



TEXAS COLLEGE
Division of Natural and Computational Sciences
Department of Biology
Course Syllabus for Spring 2023
BIOL– 4472 Vertebrate Embryology

COLLEGE MISSION

College is a Historically Black College founded in 1894, by the Colored Methodist Episcopal Church, now the Christian Methodist Episcopal Church (CME). Our mission continues to embody the principles of the Christian Methodist Episcopal Church. The College shall prepare students with competencies in critical and creative thinking related to the knowledge, skills, and abilities as defined in areas of study. Additionally, the College shall provide an environment to inspire intellectual, spiritual, ethical, moral, and social development, which empowers graduates to engage in life-long learning, leadership, and service.

Textbooks and or Electronic Site Required:

Developmental Biology by Scott Gilbert, 12th edition. Sinauer Publication ISBN:9781605358246

Required Readings/Resources:

- **Developmental biology. A decade of cloning mystique.** Cibelli J.Science. 2007 May 18;316(5827):990-2. doi: 10.1126/science.1143512.PMID: 17510352
- **Epigenetic regulation of gene expression: how the genome integrates intrinsic and environmental signals.** Jaenisch R, Bird A.Nat Genet. 2003 Mar;33 Suppl:245-54. doi: 10.1038/ng1089.
- **Frontiers in mammalian cell culture.** McKeehan WL, Barnes D, Reid L, Stanbridge E, Murakami H, Sato GH.In Vitro Cell Dev Biol. 1990 Jan;26(1):9-23. doi: 10.1007/BF02624149.
- **Potential of human twin embryos generated by embryo splitting in assisted reproduction and research.** Noli L, Ogilvie C, Khalaf Y, Ilic D.Hum Reprod Update. 2017 Mar 1;23(2):156-165. doi: 10.1093/humupd/dmw041.

Course Description: This course deals with structure, principles, and progress in vertebrate development. The chick, pig, and frog are used as vertebrate types.

Prerequisite: BIOL 2472

Purpose and Goals: The fundamental goal of vertebrate embryology is to provide a coherent description of the fundamental concepts, principles, and mechanisms of animal development, familiarity with basic experimental methods and laboratory models used in developmental biology research. Vertebrate embryology is replete with homology. The use of comparative vertebrate embryology is suggested as it is very similar to human development especially in earlier phases. This course will enhance critical thinking, analytical reasoning, stimulate research and learning (Institution goal: academic excellence).

By the end of the semester the student will be able to satisfactorily complete all the listed learning objectives with a minimum of 70% competency level based on the grade determination.

TEXAS COLLEGE OUTCOMES

1. Critical Thinking Skills
2. Communication Skills
3. Empirical and Quantitative Skills
4. Teamwork
5. Social Responsibility
6. Personal Responsibility

Furthermore, BIOL 4472 ensures the following institutional objectives:

1. Enhance communicative skills (oral and written)
2. Enhance critical thinking and technology skills
3. Enhance leadership abilities and spiritual awareness
4. Create opportunities for professional and post-graduate pathways

All learning objectives reflect the Texas College Core Values:

Academic Excellence: Developing a culture of curiosity and creativity that will challenge the frontiers of teaching/learning; stimulate research; raise the level of analytical reasoning and inquiry; and enable students to acquire leadership, human relations, communication, and technology skills.

Integrity: Instilling the pursuit of character, honesty, and sincerity of purpose as the moral rubrics upon which the behaviors of our graduates and College family are anchored.

Perseverance: Implanting diligence, enterprise, and pride in the application of skills, knowledge and abilities developed during the course of study at Texas College.

Social Responsibility: Promoting in the College community a conscious awareness that we are all stewards of the resources entrusted to our care.

Tolerance: Emphasizing openness to divergent points of view, applying an eclectic approach to rational and analytical thinking.

Community Service: Encouraging self-extension in service to others as the heart and soul of our educational enterprise.

