

## Biosc1560: Senior Seminar in Cell and Developmental Biology Spring, 2022

### A course offered by:

*The Department of Biological Sciences, University of Pittsburgh*

**Time:** Thursday, 1:00-2:50 p.m.

**Place:** A202 Langley Hall, University of Pittsburgh

### Instructor:

Name	Address	Phone	Email
<b>Jeffrey Hildebrand</b>	University of Pittsburgh Dept. of Biological Sciences 103 Life Sciences Annex	624-6987	<a href="mailto:jeffh@pitt.edu">jeffh@pitt.edu</a>

### Syllabus at-a-glance

	Date	Topic	Introduction/presenter
1	Jan. 13	Organizational Meeting	
2	Jan. 20	Let's make an axis or two	
3	Jan. 27	Let's make an axis, part two	
4	Feb. 3	Getting oriented early in life	
5	Feb. 10	Responding to tension	
6	Feb. 17	Standup tall	
7	Feb. 24	Shape + traffic = pattern	
8	March 3	Stay in your lane	
	March 10	NO CLASS: SPRING BREAK	
9	March 17	Spin around to not be round	
10	March 24	Skin deep	
11	March 31	Go with the flow	
12	April 7	Just because we can, doesn't mean we should.	
13	April 14	Student presentations	
14	April 21	Student presentations	

## Papers for discussion in class

Week #	Date	Paper to be presented and discussed
2	Jan. 20	Zeng et al (1997) The mouse Fused locus encodes Axin, an inhibitor of the Wnt signaling pathway that regulates embryonic axis formation. <i>Cell</i> , 90(1):181-192
3	Jan. 27	Xu et al. (2014) Construction of a Vertebrate Embryo from Two Opposing Morphogen Gradients <i>Science</i> 344 (6179), 87-89
4	Feb. 3	Kono et al. (2015) Inhibition of RHO–ROCK signaling enhances ICM and suppresses TE characteristics through activation of Hippo signaling in the mouse blastocyst. <i>Developmental Biology</i> 394.142–155
5	Feb. 10	Provenzano et al. (2009) Matrix density-induced mechanoregulation of breast cell phenotype, signaling and gene expression through a FAK–ERK linkage. <i>Oncogene</i> 28, 4326–4343
6	Feb. 17	Grego-Bessa et al. (2016) The tumor suppressor PTEN and the PDK1 kinase regulate formation of the columnar neural epithelium. <i>Elife</i> . 5:e12034. doi: 10.7554/eLife.12034
7	Feb. 24	Liem et al. (2012) The IFT-A complex regulates Shh signaling through cilia structure and membrane protein trafficking. <i>J Cell Biol.</i> 197(6):789-800.
8	March 3	Coutiño and Mayor (2021) The mechanosensitive channel Piezo1 cooperates with semaphorins to control neural crest migration. <i>Development</i> 148(23): dev200001.
	March 10	NO CLASS
9	March 17	Stedden et al. (2019) Planar-Polarized Semaphorin-5c and Plexin A Promote the Collective Migration of Epithelial Cells in Drosophila. <i>Curr Biol.</i> 29(6):908-920
10	March 24	Laurin et al. (2019) An RNAi screen unravels the complexities of Rho GTPase networks in skin morphogenesis, <i>Elife</i> . 8:e50226.
11	March 31	Minegishi et al. (2021) Fluid flow-induced left-right asymmetric decay of Dand5 mRNA in the mouse embryo requires a Bicc1-Ccr4 RNA degradation complex. <i>Nat Commun.</i> 12(1):4071.
12	April 7	Yu et al. (2021) Blastocyst-like structures generated from human pluripotent stem cells. <i>Nature</i> 591, 620–626  Moris et al. (2020) An in vitro model of early anteroposterior organization during human development. <i>Nature</i> . 582(7812):410-415.
13	April 14	Student presentations
14	April 21	Student presentations

### 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 developmental processes. 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.

### **Learning objectives:**

The course is intended to help students accomplish the following goals:

- 1) Gain significant insight into reading and critically analyzing primary scientific literature related to cell and developmental biology.
- 2) Gain experience in hypothesis-driven experimental design, data analysis, and methodology in cell and developmental biology.
- 3) Strengthen scientific communication skills.

