



BIOL 505 Concepts in Human Embryology (2 credits)

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Course Location: Online (6 weeks prior to HAPS conference and 6 weeks after the HAPS conference) and at the HAPS 2010 annual conference in Denver.

Required Text: Sadler, TW. (2010) Langman's Human Embryology, 11th Edition. Philadelphia, Lippincott Williams and Wilkins. ISBN 9780781790697 (*this text may be purchased online at any of the various booksellers*)

Participants also will be viewing several embryology animations found at the following site:
www.indiana.edu/~anat550/embryo_main

Computer Requirements:

- Participants must have the latest versions of QuickTime and the Adobe Flash player installed on their computer to view the embryology animations (the embryology website has links for the free downloads of these programs)
- Participants should have a relatively fast internet connection (dial-up connections may be problematic) because you also will be downloading and viewing large (~50 MB) narrated PowerPoint lectures for the online portion of the course.

Course Format: This is a hybrid course. The first part of the course will be online, and we will use the ANGEL course management tool (similar to BlackBoard) to access assignments, download recorded PowerPoint lectures, upload written assignments, and engage in online asynchronous discussion forums. The second part of the course will be face-to-face instruction and will be held at the 2010 HAPS Conference in Denver, May 29th – June 3rd. Final assignments will be peer reviewed, and both the peer review process and the submission of the final assignments will be done online via the ANGEL course management system.

Course Description: This course is designed to provide college-level instructors with the opportunity to expand their understanding of human embryology. Participants will complete significant preparatory background work prior to the face-to-face course meeting in Denver. The first part of the course (performed online and prior to the HAPS 2010 conference) will explore general human embryology topics, such as gametogenesis, fertilization, implantation, general growth and development of the fetus, as well as labor (parturition). We will explore the major

events occurring in the pre-embryonic, embryonic and fetal periods and discuss the role of teratogens in the development of birth defects. The face-to-face portion of the course (held at the HAPS 2010 conference) will explore specific developmental processes, such as heart development and gastrointestinal development. Participants will learn the material through directed readings, viewing of narrated PowerPoint lectures, completion of online exercises, participation in discussion forums, viewing of embryology videos, and the face-to-face instruction. In addition, participants will apply the information they have learned in the independent development of a peer-reviewed case study, problem set, or similar learning tool for undergraduates studying human development. (Note: we will NOT be going into detail about the molecular regulation of embryology.)

Course Expectations: This is a graduate-level course, and significant work is expected of the participants (and the instructor). Participants should expect at least 50 hours of course work, which will include:

- Directed readings in general embryology (~15-20 hours)
- Viewing of narrated embryology lectures (~6 hours) and completion of homework sheets related to each lecture and directed reading (~3-5 hours)
- Participation in the asynchronous discussion forums to discuss complex embryological topics prior to the annual conference (~5 hours)
- Participate in the HAPS-I orientation session (Saturday, May 28th, 3-4:30)
- Participate in two 3-hour workshop sessions on Tuesday, June 1st, 9:30 – 4 pm
- Development of a final assignment (case study, problem set, laboratory activity, or similar learning tool for use in an undergraduate Anatomy and Physiology course) (~20-25 hours)
- Peer evaluation of at least one other final assignment of another HAPS-I participant (~2 hours)
- Incorporation of peer evaluation feedback into your final assignment prior to submission to the ANGEL website (~2-3 hours)

Course Objectives: Upon completion of this course, participants should be able to:

- Describe the process of meiosis and be cognizant of errors that may occur during this process
- Compare and contrast the anatomic and physiologic aspects of spermatogenesis and oogenesis
- Summarize the major developmental events that occur during the pre-embryonic period, embryonic period and fetal period
- Recognize the role of the extraembryonic membranes and umbilical cord in human development
- Relate the three stages of labor to the anatomical and physiological events that occur during each stage
- Compare and contrast the four main types of birth defects
- Apply an understanding of basic embryology in explaining common birth defects
- Determine the potential effect a given teratogen may have on human development, given the dose and timing of that teratogen

- Explain the specific events that occur in heart development
- Apply an understanding of normal heart development in explaining the cause of common heart defects
- Describe the specific events that occur in gastrointestinal system development
- Distinguish the causes of selected major GI birth defects, based on an understanding of the normal embryology
- Create and evaluate a learning tool designed for undergraduate students to help the students better understand some concept of human embryology

