BIOLOGY 3360 - VERTEBRATE EMBRYOLOGY

SYLLABUS AND COURSE INFORMATION

This handout contains information about the philosophy of the course, tips to help you maximize your learning in the course, and other miscellaneous information.

Embryology is a vast field of study that is still evolving as a science. While there is much we know about the development of the embryo, there are still many unsolved problems. The science of embryology is an active, dynamic field with new findings arising every day. The study of embryology encompasses the anatomy of development, the genetic factors associated with development, cellular aspects of development, and the chemical and hormonal compounds that play important roles in inducing specific events during development. While all of these are important in the overall developmental process, the anatomy of development is probably the best understood of these varied aspects of embryology. The genetic, cellular, and chemical factors of development are areas of focus in most of the current research. My interest in embryology is the anatomy. This course is designed to help you see how developmental anatomy, which emerges during the embryonic stage, helps to clarify our adult anatomy and answers the questions as to why things have specific structural relationships. Therefore, this is an embryology course for anatomists.

Lectures

This course incorporates a wide array of pedagogy, from excellent lecture-oriented instruction to problem-based learning, and interactive discussions. Throughout the course students create their own textbook that is specific to the course of study. For this reason, students who attentively participate in lecture sessions have a distinct advantage. All written examinations are based on the material covered in lecture, with all material being equally important and fair game.

Missing Lecture

The summer Vertebrate Embryology class is listed as an In-Person course. The definition of an In-Person course is ***"A traditional, campus-based, fully in-person class with a scheduled room and meeting time."*** If for any reason you miss lecture, you should acquire the missed lecture notes from a classmate and read the assigned material from the textbook that accompanies the course. If you have any questions I will be more than happy to meet with you either during my office hour or by arrangement. I will address the reasons for this more thoroughly on the first day of class.

Books and Lecture Material

Textbook:

The Developing Human, Clinically Oriented Embryology 11th edition by Moore, et al. I am in the process of setting up the eBook in inclusive access. I will have more information about this by the end of the first week of class.

Web-based materials:

Lecture Handouts by Mark Nielsen — these handouts will be what you use for note taking during lecture and will essentially become your primary source for information as you prepare for the exams. The handouts will be in the Lecture Handouts folder in the Files folder on Canvas. I will also put them in the Lecture Handouts folder on the course website page.

Lecture Slides — these are the slides you will see during lecture. These will be available on the course website. You can either preview the lecture slides before you come to class, review the lecture slides as you study your notes, or use them if you miss lecture.

Other Materials

Obtain good quality colored pencils in pure or bright colors (e.g., red, blue, green, etc.). Embryology is a visual subject and color is used during lecture presentations to label the illustrations on each slide. It will be to your advantage to color-code drawings in the lecture handouts. Colored pencils will also be **REQUIRED** for coloring and drawings on examinations; it is your responsibility to have them.

Study Strategies

One of the most important keys for the effective study of embryology is a strong knowledge of postnatal anatomy. Remember, that is our goal—to learn how the emerging anatomy of development accounts for adult anatomy. Students who know their adult anatomy meet with much greater success in embryology. I strongly recommend that you look at the syllabus the day before each class and review the anatomy that pertains to the topic we will study in embryology. In other words, come prepared to lecture with a strong knowledge of anatomy. A second important tip is to stay on top of things and do not fall behind. Like the anatomy course, the embryology course will continue to build on past lectures and the student who keeps up with their studies will not get overwhelmed and fall behind. A third key to the study of embryology is to develop the ability to look at the body, both the adult anatomy and embryonic anatomy in sections. Much of the embryonic anatomy we will study will involve looking at sections through the body and relating this to the three-dimensional structure of the body. Finally, take advantage of my office hours to ask questions and get the help that you need. Again, DO NOT be afraid to ask questions for that is how you learn.

Office Hours

I am planning to hold office hours beginning the second week of class. I am not sure what times will work best but I will post them on Canvas as soon as I get the days and time figured out. I will also be available by appointment if you are unable to attend regular office hours. I encourage you to take advantage of office hours to get your questions answered. **DON'T BE AFRAID TO ASK QUESTIONS!**

Exams

All exams count toward your final grade in this class, this means that you **WILL NOT** be able to drop any of the exams. The three midterm exams will cover specific parts of the course; the final exam is a little different. Not only will it cover the material since the second midterm exam but it will also have a comprehensive component to it, making it a more significant exam in terms of its point value (see exam breakdown below). In addition, there will be weekly quizzes, a midterm practical quiz and final comprehensive lab practical examination (see laboratory schedule). The point distributions are as follows:

Exam 1	100 points
Exam 2	100 points
Final Exam	150 points: Approximately 100 points from the material covered during lecture after exam 2 and approximately 50 points from the material covered during lecture prior to exam 2.
Homework	50 points (five @ 10 points each). Late homework will be subject to a penalty of 10% per day.