Tentative Lecture Schedule

Week	Chapter Sr #	Chapter	Activities and Due Dates	Contact Hours
1		Introduction	Syllabus Pretest	Total hours – 12
2	1	The Making of a Body and a Field: Introduction to Developmental Biology An Overview of Early Animal Development A Basic Approach to Watch Development	Lecture, Discussion Safety Lab	Total hours – 12
3	1	Making New Bodies: Mechanisms of Developmental Organizations Evolutionary Embryology Personal Significance: Medical Embryology and Teratology	Lecture, Discussion, Lab Assignment Class Assignment	Total hours – 12

4	3	Differential Gene Expression: Mechanisms of Cell Differentiation Evidence for Genomic Equivalence Anatomy of the Gene Mechanisms of Differential Gene Expression: <i>Transcription</i>	Chapter 1 test Lecture, Discussion, Lab Assignment Class Assignment	Total hours – 12
5	3	Differential Gene Expression: Mechanisms of Cell differentiation <i>Pre-messenger RNA Processing</i> <i>mRNA Translation</i> Mechanisms of Differential <i>Posttranslational Protein</i> <i>Modification</i>	Lecture, Discussion, Lab Assignment Class Assignment	Total hours – 12
6	3	Differential Gene Expression: Mechanisms of Cell differentiation <i>Pre-messenger RNA Processing</i> <i>mRNA Translation</i> Mechanisms of Differential <i>Posttranslational Protein</i> <i>Modification</i>	Lecture, Discussion, Lab Assignment Class Assignment	Total hours – 12
7		Midterm		Total Hours 12
8	7	Fertilization: Beginning a New Organism Structure of the Gametes External Fertilization in Sea Urchins	Lecture, Discussion, Lab Assignment Class Assignment	Total hours – 12
9	7	Fertilization: Beginning a New Organism: Internal Fertilization in Mammals	Lecture, Discussion, Lab Assignment Class Assignment	Total hours – 12
10	11	Amphibians and Fish: Early development and axis formation Fertilization, Cortical Rotation, and Cleavage Amphibian Gastrulation Progressive Determination of the Amphibian Axes	Chapter 7 Test Lecture, Discussion, Lab Assignment Class Assignment	Total hours – 12

11	11	<p>Amphibians and Fish: Early development and axis formation</p> <p>The Work of Hans Spemann and Hilde Mangold: Primary Embryonic Induction</p> <p>Molecular Mechanisms of Amphibian Axis Formation</p> <p>Regional Specificity of Neural Induction along the Anterior-Posterior Axis</p> <p>Specifying the Left-Right Axis</p>	Lecture, Discussion, Lab Assignment Class Assignment	Total hours – 12
12	12	<p>Birds and Mammals: Early development and axis formation</p> <p><i>Early Development in Birds</i></p> <ul style="list-style-type: none"> • Avian Cleavage • Gastrulation of the avian embryo • Axis specification and the avian “organizer” • Left-right axis formation 	Chapter 11 Test Lecture, Discussion, Lab Assignment Class Assignment	Total hours – 12
13	12	<p>Birds and Mammals: Early development and axis formation</p> <p>Early Development in Mammals</p> <ul style="list-style-type: none"> • Mammalian cleavage • Trophoblast or ICM? The first decision of the rest of your life • Mammalian gastrulation • Mammalian axis formation • Twins 	Lecture, Discussion, Lab Assignment Class Assignment	Total hours – 12
14	21	Birth Defects, Endocrine Disruptors, and Cancer	Lecture, Discussion, Lab Assignment Class Assignment	Total hours – 12
15		Final Exam	Apr 15-19	Total hours – 12
	Total reading hours— 60 (4	Total participation hours— 120 (4 credit hour course)	Total Student Contact Hours TOTAL—180.0 (4 credit- hour course)	180 hours

	credit hour course)			
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Measurable Student Learning Outcomes (MSLO):

After completion of the course, students will be able to demonstrate the understanding of

1. Have acquired knowledge and comprehension in the field of vertebrate embryology: life cycles and stages of animal development, principles of anatomical embryology, principles of experimental embryology (at the cellular, genetic and molecular signaling levels), (TC 1, 2 and 4)
2. Characteristics of the early development of amphibians, birds and mammals (TC 1, 2 and 4)
3. Demonstrate practical ability in the study of vertebrate embryos in the laboratory. (TC 1, 2 and 4)

By the end of the semester, the student will be able to satisfactorily complete all the listed students learning objectives with the aid of lecture notes at a minimum of 70% competency level.

Roles and Responsibilities: Students and Faculty

This class comes with expectations for college-level students. Failure to meet these expectations can result in a lower grade, and even expulsion from the class.

