

GCD 4161 Message Board

GCD 4161: Developmental Biology

Gilbert Text's Website

Syllabus ~ Spring 2006

(subject to modification! Updated 3/24/06)

Date	Speaker	Topic	Assignment (All Gilbert pages and items in RED are required). Seminars of interest, but not required are in GREEN .
January 18	Rougvie	<p>Introduction to course; Introduction to developmental biology, including systems and general approaches used. Many model organisms have centralized home pages that allow you access to all kinds of information, from genomic sequence to Movies: Worms! Flies! Zebrafish! Arabidopsis! Xenopus! More Xenopus!</p> <p>Seminar of Interest Tomorrow: Dr. David Greenstein, "Signaling for sex in <i>C. elegans</i>" 12 noon, 2-101 BSBE</p>	<p>Gilbert pp. 3-10; Mosaic vs. regulative development and Roux's expts. Gilbert pp. 54-61.</p> <p>NOTE: You are responsible for understanding these techniques and concepts which will not be taught in class: 1) Northern Analysis pp.93; 2) PCR pp. 94-96; and 3) Gene structure and expression [intron, exon, 5' UTR, 3'UTR, enhancer, promoter, etc.] pp 107-117. Please review these topics!</p>
January 20	Rougvie	<p>Fertilization I: Sea urchins. Learn about Sea Urchins as a model system from Dr. Jeff Hardin at the University of Wisconsin. Follow the red arrows on each of the Hardin Pages to learn more about the topic, including fertilization.</p>	<p>Fertilization readings for today - Jan. 31 are Gilbert Chapter 7 pps. 183-214. We will discuss sea urchins first, through gastrulation, and then turn to mammalian fertilization.</p>
January 23	Rougvie	<p>Fertilization II: Check out Sea Urchin Embryology's page, especially #3, for animations of the acrosome reaction. Prevention of polyspermy. Check out Sea Urchin Embryology's page again, especially the prevention of polyspermy sections, #4 and #5, and finally #6, fertilization to put it all together. And, if you're into whacky humor, try their final cartoon sequence.</p> <p>Seminar of Interest Tomorrow: Dr. Helen Chamberlin, "Life and death in <i>C. elegans</i>:"</p>	<p>Gilbert pp. 181-192; 194-195; 197-209.</p> <p>Link to movies of calcium waves in a fish egg and in a sea urchin egg (more subtle - fert. occurs in upper right, Ca⁺⁺ wave is shown in right panel.)</p>

		Conservation and evolution of transcriptional regulation systems." 2 PM Tuesday Jan 24, 2-101 BSBE	
January 25	Rougvie	Maternal contributions to development Seminar of Interest Tomorrow: Dr. Amy Lossie, "Using the mouse to model epigenetic defects" 12 PM Thursday Jan 26, 2-101 BSBE	For the maternal contributions section, read link 1 of the Gilbert website 5.16 . Gilbert 208-216. Paper required for January 30, 2006: Ransick and Davidson 1993. NEW: Questions to think about as you read this paper.
January 27	Kirkpatrick	Cleavage: Learn patterns of cleavage on your own. Also, check out Dr. Jeff Hardin's Cool Sea Urchin Cleavage Page and learn more about cleavage in amphibians . Gastrulation I: Sea Urchins - Check out Dr. Jeff Hardin's Cool Sea Urchin Gastrulation Page	HOMEWORK #1 handed out today. DUE February 1, 2006 before class. Gilbert pp. 221-229.
January 30	Kirkpatrick	Gastrulation II: Finish discussion of Sea Urchin gastrulation; Discuss molecules key to sea urchin gastrulation. Introduce B-catenin/wnt pathway. Members of the video generation might enjoy Dr. Randy Moon's animations of the WNT pathway , +/- signaling. [Note: don't worry about the details of the second Flash Movie of Beta-catenin Signaling and Axis Specification -- that will apply later in the course!]. Sea urchin movies; Discuss Ransick and Davidson paper. SPECIAL SEMINAR TOMORROW (TUESDAY): The Deinard Memorial Lecture Series on Law & Medicine will present Prof. David H. Kaye, JD (Arizona State University) on Tuesday, January 31, 2006 from 11:30am-1:00pm in the Mississippi Room at Coffman Memorial Union. Prof. Kaye will lecture on "The Science of Human Identification: From the Laboratory to the Courtroom." More info here.	Gilbert summary of wnt/B-catenin signaling: pp. 161 and Fig. 6.24. Gilbert pp. 229-239.
February 1	Rougvie	End of sea urchin gastrulation. Fertilization in mammals. Check out Leon Browder's info on the acrosome reaction in mammals. Embryonic cleavage in mammals; Here is a review on Mammalian Fertilization for anyone who would like additional reading (i.e., it's not required). Seminar of Interest Tomorrow: Dr. E. Jane	Gilbert - portions of Chapter 7 that apply to mammals: including Fig. 7.8; 192-194; 195-197; 201-203. 204-214. (For next couple lectures).

