

Developmental Biology, Biol. 218
Fall, 2006
Professor Devoto

1. Fertilization and Cleavages	September 6
<i>Experimental Techniques Handbook (1) due</i>	October 2
2. Gastrulation	October 2
<i>Test #1</i>	October 9
3. Axis Determination	October 11
4. Neuroectoderm	November 1
<i>Experimental Techniques Handbook (1, 2) due</i>	November 27
5. Mesoderm	November 13
<i>Art Project due</i>	November 20
6. Stem Cells	November 29
<i>Experimental Techniques Handbook (complete) due</i>	November 27
7. Evolution	December 6
<i>Perspective essay due</i>	November 27
<i>Final Exam</i>	To be determined by Registrar

1. Fertilization and Cleavages	
6 September	Introduction and historical overview
<i>Readings</i>	Chapter.1 and Ch. 4, pp 77-85
11 September	Life cycles and diversity
<i>Readings</i>	Chapter 2
Assignment	Pick a body part, organ, or tissue of most interest in any multi-cellular organism. (for art project)
13 September	Principles of Experimental Embryology: Specification, Differentiation, Commitment, Cell adhesion, cell-cell communication
<i>Readings</i>	Chapter 3, pp 56-63, pp 69-76; Chapter 4, pp 143-150
18 September	Differential Gene Expression
<i>Readings</i>	Chapter 5
Assignment	Short compare/contrast of Specification, Differentiation, and Commitment.
20 September	Fertilization and cleavage, reading a scientific article
<i>Readings</i>	Chapter 7, Chapter 8, pp 221-224
25 September	Mid Blastula Transition, reading a scientific article
<i>Readings</i>	Chapters 9, 10, p. 263-266, 305-307 <ul style="list-style-type: none"> Donald A. Kane and Charles B. Kimmel (1993). The zebrafish midblastula transition. <i>Development</i> 119, 447-456
Assignment	Turn in two questions related to the posted article to be presented.
27 September	Polarized Cell Divisions: c. elegans
<i>Readings</i>	Chapter 8, pp 243-251 <ul style="list-style-type: none"> Lyczak, Gomes and Bowerman (2002). Heads or Tails: Cell Polarity and Axis Formation in the Early Caenorhabditis elegans Embryo. <i>Developmental Cell</i>, 3: 157-166. Lynn Boyd, Su Guo, Diane Levitan, Dan T. Stinchcomb, and Kenneth J. Kemphues. 1996. PAR-2 is asymmetrically distributed and promotes association of P granules and PAR-1 with the cortex in C. elegans embryos. <i>Development</i> 122, 3075-3084

2. Gastrulation	
2 October	Gastrulation: the component movements, sea urchin, frog
<i>Readings</i>	Chapter 8, sea urchin gastrulation; Chapter 9, frog gastrulation <ul style="list-style-type: none"> Excellent review article--Wallingford JB (Wesleyan, '92!), Fraser SE, Harland RM (2002). Convergent Extension: The Molecular Control of

	Polarized Cell Movement during Embryonic Development. Developmental Cell 2: 695–706
Assignment DUE	Pick one gene that plays a role in the development of your chosen animal part (for art project) TURN IN YOUR EXPERIMENTAL TECHNIQUES HANDBOOK (PART 1)
4 October	Gastrulation in fish: ZEBRAFISH LAB
<i>Readings</i>	• Chapter 11, pp 325-343
9 October	Exam 1

3. Axis Determination	
11 October	Cortical Rotation, Primary Induction
<i>Readings</i>	Chapter 10, axis induction • Art and science reading, TBD
Assignment	Discuss with professor your art project before Fall Break



FALL BREAK!!!

