Global Learning Semesters
Course Syllabus
Course: BIOL-315 Developmental Biology and Human Embryology
Department: Health and Life Sciences
Host Institution: University of Nicosia, Nicosia, Cyprus

Course Summary		
Course Code	**Course Title**	**Recommended Credit Hours**
BIOL-315	Developmental Biology and Human Embryology	4
Semester Offered	**Contact Hours**	**Prerequisites**
Please contact us	42-45	BIOL-105, BIOL-106, BIOL-205
Department	**Level of Course**	**Language of Instruction**
Health and Life Sciences	Upper Division	English

Course Description

This course presents developmental biology as an ongoing process of investigations by focusing on the classical methods of analysis of the stages of embryonic development from gametogenesis to histogenesis. The student is also introduced to the genetic and molecular analysis of development and how classical and modern methods are used for the investigation of long standing problems in development. The part of the course on human embryology introduces the student to the molecular and mechanistic basis of human development with classic descriptive embryology. The format of the course is 3h/week lectures and one 3h laboratory session per week.

Prerequisites

BIOL-105, BIOL-106, BIOL-205

Topic Areas

1. Analysis of Development; The Role of Cells in Development (models: the slime mold; the sea urchin).
2. Stages of animal development: Gametogenesis, Fertilization, Cleavage; Cell Fate, Potency and Determination (Xenopus)
3. Genomic Equivalence and the Cytoplasmic Environment; Cytoplasmic Determinants, Axis Formation and Mesoderm Induction (Xenopus)
4. Gastrulation; Cell Adhesion and Morphogenesis (Xenopus/Chick)
5. Early human development (gametogenesis, fertilization, blastogenesis)
6. Neurulation and Axis Induction, Ectodermal, Endodermal and Mesodermal Organs (Xenopus/Chick)
7. Development of the central and peripheral nervous systems in the human embryo
8. Organogenesis-heart development in the vertebrate body plan
9. The fetal period (limb, muscle, skin and blood development)
10. The genetic core of development; differential gene expression; Mutants and Transgenic Organisms in the Analysis of Development
11. The germ cell line; Cell Differentiation and cell death
12. Pattern Formation and Embryonic Fields, Pattern Formation in the Drosophila Embryo
13. The Role of Hox Genes in Vertebrate Development
14. Human Birth defects

Laboratory Exercises

In a 3h/week laboratory experience the student is exposed to the basis of developmental biology through the study of various experimental models including the slime mold, the sea urchin, the frog, the chick embryo and planarian. This experience includes hands-on experiments which are complemented with slide observations and CD/video projections. Human embryology is studies through case studies and video projections.

1. Cellular slime molds (Dictyostelium discoideum)
2. Observations and Experiments on the Living Frog Embryo
3. Patterns of Frog Development
4. Extirpation Experiments, Transplantations, and Parabiosis
5. Dissociation and Reaggregation of Amphibian Embryonic Cells
6. The Primordial Germ Cells of the Frog
7. Experimenting with Xenopus Development
8. Patterns of Chick Development; The human embryo (from conception to birth)
9. In Vitro Culture of Chick Embryos and Embryonic Heart Duplication
10. Surgery on the Chick Embryo
11. Chorioallantoic Membrane Grafting
12. Planarian regeneration
13. Case studies of human birth defects; in vitro fertilization

Readings and Resources

Required Textbooks

1. Developmental Biology by Scott F. Gilbert Publisher: Sinauer Associates, Inc.; 7th edition (March 4, 2003) ISBN: 0878932585

2. Human Embryology and Developmental Biology by Bruce Carlson Publisher: C.V. Mosby; 3rd edition (February 20, 2004) ISBN: 0323014879

3. Patterns And Experiments In Developmental Biology, Third Edition by Leland G. Johnson, E. Peter Volpe, Publisher: McGraw-Hill Science/Engineering/Math; 3rd edition (January 22, 2001) ISBN: 0072379650

Recommended Textbooks

1. Analysis Of Biological Development, Second Edition by Klaus O. Kalthoff, Publishers: McGraw-Hill, 2000, ISBN: 0-07-092037-0

2. Principles of Development by L. Wolpert, Rosa Beddington, Jeremy Brockes, Thomas Jessell, Peter Lawrence, Elliot Meyerowitz, Bruce C. Wolpert Publisher: Oxford University Press; (January 1998) ASIN: 019850263X

3. Genomic Regulatory Systems: Development and Evolution by Eric H. Davidson Publisher: Academic Press; 1st edition (February 15, 2001) ISBN: 0122053516

4. Genes & Signals by Mark Ptashne, Alexander Gann Publisher: Cold Spring Harbor Laboratory; 1st edition (November 13, 2001) ISBN: 0879696311

5. Signal Transduction by Bastien Gomperts, Ijsbrand M. Kramer, Peter E. R. Tatham, Bastien D. Gomperts (Editor), M. Kramer Ijsbrand, Ijsbrand Kramer, Peter Tatham Publisher: Academic Press; (March 2002) ISBN: 0122896319

6. Developmental Biology & Tyler: Differential Expressions: Key Experiments in Developmental Biology (Book W/CD-ROM Package) with CDROM by Gilbert, Scott F. Gilbert, Mary S. Tyler Publisher: Sinauer Associates (March, 2003) ISBN: 0878932615

7. Developmental Biology: A Guide for Experimental Study by Mary S. Tyler Publisher: Sinauer Associates; 2nd edition (March 1, 2000) ISBN: 0878938435

8. Human Embryology by William J., Phd Larsen, Lawrence S., Phd Sherman, S. Steven, Phd Potter, William J., Phd Scott, Lawrence S. Sherman, S. Steven Potter, William J. Scott, William J. Larsen Publisher: Churchill Livingstone; 3rd edition (June 8, 2001) ISBN: 0443065837

9. Human Embryonic Stem Cells: An Introduction to the Science and Therapeutic Potential by Ann A. Kiessling, Scott. C. Anderson Publisher: Jones and Bartlett Publishers, Inc. (March 31, 2003) ISBN: 076372341X