1. Class will begin promptly at the beginning of each class period. If you are late you forfeit your right to enter class.
2. Cell phones and Laptops must be turned off during class, unless advised otherwise by the instructor. Any student who violates this policy and leaves class to answer a phone call will not be readmitted to the class.
3. Sleeping in class will not be tolerated. If you violate this rule you will be asked to leave class. You will be asked to meet with the instructor before returning to class.
4. Classroom Attire: Students are expected to follow the College dress code. Students dressed inappropriately will be dismissed with an unexcused absence for the day.
 - Female students are required to wear covering over the upper portions of their bodies.
 - Low-cut blouses are prohibited.
 - Back-out tops, blouses and t-shirts are prohibited.
 - Micro-mini shorts that expose the buttocks are prohibited.
 - Any dress, shirt, short, etc., that distracts from the teaching/learning process in the classroom is prohibited.
 - Caps, head gear, du rags are prohibited within the buildings.
 - Male students are not permitted to wear shaggy pants.
 - Male students are not permitted to wear sleeveless/muscle shirts in the classrooms or on campus.
 - Male students are required to wear a belt with pants.
 - Shoes are required in the classroom and cafeteria.
 - No house shoes are permitted on campus.
5. If you leave class during an exam, you will not be allowed to complete the exam. You do have the option of taking the makeup exam which is always an essay exam.
6. Missed assignments may only be made up with an Excused Absence. Students with excused absences have one week to make up their work, otherwise the grade will be entered as a zero. Excused Absences are:
 - a. Personal illness or illness of an immediate family member **with a doctor's statement.**
 - b. Death of an immediate family member **with the funeral program.**
 - c. Patriotic Duty (jury, or military duty, or court appearance) **with a copy of the summons.**
 - d. Co-curricular or extra-curricular obligations to the College (athletics, conferences, seminars, performances) **with a written notice from the Office of Academic Affairs.**

All makeup exams and assignments are given during office hours. Students are responsible for it.

7. Late assignments will be given 70% of the earned grade.
8. **Inclement Weather:** The President of Texas College makes the decision and announces when classes are canceled due to inclement weather. If in doubt, check your Texas College email, or the Texas College website.
9. **Attendance:** It is unlikely that students will earn an acceptable grade if they do not attend class regularly. Attendance is recorded for each class. Attendance alone does not guarantee a passing grade. It is important that students take complete and comprehensive notes during lectures. It is also essential that students study regularly.

10. **Academic Ethics:**

Texas College may initiate disciplinary proceedings against a student accused of scholastic dishonesty. At the minimum the student, or all students involved, will fail the assignment or exam.

Scholastic dishonesty includes, but is not limited to, statements, acts, or omissions related to applications for enrollment or award of a degree, and/or the submission as one’s own work material that is not one’s own. Scholastic dishonesty may involve, but is not limited to, one or more of the following acts: cheating, plagiarism, collusion, use of annotated texts or teacher’s editions, and/or falsifying academic records.

Plagiarism is the use of an author’s words or ideas as if they were those of the student without giving credit to the source, including, but not limited to, failure to acknowledge a direct quotation.

Cheating is the willful giving or receiving of information in an unauthorized manner during an examination, illicitly obtaining examination questions in advance, copying computer or internet files, using someone else’s work for the assignments as if it were one’s own, or any other dishonest means of attempting to fulfill the requirements of a course. **Cheating during the test/exam will result in a grade of zero for the exam.**

Collusion is intentionally aiding or attempting to aid another in an act of scholastic dishonesty, including but not limited to, providing a paper or project to another student; providing an inappropriate level of assistance; communicating answers to a classmate during an examination; removing tests or answer sheets from a test site, and allowing a classmate to copy answers and signing the role for an absent student.

PROGRAM FOR WHICH THE COURSE IS REQUIRED

Vertebrate Embryology is a requirement for Biology Majors which leads to a Bachelor of Science (BS) Degree in Biology.

METHOD OF STUDENT EVALUATION

For the assessment of each objective, multiple choice, short answer, fill-in-the blank, true/false and matching questions test will be given. Application activities will be given for each objective.

1. Lecture -----70%

- Chapter exams: 100 points each;
- Final exam: 200 points
- Worksheets/class quizzes/Scenarios from textbook 100 points each
- QEP Assignment – Writing Assignment
- Kahoot Challenges- 10 points each

Attendance 5%

2. Laboratory assignments-----25%

Lab assignment: 100 points each

QEP Assignment 1: consists of a five-paragraph essay. The first essay will be on “Impact of recreational drugs and alcohol on the development of Fetus.