Course Assessments and Grading Policy:

In order to pass this course, participants must earn 70% of the 200 total points assessed. Participants will be assessed in a variety of ways:

1. Completion of five problem set assignments, each worth 10 points (for a total of 50 points):

Participants are expected to complete five problem sets prior to the HAPS 2010 conference (see course schedule for specific due dates). These problem sets will be posted on ANGEL, and students are expected to post their answers on ANGEL. Participants are encouraged to discuss the problem sets with each other using the asynchronous discussion forum in ANGEL, but each participant should turn in his/her OWN work. If participants watch the online narrated powerpoint lectures and do the reading, they should be able to answer the problem sets.

2. Participation in the asynchronous discussion forums on Angel from April 17th – May 28th (30 points total):

During each of the six weeks of online instruction, participants are expected and encouraged to post their questions in the discussion forums, help answer other individuals' questions in the forums, and respond to my questions at periodic times during this time frame. Our discussion will be held in an asynchronous format. Each participant is expected to post at least one relevant question or comment each week during this six week period.

3. Attendance/participation at the HAPS-I orientation session (Saturday, May 29th, 3-4:30) and Biol 505 workshops (Tuesday, June 1st – morning and afternoon) (50 points total).

While in the workshop sessions, participants are expected to engage in all the activities and problem sets, and to contribute during discussions.

4. Final project (50 points): Following the HAPS conference, participants are expected to submit a culminating project that supports the teaching of some element of human embryology in college-level A&P courses. This project may take the form of a case study, an inquiry-based laboratory activity, a problem set, a visual model, a hands-on model, or another learning tool or activity approved in advance by the instructor. The project must be creatively and originally designed by the participant (no plagiarized projects allowed – or the individual will receive a 0 for their grade). Submissions will be peer-reviewed by classmates forming teams. It is expected that these learning tools will be made available to the HAPS membership as a whole for use in their classrooms and laboratories.

5. Peer review of a final project (20 points): You are required to give a peer review of one of your classmates' final project no later than Monday, July 19th. Your peer review will include constructive criticism as described at the orientation session and in the peer review document.

You will post your peer evaluation on the ANGEL website and specific criteria for peer evaluation will be discussed during the HAPS conference workshops. This assessment also includes how you deal with the peer review done for you on your own project. You should use the advice that has been given to you as that – advice to be used as appropriate for your project. However, as part of the assignment, you should address all the reviewers’ comments and how you incorporated them (or why you did not) in a separate document that is posted with your revised final project (much like when you submit a revised manuscript and a separate response to the journal editor about your revisions). Failure to turn in a timely peer review or failure to incorporate appropriate peer review comments will result in a partial or complete loss of these points.

5 Problem Sets (each worth 10 points)	50 points
Discussion Forum Participation	30 points
Attendance/participation at HAPS workshops	50 points
Final Project	50 points
Peer Review of Final Project	20 points
TOTAL	200 points

Course Schedule:

Participants should log onto the Pierce College ANGEL site by April 17th in order to access course materials, view and participate in the asynchronous discussion forums, and access the narrated PowerPoint lectures. The ANGEL site will be open from April 17th – early August, 2010.

DATE	TOPICS Covered	ASSIGNMENTS (do the readings before watching the narrated powerpoints)
April 18 th – April 23 rd	Introduction to the course, terminology, gametogenesis, ovulation	<ol style="list-style-type: none"> 1. Sadler Ch 2 (pp. 13-21), Ch 3 (pp. 33-36) 2. View narrated Embryology PowerPoints (total viewing time ~60 minutes) (<i>get URL for powerpoints on ANGEL</i>) 3. Access problem set on ANGEL, work with colleagues in the ANGEL discussion forum to figure out answers (collaboration is encouraged, but plagiarism and cheating is not!)
Saturday, April 24 th , 5 pm EDT		First Problem set due (post answers up to ANGEL)
April 25 th – April 30 th	Fertilization and the first week of development	<ol style="list-style-type: none"> 1. Sadler Ch 3 (pp. 36-46) 2. View narrated Embryology Powerpoints (total viewing time ~60 minutes) 3. Access problem set on ANGEL, work with colleagues in discussion forum to figure out answers

