DE LA SALLE UNIVERSITY   
**College of Science**

Department of Biology

**LBYBIO4**-Vertebrate Embryology Laboratory

Prerequisite: *COMPANA, LBYBIO3, LBYBIO1* Prerequisite to: none

**Instructo**r: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Contact details**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Consultation Hours**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Class Schedule and Room**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **Course Description** |

Vertebrate embryonic development is studied in the laboratory with frog, chick and pig as representative animals. The course emphasizes actual observations of slide sections and integration with patterns and mechanisms of development.

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| **Learning Outcomes** |

On completion of this course, the student is expected to present the following learning outcomes in line with the Expected Lasallian Graduate Attributes (ELGA).

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| **ELGA** | **Learning Outcome** |
| Critical and Creative Thinker  Effective Communicator  Lifelong Learner  Service-Driven Citizen | On the completion of the course, the student is expected to describe and identify the different stages of embryonic development and compare and contrast the patterns of development in vertebrates and also to further improve their appreciation and respect of life. |

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| **Final Course Output** |

As evidence of attaining the above learning outcomes, the student is required to submit the following during the indicated dates of the term.

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| **Learning Outcome** | **Required Output** | **Due Date** |
| On the completion of the course, the student is expected to describe and identify the different stages of embryonic development and compare and contrast the patterns of development in vertebrates and also to further improve their appreciation and respect of life. | Group Research Proposal | Finals Week |

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| **Rubric for assessment** |

1. **Group Experimental Work and Presentation of Results**

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| **Criteria** | **Neurula**  **(3.5-4.0)** | **Gastrula**  **(2.5-3.4)`** | **Blastula**  **(1.5-2.4)** | **Zygote**  **(1.0-1.4)** |
| **Set Objectives**  **(30%)** | Objectives were set from the start of the experiment/presentationand were reviewed at the end if it were achieved.  Moreover, the group highlighted the significance of the reports of the course. | Objectives were set from the start of the experiment/  presentation, and were reviewed at the end if it were achieved. | Objectives were set from the start of the experiment/  presentation, but were not reviewed at the end if it were achieved. | No objectives were set from the start of the experiment/  presentation. |

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| **Content of Experiment/**  **Presentation**  **(30%)** | New information were learned from the experiment/ presentation, and was easy to understand.  Moreover, the presentation was concise. | New information was learned from the experiment/  presentation and was easy to understand. | New information was learned from the experiment/  presentation but was hard to understand. | No new information was learned from the experiment/ presentation. |
| **Overall Performance**  **(20%)** | The group presented their results clearly and made sure everyone in class understood the information they were sharing. Moreover, they were very enthusiastic and knowledgeable of their report. | The group presented their results clearly and made sure everyone in class understood the information they were sharing. However they were not very enthusiastic or knowledgeable of their report. | The group presented their results but lacked clarity and fell short to make sure everyone in class understood the information they were sharing. Enthusiasm and knowledgeability were low | The group presented their results very unclearly and made no effort so everyone in class understood the information they were sharing. Moreover, had no enthusiasm and were not knowledgeable of their report. |
| **Multimedia**  **(20%)** | The report was creatively and uniquely presented, with the aid of the computer.  Moreover, it kept everyone attentive. | The report was creatively and uniquely presented with the aid of the computer. | The report was ordinary and very standard, but was aided by the computer. | The report was dull and boring. |

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| **Additional Requirements** |

* Active individual participation in ALL laboratory activities.
* Submission of individual output or laboratory exercises.
* Participation in and submission of group output (Research Proposal)
* Five (5) Long Exams (Move Stations Type)

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| **Grading System** | | |
| 5 Long Exams 90%  Group Research Proposal 5%  Attendance/Performance 5%  **Total 100%**  **Passing Grade 60%** | **Scale:**    92-100% 4.0  86-91% 3.5  80-85% 3.0  75-79% 2.5  70-74% 2.0  65-69% 1.5  60-64% 1.0  <60% 0.0 |