### **Grading:**

#### ***Class Participation 50% of final grade :***

**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 if the data support the author's conclusions.

#### ***Writing assignment 20% of final grade:***

1. For three of the discussion sessions, students will produce a 1-2 page (12 point, single space) written document that is designed to be a follow-up to the papers, for any three papers you choose. 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 aim, and an experiment (or 2) you might perform to address that aim. Assignments should be submitted via Canvas.

#### ***Presentations (2 total), 30% of final grade:***

1. *Short introductory presentation:* The first presentation will occur as part of the faculty-lead discussions of the assigned research papers. During 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 form 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. For presentations, it is highly recommended that you meet with the instructor by **TUESDAY** before your presentation.
2. *End of the semester oral presentation:* At the end of the semester, each student/group will choose a paper related (loosely) to one of the topics covered during the semester and will give a short (~30-40 minute) oral presentation to the class with ~10 additional minutes for questions. See below for more detailed instructions.

**Instructions for final oral presentations:**

The final oral presentations begin April 5<sup>th</sup>. These should be in the form of a Powerpoint presentation. Each student/group will choose a current research paper (within the past 18 months at least) loosely related to the topic of cell and developmental biology. So that we don't have duplicate presentations, please inform me at least two weeks in advance which paper you wish 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) Outline the methods but don't dwell on them if they are common or we have discussed them in class. Spend time on novel methods or experimental model systems that we have not discussed.
- 4) 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.
- 5) Identify the broader significance of the work (i.e. how does this work extend our knowledge in this field).
- 6) Identify any weaknesses in the paper.
- 7) 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

**10 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!

Missed classes: As the majority of your grade is based on in-class discussion, missing class is strongly discouraged. If, however, you do miss class because of sickness, interviews, or some other reason, you are expected to make up the missed material by writing a summary of the papers that were discussed. For each paper discussed, you are expected to write a 2-page summary that includes a discussion of why this work was done, the methods used, the conclusions drawn by the authors, why this paper was important, and your opinion of the paper (include whether the data support the conclusions drawn by the authors). This is in addition to the other writing assignments. Make up papers should be handed in within one week of the missed class. You must provide appropriate documentation for missed classes. 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.

**Academic Integrity:** All students are expected to adhere to the standards of academic honesty. Cheating/plagiarism will not be tolerated. Students suspected of violating the University of Pittsburgh Policy on Academic Integrity, from the February 1974 Senate Committee on Tenure and Academic Freedom reported to the Senate Council, will be required to participate in the outlined procedural process as initiated by the instructor. A minimum sanction of a zero score for the quiz or exam will be imposed. View the complete policy at [www.cfo.pitt.edu/policies/policy/02/02-03-02.html](http://www.cfo.pitt.edu/policies/policy/02/02-03-02.html).

The punishment for any academic integrity violation will be an automatic failing grade (F) for this course and a report will be filed with the University. Note that multiple offenses will result in further punishment.

The posting (either verbatim or paraphrased) of any assignment or examination, or subsection thereof, that is formally assessed for part of your course grade to online resources (such as Chegg) will constitute an academic integrity violation. It also may constitute a violation of US copyright law.

The access or utilization of any such online postings, even if you did not personally post them, also constitutes an academic integrity violation.

Students are expected to do their own work. You may not work with another student (or anyone else) on any graded coursework unless specifically authorized to do so on a specific assignment. Even in those cases, students are still responsible for doing their own work. Any evidence that we find or formal complaints that we receive of students colluding on assessed work or free-riding from the work of others will constitute an academic integrity violation.

**Withdrawal:** The University Add/Drop period ends on **Jan 21<sup>st</sup>**, and extended Add/Drop ends **Jan. 28<sup>th</sup>**. Withdrawals after this date can only be granted for special reasons, and only with permission of both instructors and the appropriate dean. The submission deadline for Monitored Withdrawals is **March 18<sup>th</sup>**. Low grades cannot be used as a reason for late withdrawal. It is important that you make an early decision about withdrawal from the course.