This testing format provides for an equal evaluation of all parts of the course, with no emphasis being placed more strongly in one area over another.

Evaluation of Student Performance

To pass this course, you must earn a cumulative average of 45%:

25.0%	Exam 1 - 100 points
25.0%	Exam 2 - 100 points
12.5%	Homework - 50 points
37.5%	Final Exam - 150 points

Total points possible = 400

The grading breakdown is as follows:

90.0—100%	A
88.5—89.9%	A-
84.5—88.4%	B+
80.0—84.4%	B
77.5—79.9%	B-
70.0—77.4%	C+
60.0—69.9%	C
50.0—59.9%	C-
45.0—49.9%	D
0.00—44.9%	E

All grades are final. There will not be any opportunities to change your grade after you have completed the course. If you have been accepted into a professional program and your entry depends on passing this course, then you must achieve the necessary grade. Under no condition will make-up work or exam re-takes be given.

Course Content Accommodations Policy

I do not grant content accommodation requests as the course content fulfills legitimate pedagogical goals.

PLEASE NOTE THAT SOME ASPECTS OF THIS SYLLABUS MAY BE SUBJECT TO CHANGE. I WILL NOTIFY YOU IF THIS SHOULD HAPPEN. HOWEVER, NO CHANGES WILL BE MADE TO THE EVALUATION OF STUDENT PERFORMANCE.

BIOLOGY 3360 - VERTEBRATE EMBRYOLOGY

EXPECTED LEARNING OUTCOMES

The undergraduate Biology programs at the University of Utah provide students the knowledge base, skills, and resources needed to prepare them for careers in the Biological Sciences, or for enrollment and success in post-graduate education opportunities in numerous graduate or professional schools such as, biology, medicine, dental, veterinary, pharmacy, nursing, physical therapy, occupational therapy, and physician assistant programs. Within the department of biology, the Vertebrate Embryology course is specifically designed to serve the needs of students in biology, and from many other departments on campus, as they prepare for futures in medical and allied heath care careers. In fact, it is designed for the educated person who is interested in becoming more knowledgeable about the development of their most important possession—their own body.

Specific Learning Outcomes

- **Developmental Processes**
  Students will be able to explain how developmental processes, stages, and patterns account for the structure-function relationships of the human (mammalian) body.

- **Evolutionary Relationships**
  Students will be able to think critically about how the shared embryonic vertebrate body plan can be molded by selection into a variety of vertebrate forms.

- **Structure and Function**
  Students will be able to describe how plasticity and malformations in adult anatomy arise as a consequence of developmental variations or problems, as well as explain why adult anatomy has the relationships and structure we observe.

- **Transmission, Flow, and Interpretation of Anatomical Information**
  Students will be able to utilize the extensive language of embryology to explain the important structural relationships and functional significance of the human body in biological and medical contexts.

- **Body Systems**
  Students will be able to explain how the hierarchical organization of the human form, from cells, to tissues, to organs, to body systems account for the structural and functional features at all levels of organization and function in the human body.

- **Ability to Apply Scientific Reasoning**
  Students will be able to apply critical thinking skills using the problem solving skills of science to diagnose and solve anatomical problems related to the structure and function of the human body.

- **Real World Application**
  Students will not only be prepared to enter the medical and allied healthcare world with the critical knowledge base of one of the most important tools they can have in their toolbox—developmental anatomy—but they will be better prepared to understand anomalies that arise during development and impact health.

ADDITIONAL IMPORTANT INFORMATION

The following information provides students with a variety of important resources and facts about the course and the university in general:

Americans with Disabilities Act

The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, (801) 581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services.

Addressing Sexual Misconduct

Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a dis- ability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801- 581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585- 2677(COPS).

Wellness Statement

Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student's ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness at https://wellness.utah.edu or 801-581-7776.