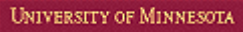
		Albert Hubbard, "Experimental and computational approaches to <i>C. elegans</i> development." 12 PM Thursday Feb. 2, 2-101 BSBE	HOMEWORK#1 due before class (see 1/27/06).
February 3	Rougvie	Mammalian Fertilization. Sperm-egg adhesion, ZP functions, prevention of polyspermy.	HOMEWORK #2 handed out today. DUE 2/8/06 before class.
February 6	Rougvie	Mammalian cleavage, restriction of potency, and implantation.	Gilbert pp. 363-372; 683-686; 693-694
February 8	Rougvie	How to make a "knock-out" mouse. Preimplantation diagnosis. A review (supplemental reading for those interested in the topic) on "Preimplantation genetic diagnosis" is Nature Reviews Genetics 3, 941 -955 (2002) . A link to a discussion of human sex selection at the old Gilbert website and more at the new site . A discussion of human germline modification is at Gilbert's website. Seminar of Interest Tomorrow: Dr. Laura Gamill, "Developmental genomics of the neural crest" 12 PM Thursday Feb. 9, 2-101 BSBE REVIEW SESSION tomorrow (Thursday) at 3:30-4:30 in 4-122 MCB. Make sure to review your notes and have questions ready!	Making "knock-out" and transgenic mice: Gilbert pp 98-102 HOMEWORK#2 due before class (see 2/3/06).
February 10	Rougvie	<i>C. elegans</i> I: Why? Discussion of "genetic approach". Discussion of early development. Asymmetric cell divisions. Check out the movies of early C. elegans cell divisions and P granule localization on Dr. Susan Strome's webpage. Link directly to the C. elegans early cleavage page -- click on the diagram above "Sequence of Events in the Early <i>C. elegans</i> Embryo".	Gilbert pp. 251-257. 2002 Nobel Prize in Physiology and Medicine to Brenner, Sulston and Horvitz recognizes research contributions from <i>C. elegans</i> studies. Learn more .
February 13	---	Exam I: Click here for practice Questions. NEW: MORE QUESTIONS from Kirkpatrick lectures.	
February 15	Rougvie	<i>C. elegans</i> II: Intrinsic signals.	Movie from Bob Goldstein showing cytoplasmic movements following fertilization. The male pronucleus takes up position to the right in this embryo.
February 17	Rougvie	<i>C. elegans</i> III.: Extrinsic signals.	
February 20	Rougvie	<i>C. elegans</i> IV: extrinsic signals continued.	Gilbert pp. 157-158; 167
February 22	O'Connor	Frog Gastrulation: Check out Dr. Jeff Hardin's Cool Frog Gastrulation Page The Organizer: Spemann experiments.	The frog section, today thru Feb21 will be based on Gilbert Chapter 10, pp. 305-338. HOMEWORK#3 handed out today. Due Monday Feb. 27.

February 24	O'Connor	Specification of cell fates I: Mesoderm induction and axis specification in vertebrates. A useful review article on patterning the <i>Xenopus</i> embryo is DeRobertis et al (2000) Nature Reviews Genetics volume 1 p171-181. Unfortunately this journal is not available on-line; it is available in the BioMed library - BIO-MED Periodicals Stack 147 and in the Med School Library in Diehl Hall	Gilbert pp. 305-338. Additional (and useful!) information on signaling systems can be found on these pages: Gilbert pp. 143-175; Especially of interest are the Wnt pathway pp. 152 and 161-162; BMP/TGF- β and Smad family pp. 153 and 159. dsh::gfp movie . Future dorsal side will be at the lower right. Note that green particles (ie., dsh::gfp) tend to flow in that direction. Courtesy of J. Miller.
February 27	O'Connor	Specification of cell fates II; B-catenin pathway. Members of the video generation might enjoy Dr. Randy Moon's animations of the WNT pathway , +/- signaling. The link takes you to his lab page, then choose "Active View: Absence of Wnt-1 signal" watch it, then go back and choose "Active view: Wnt-1 Signaling." Supplemental reading for today's lecture: Wnt-Xenopus axis specification	Reading on morphogen gradients: Gilbert pp. 61-68, especially the part relating to frogs on 65&66. Websites 3.3 and 3.4 are also useful. HOMEWORK #3 DUE at start of class. HOMEWORK #4 Handed out today. Due Friday March 3th.
March 1	O'Connor	Specification of cell fates III.	
March 3	O'Connor	<i>Drosophila</i> techniques	The fly lectures (today thru March 31) are based on Gilbert Chapter 9, pp. 263-299. Homework #4 Due today at the start of class.
March 6	O'Connor	Pattern formation I - bicoid	Gilbert pp 263-277
March 8	---	Exam II: Click here for practice questions! Answers to worm Qs and frog Qs	
March 10	O'Connor	Pattern formation II: A/P in <i>Drosophila</i> ; Gap and pair rule genes	Gilbert pp. 278-283.
March 13-17	---	*** SPRING BREAK ***	
March 20	O'Connor	Pattern formation III - segment polarity genes	Gilbert pp. 283-285.
		Pattern formation IV - Gap, Pair Rule and Segment	