**Disability Statement:** If you have a disability for which you are, or may be, requesting an accommodation, you are encouraged to contact both the instructor for this course and the Office of Disability Resources and Services, 140 William Pitt Union, 412-648-7890/412-624-3346 (Fax), as early as possible in the term. Disability Resources and Services will verify your disability and determine reasonable accommodations for this course.

**E-mail Communication:** Each student is issued a University e-mail address ([username@pitt.edu](mailto:username@pitt.edu)) upon admittance. This e-mail address may be used by the University for official communication with students. Students are expected to read e-mail sent to this account on a regular basis. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an e-mail forwarding service that allows students to read their e-mail via other service providers (e.g., Hotmail, AOL, Yahoo). Students who choose to forward their e-mail from their pitt.edu address to another address do so at their own risk. If e-mail is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University e-mail address. To forward e-mail sent to your University account, go to <http://accounts.pitt.edu>, log into your account, click on **Edit Forwarding Addresses**, and follow the instructions on the page. Be sure to log out of your

account when you have finished. (For the full E-mail Communication Policy, go to [www.bc.pitt.edu/policies/policy/09/09-10-01.html](http://www.bc.pitt.edu/policies/policy/09/09-10-01.html).)

***Classroom Recording:*** Lecture content will sometimes be provided as video recordings, but this is not guaranteed. Classroom recordings must be approved by the instructors.

## **BIOSC1561\_2022 ~ Seminar in Cell and Developmental Biology W course**

**Class time and location:** Thursday: 3:00-3:50 p.m. Rm 202A Langley hall.

*As of now, class will meet online on January 13<sup>th</sup> and 20<sup>th</sup>. Starting on January 27<sup>th</sup>, and for the remainder of the semester, we will meet in-person immediately after completion of the Biosc 1560 class time (after a short break, as needed). When meeting remotely, please use the Canvas site for BIOSC 1560 to access the Zoom link for the given day.*

**INSTRUCTOR:** Dr. Jeffrey Hildebrand, 624-6987, jeffh@pitt.edu

**Office Hours:** Please e-mail to arrange a suitable time to set up an in-person or Zoom meeting.

### **Writing Assignments:**

**1. “WEEKLY” ASSIGNMENTS:** For 3 of the initial papers presented in BIOSC1560, students taking the “W” option must submit a 2-3 page paper (12 point, single-spaced) consisting of 2 parts (see below). Students should plan on submitting these within the first 8 weeks of class, preferably skipping a week so that the critiques can be graded and the student can see the corrections as to not make the same mistakes! Assignments should be submitted via the BIOSC 1561 Canvas page.

- 1) A 1-1.5 page written summary and critique of the paper being presented. This will consist of a short background, the hypothesis/question being investigated, generalization of 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.
- 2) 1-1.5 page 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 aim, and an experiment (or 2) you might perform to address that aim.

**2. RESEARCH PAPER** You will write an original research paper (max of 7-10 pages, double-spaced (margins ~ 0.75” around, 12 point font - Arial is nice!) centered on the research described in one of the papers that you wrote a critique for (perhaps even the paper for which you did the Introduction). You are expected to read additional papers – thus the title “research paper”. Your paper needs to be fully referenced and include a cited literature section at the end. 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, 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. There will be three parts to this writing project:

1. A detailed outline of the paper. This should consist of section headings, major points for each section, and supporting information of each point. It can also start to include potential figures (if you are including any) and references at this point. This is where you get your thoughts, information, and organization in place. The purpose of the outline is to make writing the first draft significantly easier. These will be due no later than **March 19<sup>th</sup>** but may be turned in as soon as you have it completed.
2. First drafts are due no later than **Friday, April 1<sup>st</sup>**, and must be submitted in electronic form on the Canvas site as a word doc. *The first draft is not intended to be perfect.* The revision process is for really cleaning it up. Individual conferences to discuss the drafts will occur during the week of **April 4<sup>th</sup>**.
3. Revised papers will be due by **Friday, April 22<sup>nd</sup>**.

**Turnitin:** Students agree that by taking this course all required assignments may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of Turnitin.com page service is subject to the Usage Policy and Privacy Pledge posted on the Turnitin.com site.

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