minutes for comments and questions. The Powerpoint presentation will be submitted to the instructors via CourseWeb prior to the presentation (**by midnight the Wednesday before the class**). Each member of the group must participate equally in the oral presentation (and in preparing the Powerpoint

presentation). The group can divide and organize the presentation however they think appropriate, but they should address the following:

1) Explain why you chose the paper.

2) *Introduction:*

Provide enough background information to place the paper in the larger context of the field as a whole. What is the hypothesis/hypotheses being tested? (Is there a hypothesis being tested?)

3) *Materials & Methods:*

Describe the main experimental techniques being used and whether your group believes these were the appropriate techniques? Are there better ones or alternative ones that could have been used?

4) *The Results:*

Describe the key experiments and discuss how strongly the results of these experiments support the conclusions of the authors. You will not have time to go through all of the figures of the paper! Therefore choose the most important/significant figures (or panels from figures) that support the important conclusions of the paper. Identify any major weaknesses in the paper.

5) *The Conclusions:*

What are the major conclusions of the study? Identify the broader significance of the work (i.e. how did this work extend our knowledge in this field?).

6) *Future Studies:*

Based on this work, consider what a new grant proposal could look like: Provide one specific aim for the grant; be sure to include the hypothesis/question, rationale, the approaches, and the results that would either support or refute your hypothesis. This should not be a reiteration of the authors' discussion

All members of the presenting group should be prepared to answer thoughtful, insightful questions from the non-presenting student.

Grade for the presentation will be based on:

- 1) Organization and clarity of presentation
- 2) Success in addressing the six points above.
- 3) Ability to answer questions

Non-presenting students: For any student not presenting on a particular day, you will be expected to have read the paper and have insightful questions for the presenter. In addition, all non-presenting students should also prepare a specific aim for future studies (a paragraph that includes the items listed in #6 above. You will submit the question(s) and the specific aim paragraph to the Assignment posted on CourseWeb **by 11:59 pm on Wednesday prior to the Thursday class**. You will be graded on both of these.

After the paper discussion, the group as a whole will discuss future directions for the research. Each student presenter is expected to read other primary literature and relevant review articles in addition to the paper being presented.

All papers for class discussion will be available on the CourseWeb site for this course. To download and search for other relevant papers you should use the PubMed site. If you are

accessing through the Pitt server, then you can find papers directly through PubMed (<http://www.ncbi.nlm.nih.gov/sites/entrez>). It is also recommend that you utilize the following journals as a source of papers: *Development*, *Developmental Biology*, *Genes & Development*, *Journal of Cell Biology*, *Journal of Cell Science*, *Cell*, *Developmental Cell*, *Current Biology*, *Molecular and Cellular Biology*, *Science*, *Nature*, *PLoS*, *Nature Cell Biology*, *PNAS*, *Molecular Biology of the Cell*.

Missed class: If you need to **miss class** for medical reasons, interviews, or something along those lines, relevant documentation must be provided. You will be required to turn in a written evaluation of the paper being presented on the day that you are absent. Once the presentation schedule is set, it will be your responsibility to make arrangements with your classmates to switch the date of your presentation if a conflict arises. Please inform me if you switch presentation dates with a classmate.

Withdrawal: The University Add/Drop period ends on **January 18th**. Late withdrawals after this date can only be granted for special reasons, and only with permission of the instructor and the appropriate dean.

If you are taking the "W" option (BIOSC1561): For **4** of the "faculty-led" discussions, students taking the "W" option must submit a short (1-2 page, 12 point, single spaced) written summary and critique of the paper being presented. This will consist of a short background, the hypothesis/question being investigated, the methods used, the results/conclusions, and any "problem" you found with the paper. This is **not** to be a figure-by-figure review of the paper. The summary can be turned in as a hardcopy at the start of class or sent by e-mail in PDF format prior to the start of class. In addition, you will also be required to write a research paper (max of 7-10 pages, double-spaced (margins ~ 0.75" around, 12 point font - Arial is nice!) centering on the research described in the paper for which you did the introduction. You are expected to read additional papers – thus the title "research paper". For this reason it is good to choose a paper for the second part of the course that is related to the first paper. Your paper needs to be fully referenced and include a bibliography! You will be expected to include in your paper significant background about the biological question being investigated, the current state of the knowledge about the topic, and a discussion of the important aspects of the paper that go beyond the experimental methods and results (such as why this work is important, medical relevance, new models, why it's not worth the paper its printed on, etc.). You should also include any new developments in the field – perhaps another group published similar or contradicting data using the same or a different organism; or used new technology to better test the hypothesis. First drafts are due not later than **Monday, March 13th**, and must be submitted in electronic form. Individual conferences to discuss the drafts will be during the week of **March 20th**. Revised papers will be due by **Thursday, April 6th**. If required, a third revision will be due by **April 17th**.