March 22	O'Connor	Polarity Genes.	
March 24	Rougvie	Homeotic Genes	Gilbert pp. 285-290 HOMEWORK #5 handed out today. (new version posted 3.27.06 with typo corrected and note from Dr. O'Connor added). Due Wednesday March 29th at the start of class.
March 27	Rougvie	End of homeotic genes - vertebrates. Limb Formation I: Check out the Scanning Electron Micrographs of limb formation in mammalian development created by K. Sulik and P. Bream (UNC - Chapel Hill). These micrographs are part of a larger webpage of human and mouse SEMs that may be accessed by selecting the House Icon on the limb page or select here . Also check out the Visible Embryo site. Click on the embryos around the spiral to see SEMs of the stage and descriptions of development. Note that the page also has game links (Implantation!).	Gilbert pp. 523-543; Gilbert website: AER induction.
March 29	Rougvie	Limb formation II: A/P and P/D Pattern	Gilbert pp. 523-543. Homework #5 Due at start of class.
March 31	O'Connor	Limb Formation III: D/V Pattern	Gilbert pp. 523-543.
April 3	O'Connor	Fly Appendage I	Gilbert pp. 584-588; also HH pathway on 161-163. Also, much of the topic is presented by Dr. Bill Brook on Leon Browder's Virtual Embryo website at University of Calgary. Homework #6 handed out today. Due Friday April 7th at the START of class.
April 5	O'Connor	Fly Appendage II	
April 7	Rougvie	Left-right axis formation: microRNAs	The important topic of miRNAs is only briefly mentioned in the textbook Gilbert pp. 134-135. Here is a pdf of a review article for additional reading . [You can give less attention to the section on Prediction and validation of targets.] HOMEWORK #6 DUE
April 10	Rougvie	Left-Right Axis formation: microRNAs	
April 12	---	Exam III: Click here for practice questions.	
			Gilbert pp 381-383 (L/R

April 14	O'Connor	Left-right axis formation: Mammals	axis section). If you want more reading on this topic see this review article: Ryan and Belmonte.pdf Establishing a left-right axis in the embryo. Life 50,1-11 (requires Adobe Acrobat) Two other more recent reviews are Capdevila et al. 2000 (diagrams used in class) and Tabin and Vogan 2003
April 17	O'Connor	Sex Determination	Gilbert pp. 567-570; 547-559.
April 19	O'Connor	Sex Determination and Dosage Compensation	Gilbert pp. 124-126.
April 21	O'Connor	Stem cells	Gilbert pp. 409-410, 709-711, 505-510. HOMEWORK #7 handed out today. Due Wednesday April 26 at the START of class.
April 24	O'Connor	End of stem cells	
April 26	O'Connor	TBA	
April 28	Rougvie	Cloning	Gilbert pp. 85-90; 708-709. HOMEWORK#8 handed out today. Due Wed. May 3th at the start of class.
May 1	Rougvie	Zebrafish as a model system. Germ cells. A primary literature paper was the focus of portions of the lecture, and can be used as supplemental reading: 1. Doitsidou et al. (2002) " Guidance of primordial germ cell migration... " Cell 111:647-659.	Gilbert pp 345-354. Additional info on germ cell migration: Gilbert pp. 618-621. primary literature Haffter et al. 1996 - A long paper, but if you are interested, this will give you an introduction to fish screens.
May 3	Rougvie	Teratology and the human embryo	Gilbert pp. 16-18; 162-163
May 5	Rougvie	TBA	
May 8-13	---	Finals week	
May 12	---	Final Exam: 8:00-10:00 AM Friday, May 12, 2006. Practice questions.	

URL:<http://www.cbs.umn.edu/class/spring2006/gcd/4161/syllabus.html>



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Comments to:<mailto:janep@tc.umn.edu>

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