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| Learning Plan |

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| **Learning Outcome** | **Laboratory Activities** | **Week** | **Learning Activities** |
| On the completion of the course, the student is expected to describe and identify the different stages of embryonic development and compare and contrast the patterns of development in vertebrates and also to further improve their appreciation and respect of life. | **Mitosis**  **Gametogenesis**  Testis (Frog’s and mouse’s)  Ovary (Frog’s and cat’s) | 1 | Microscopic examination of prepared slides |
| **Stages of Early Ontogenic Development**  Cleavage  Blastula  Gastrula  Neurula  Neural plate  Neural fold  Neural tube | 2 | Microscopic examination of prepared slides |
| **Amphibian Development**  **(Frog as animal model)**  4 mm serial sections  10 mm serial sections | 2 | Microscopic examination of prepared slides |
| **1st Long Exam** | 3 | Move Stations Type |
| **Avian Development**  **(Chick as animal model)**  Whole-mounted samples  18 hr stage - wm  24 hr stage – wm  33 hr stage – wm  Serial section samples  24-hr serial sections  33-hr serial sections | 4 | Microscopic examination of prepared slides |
| Whole-mounted samples  48 hr stage – wm  72 hr stage – wm  96 hr stage – wm | 5 | Microscopic examination of prepared slides |
| **2nd Long Exam** | 6 | Move Stations Type |
| Serial section samples  48-hr serial sections  72-hr serial sections | 7 | Microscopic examination of prepared slides |
| **3rd Long Exam** | 8 | Move Stations Type |
| **Mammalian Development**  **(Pig as animal model)**  - Nervous System  - Digestive System  - Respiratory System | 9-10 |  |
| **4th Long Exam** | 11 | Move Stations Type |
| - Urogenital System  - Circulatory Sytem  Heart  Arterial System  Venous System | 12-13 | Microscopic examination of prepared slides |
| **5h Long Exam** | 14 | Move Stations Type |

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| **References** |

Appasani, K. and R. Appasani. 2011. Stem Cells & Regenerative Medicine (electronic resource) : From Molecular Embryology to Tissue Engineering . Totowa, NJ: Humana Press

Desalle, R. and B. Schierwater. 2011. Key transactions in animal evolution. Enfield, New Hampshire:

Science Publishers

Kubiak, J. 2011. Cell Cycle in Development (electronic resource). Berlin, Heidelberg: Springer

Berlin Heidelberg.

Poole, D., Warren, A. and N. Nunez. 2007. The Story of human development. Upper Saddle River, NJ:

Pearson/Prentice Hall.

**Schoenwolf, G. 2009. Laboratory studies of vertebrate and invertebrate embryos: guide and atlas of**

**descriptive and experimental development. San Francisco : Benjamin Cummings (REQUIRED TEXT)**

Wolpert, L. and C. Tickle. 2011. Principles of Development. Oxford: Oxford University Press

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| **Online Resources** |

For supplementary purposes only. Prelab lectures, the required text Schoenwolf, and the actual observations of the slides in class will be the definitive bases of all the Long Exams.

Frog testis: <http://home.cse.edu/~ikessler/emb/tutorials/frogtestis/indexfrogtestis.html>

4mm frog: <http://nte-serveur.univ-lyon1.fr/nte/embryon/www.uoguelph.ca/zoology/devobio/34mmfrog/db34fg1.htm>

10mm frog: <http://nte-serveur.univ-lyon1.fr/nte/embryon/www.uoguelph.ca/zoology/devobio/57mmfrog/db57fg1.htm>

24hr chick: <http://www.tulane.edu/~embryo/24hrChick/24hrChick.htm>

33hr chick: <http://www.tulane.edu/~embryo/33hrchick/33hrChick.htm>

48hr chick: <http://www.tulane.edu/~embryo/48hrchick/48hrMain.html>

72hr chick: <http://www.tulane.edu/~embryo/72hrChk/72htmlpages/72hrMain.html>

10mm pig: <http://www.tulane.edu/~embryo/10mmPig/10mmhtmlpages/10mmMain.html>

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| **Class Policies** |

* Honesty and integrity are integral components of the academic process. Any form plagiarism is strongly prohibited.
* University policies on dishonesty, absences, and tardiness are strictly followed.
* Wearing of laboratory gown is required during laboratory period, as stipulated in policy on laboratory classes.
* Proper decorum is to be observed among peers in all activities.
* Attentiveness and active participation are critical to successful learning.
* The use of cameras is allowed only on the class meeting immediately prior to the scheduled examination (designated as the review session).
* No make-up exam for non-officially excused absence. Pass/Fail Policy will be observed for Vice Dean certified absences, except for University sanctioned absences like Varsity competition.

Approved by:

DR. MARY JANE C. FLORES

Chair, Department of Biology