18 October	The Organizer
<i>Readings</i>	Chapter 10, axis induction
23 October	Morphogens
<i>Readings</i>	Chapter 3, Developmental dynamics of cell specification • Vincent S, Perrimon N. (2001) Fishing for morphogens. <i>Nature</i> 411 : 535-6 • Chen Y, Schier AF. (2001). The zebrafish Nodal signal Squint functions as a morphogen. <i>Nature</i> 411 :607-10.
Assignment	Turn in two questions related to the posted article.
25 October	Early Amniote development
	Chapter 11, pp Early Development in Birds
30 October	Peer Review of Art Project Ideas
Assignment	Draft of Art Project

4. Neuroectoderm	
1 November	Neurulation, Spinal Cord Patterning.
<i>Readings</i>	Chapter 12, Neural Cells, Neural Tube; Chapter 6, Hedgehog family
6 November	Brain and Neuronal Differentiation
<i>Readings</i>	Chapter 12, pp Central nervous system, eye.
DUE	EXPERIMENTAL HANDBOOK (PARTS 1 AND 2)
8 November	Neural Crest and Placodes
<i>Readings</i>	Chapter 13, Neural Crest

5. Mesoderm	
13 November	Paraxial mesoderm: Segmentation
<i>Readings</i>	Chapter 14, Formation of somites • Excellent Review Article—Cooke, J. (1998). A gene that resuscitates a theory--somitogenesis and a molecular oscillator. <i>Trends in Genetics</i> 14 : 85-88 • Palmeirim I, Henrique D, Ish-Horowicz D, Pourquie O. (1997). Avian hairy gene expression identifies a molecular clock linked to vertebrate segmentation and somitogenesis. <i>Cell</i> 91 :639-48.
Assignment	Turn in two questions related to the posted article. Meet with Professor to discuss your Perspective this week.
15 November	Paraxial mesoderm: Dermomyotome and Myogenesis
<i>Readings</i>	Chapter 14, myogenesis • Devoto SH, Stoiber W, Hammond CL, Steinbacher P, Haslett JR, Barresi MJ, Patterson SE, Adiarte EG, Hughes SM. (2006). Generality of vertebrate developmental patterns: evidence for a dermomyotome in fish. <i>Evol Dev.</i> 8 :101-10.

20 November	Gallery walk through and presentation
DUE	ART PROJECT



Thanksgiving Break

27 November	Lateral plate mesoderm and Limb:
<i>Readings</i>	Chapter 15, Lateral Plate Chapter 16, Limb development
DUE	TURN IN EXPERIMENTAL TECHNIQUES HANDBOOK (COMPLETE).

6. Gene Therapy and Stem Cells

29 November	Stem Cell Introduction
<i>Readings</i>	Chapter 21, Developmental Biology and Medicine
4 December	Stem cell therapy and ethics
<i>Readings</i>	<ul style="list-style-type: none"> (review for Alvarez article) Chien KR. (2004). Stem cells: lost in translation. <i>Nature</i>. 428:607-8. Alvarez-Dolado M, Pardal R, Garcia-Verdugo JM, Fike JR, Lee HO, Pfeffer K, Lois C, Morrison SJ, Alvarez-Buylla A. (2003). Fusion of bone-marrow-derived cells with Purkinje neurons, cardiomyocytes and hepatocytes. <i>Nature</i> 425:968-73. Ethics reading TBD
Assignment	Turn in two questions related to the posted article(s) to be presented. Answer survey questions

7. Evolution

6 December	Developmental Mechanisms of Evolutionary Change
<i>Readings</i>	Chapter 23
11 December	Genetic Basis for Evolutionary Change
<i>Readings</i>	<ul style="list-style-type: none"> Shubin NH, Dahn RD. (2004). Evolutionary biology: lost and found. <i>Nature</i>. 428:703-4. Shapiro MD, Marks ME, Peichel CL, Blackman BK, Nereng KS, Jonsson B, Schluter D, Kingsley DM. (2004). Genetic and developmental basis of evolutionary pelvic reduction in threespine sticklebacks. <i>Nature</i>. 428:717-23.
Assignment DUE	Turn in two questions related to the posted article(s) to be presented. PERSPECTIVE ESSAY
EXAM WEEK	Exam 2
	There will be lots of practice questions

GRADING

	Points
Class Participation	20
Small weekly assignments	10
Art project and brief presentation	40
Techniques handbook part 1 (10 pts)	10
Techniques handbook parts 1 and 2	10
Techniques handbook Complete	20
Midterm exam	40
Perspective essay	40
Final Exam	50
Total	240