DATE	TOPICS Covered	ASSIGNMENTS (do the readings before watching the narrated powerpoints)
Saturday, May 1 st , 5 pm EDT		Second Problem set due (post answers up to ANGEL)
May 2 nd – May 7 th	Weeks 2 and 3 of development (bilaminar germinal disc, gastrulation, notochord)	1. Sadler Ch 4 (pp. 47-54), ch 5 (pp. 55-56, 61-66), Ch 6 (74-79, 82-84) 2. View narrated Embryology PowerPoints (total viewing time ~60 minutes) 3. Access problem set on ANGEL, work with colleagues in ANGEL discussion forum to figure out answers
Saturday, May 8 th , 5 pm EDT		Third Problem set due (post answers up to ANGEL)
May 9 th – May 14 th	Neurulation, Neural Tube Defects	1. Sadler Ch 6 (pp. 67-74) 2. View narrated Embryology PowerPoints (total viewing time ~60 minutes) 3. Access problem set on ANGEL, work with colleagues in ANGEL discussion forum to figure out answers
Saturday, May 15 th , 5 pm EDT		Fourth Problem set due (post answers up to ANGEL)
May 16 th – May 21 st	Summary of embryonic and fetal periods, extraembryonic membranes, labor and birth	1. Sadler Ch 6 (pp. 85-90), Ch 7 (pp. 91-112) 2. View narrated Embryology PowerPoints (total viewing time ~60 minutes) 3. Access problem set on ANGEL, work with colleagues in ANGEL discussion forum to figure out answers
Saturday, May 22 nd , 5 pm EDT		Fifth Problem set due (post answers up to ANGEL)
May 23 rd – May 26 th	Teratogens and Birth Defects	1. Sadler Ch 8 (pp. 113-124) 2. View narrated Embryology PowerPoints (total viewing time ~60 minutes)
May 27 th – May 30 th	Introduction to systems-specific embryology (heart, GI and head and neck)	1. Sadler Ch 12 (pp. 165-170, 173-188, 196-200) and Ch 14 (pp. 209-230) 2. Review all of the heart and GI embryology animations (and take the pre/posttests) at: http://www.indiana.edu/~anat550/cvanim/index.html (8 animations) and http://www.indiana.edu/~anat550/gianim/index.html (2 animations) <i>(this animation review and testing will take several hours total –DON'T try to watch all animations in one sitting!)</i>

DATE	TOPICS Covered	ASSIGNMENTS (do the readings before watching the narrated powerpoints)
Saturday, May 29 th 3-4:30 pm (room TBA)	Attend HAPS-I orientation session	
Tuesday, June 1 st AM workshop	* Heart embryology, heart defects, aortic arch vessels, fetal vs. postnatal circulation	<i>(prior to the AM workshop):</i> 1. Sadler Ch 12 (pp. 165-170, 173-188, 196-200) 2. Review the heart embryology animations (and take the pre/posttests) at: http://www.indiana.edu/~anat550/cvanim/index.html
Tuesday, June 1 st PM workshop	*GI embryology (development of the stomach, duodenum and omenta, rotation of the intestines * Discussion of incorporating embryology into our A&P classes *assignment of peer review groups for final project assessment *(if time allows) development of the head and neck (pharyngeal arches, thyroid, development of face)	<i>(prior to the PM workshop):</i> 1. Sadler Ch 14 (pp. 209-230) 2. Review the GI and head and neck embryology animations (and take the pre/posttests) at: http://www.indiana.edu/~anat550/gjanim/index.html and http://www.indiana.edu/~anat550/hnanim/index.html 3. Come prepared to discuss potential ideas you have for your final project (peer-reviewed case study, problem-set, lab activity or similar learning tool dealing with human embryology)
June 4 th – July 4 th	Final project development <i>(I encourage you to use the discussion forum to discuss your project with your classmates and contact me for any advice you may need)</i>	
July 5 th	Final project given to peer-reviewer for assessment <i>(projects are to be uploaded on ANGEL for peer-review – please also email me when you have done this)</i>	
July 5 th - July 18 th	Peer-reviewers evaluate final project, provide colleague with a written writeup/critique of the project	
July 19 th	Peer-reviewers upload critique/writeup of project onto ANGEL website	
Monday, August 2 nd	Revised final project posted to ANGEL	
Late August, 2010	Grades posted	