Veterans Center

If you are a student veteran, the University of Utah has a Veterans Support Center located in Room 161 in the Olpin Union Building. Hours: M-F 8-5pm. Please visit their website for more information about what support they offer, a list of ongoing events and links to outside resources: https://veteranscenter.utah.edu. Please also let me know if you need any additional sup- port in this class for any reason.

LGBT Resource Center

If you are a member of the LGBT community, I want you to know that my classroom is a safe zone. Additionally, the University of Utah has an LGBT Resource Center on campus. They are located in Room 409 in the Oplin Union Building. Hours: M-F 8-5pm. You can visit their website to find more information about the support they can offer, a list of events through the center and links to additional resources: https://lgbt.utah.edu. Please also let me know if there is any additional support you need in this class.

English as an Additional/Second Language

If you are an English language learner, please be aware of several resources on campus that will support you with your language and writing development. These resources include: the Writing Center (https://writingcenter.utah.edu); the Writing Program (https://writing-program.utah.edu); the English Language Institute (https://eli.utah.edu). Please let me know if there is any additional support you would like to discuss for this class.

BIOLOGY 3360 - VERTEBRATE EMBRYOLOGY

Fall TERM 2022

Schedule of Lectures and Exams

Lecture time and place: M, W, F – 10:45 to 11:35 AM in ASB 210.

Note to students: Print this schedule and keep it with you. **You are responsible for all dates, times and places in this schedule.**

Aug.	22	Introduction to Course and to Embryology
	24	Gametogenesis
	26	Fertilization **(Last day to add without permission code)**
	29	Human Development – Weeks One and Two
	30	Human Development – Week Three
Sept.	2	Human Development – Weeks Three and Four **(Last day to add/drop/elect CR/NC)**
	5	**LABOR DAY - NO LECTURE**
	7	Placentation
	9	Placentation
	12	Comparative Aspects of Vertebrate Embryology
	14	Integument Morphogenesis
	16	Integument Morphogenesis
	19	Musculoskeletal Morphogenesis – Trunk Skeleton
	21	Musculoskeletal Morphogenesis – Trunk Musculature
	23	Musculoskeletal Morphogenesis – Limb Skeleton
	26	Exam One
	28	Musculoskeletal Morphogenesis – Limb Musculature
	30	Musculoskeletal Morphogenesis – Head Skeleton **(Last day to withdraw)**
Oct.	3	Musculoskeletal Morphogenesis – Head Skeleton/Head Musculature
	5	Musculoskeletal Morphogenesis – Head Musculature
	7	Gut Morphogenesis – Pharynx and Respiratory System
	10	**FALL BREAK – NO CLASS**
	12	**FALL BREAK – NO CLASS**
	14	**FALL BREAK – NO CLASS**
	17	Gut Morphogenesis – Respiratory System
	19	Gut Morphogenesis – Digestive System
	21	Gut Morphogenesis – Digestive System **(Last day to withdraw)**
	24	Coelomic Partitioning and the Mediastinum
	26	Urogenital Morphogenesis – Urinary System
	28	Urogenital Morphogenesis – Urinary System

	31	Urogenital Morphogenesis – Reproductive System
Nov.	2	Urogenital Morphogenesis – Reproductive System
	4	Urogenital Morphogenesis – Reproductive System
	7	Exam 2
	8	Cardiovascular Morphogenesis – Angiogenesis
	11	Cardiovascular Morphogenesis – Heart Formation
	14	Cardiovascular Morphogenesis – Heart Formation
	16	Cardiovascular Morphogenesis – Arteries
	18	Cardiovascular Morphogenesis – Arteries/Veins
	21	Cardiovascular Morphogenesis – Veins/Lymphatics
	23	Cardiovascular Morphogenesis – Fetal circulation
	25	Thanksgiving Holiday – No Lecture
	28	Morphogenesis of the Nervous System – Foundations
	30	Morphogenesis of the Nervous System – Central Nervous System
Dec.	2	Morphogenesis of the Nervous System – Peripheral Nervous System **(Last day to reverse CR/NC)**
	5	Morphogenesis of the Nervous System – Eye
	7	Morphogenesis of the Nervous System – Ear
	9	**READING DAY - NO LECTURE**
	12	**FINAL COMPREHENSIVE WRITTEN EXAM, 10:30 AM -12:30 PM**

Instructor: Shawn Miller, Ph.D.
Email: smiller@biology.utah.edu (However, it is best to use Canvas messages to contact me)
Office Hours: TBD