Grading Rubric:

90-100	A	Transformative (and submitted on time)
80-89	B	Proficient

70-79	C	Developing
60-69	D	Beginning
Below 60	F	Not Submitted

*Grade of C or above is required to pass the course. The course must be repeated for Biology Majors if grade is a D or below.

Instructional Strategies to better support achievement in STEM courses:

- In class Discussion
- In class Presentations and handouts
- Relevant videos
- Hands on Project
- Real world applications
- Collaborative Problem Solving
- Resources for Independent learning

RUBRICS FOR GRADING WRITTEN ASSIGNMENTS FOR BIOL 2423

	Excellent (5)	Satisfactory (4-3)	Not Satisfactory (2-1)
Content	Clear topic and many interesting details	Somewhat clear topic and some mildly interesting details	Topic not clear and few details
Organization	Details and sequences are clearly evident	Details and sequence are evident but not clear	Details and sequence are not evidence (jumbled/confused)
Fluency	Written in natural language	Some natural and patterned language	Unnatural language patterns
Mechanics	Very few errors (90%) spelling grammar and usage capitalization punctuation	Majority conventions correct (80%) spelling grammar and usage capitalization punctuation	Frequent errors (70% correct) spelling grammar and usage capitalization

Remediation Plan:

Students who have difficulty with the course will have the opportunity to:

- Meet with the professor for one-on-one support through fact-to-face meetings, telephone sessions, or web conferencing.
- Revise unsatisfactory work until it is satisfactory with in a 7-day limit.

DIVERSITY STATEMENT

Texas College is committed to creating a community that affirms and welcomes persons from diverse backgrounds and experiences and supports the realization of their human potential. We recognize that there are differences among groups of people and individuals based on ethnicity, race, socioeconomic status, gender, exceptionalities, language, religion, sexual orientation, and geographical area. All persons are encouraged to respect the individual differences of others.

DISABILITIES AND SPECIAL NEEDS

Texas College provides equal opportunity to qualified disabled persons in accordance with the requirements of the American with Disabilities Act (ADA). This Act ensures that individuals with current disabling conditions are provided reasonable accommodations to enable them to enjoy the programs, activities, services, and employment opportunities offered by the College. Texas College adheres to this provision once a student/employee self identifies. Students may contact the Office of Academic Affairs for information/assistance at: adasupport@texascollege.edu .

NOTICE OF NON-DISCRIMINATION

Texas College does not discriminate in any employment practice, education program, or educational activity on the basis of race, color, religion, national origin, sex, age, disability, sexual orientation, or veteran status. The Vice President for Academic Affairs has been designated to handle student inquiries regarding non-discrimination policies. Contact information is: Texas College, Attn: Vice President for Academic Affairs, Office of Academic Affairs/Martin Hall 1st floor, 2404 North Grand Avenue, Tyler, Texas 75702.

Netiquette:

All students in the online class must strictly observe the standards of polite online communication know as netiquette. Online learning requires that everyone in the course (both students and professors) work together and share their ideas. Since we are not meeting face to face, it is expected that you foster a respectful environment when you are sharing your ideas.

WITHDRAWAL POLICY

Withdrawal from a course is the student's responsibility. Refer to the Texas College Academic Policies and Responsibilities for additional information on the College's withdrawal policy. April 12th is the last day to withdraw from the class.

BIOLOGY PROFESSIONAL ORGANIZATIONS/ASSOCIATIONS

Professional Associations are a great source of information about internships, career pathways, conferences, scholarships, opportunities to meet people in your field, and a whole host of career-related topics. Usually associations will provide a discounted membership rate for students enrolled in college. A few of these organizations include:

- [American Academy of Forensic Sciences](#)
- [American Association for the Advancement of Science](#)
- [American Institute of Biological Sciences](#)
- [The American Physiological Society](#)
- [American Society for Biochemistry and Molecular Biology](#)
- [American Society of Crime Laboratory Directors](#)
- [American Society for Human Genetics](#)
- [American Society for Microbiology](#)
- [Association for Women in Science](#)
- [The International Association for Science, Technology and Society](#)
- [National Academy of Science](#)
- [Human Genetic Modification | Center for Genetics and Society](#)

CAVEAT

In the event of extenuating circumstances, the schedule and requirements for this course may be modified.