



# UNIVERSITY OF NICOSIA ΠΑΝΕΠΙΣΤΗΜΙΟ ΛΕΥΚΩΣΙΑΣ

University of Nicosia, Cyprus

<b>Course Code</b> BIOL 301	<b>Course Title</b> Developmental Biology and Human Embryology	<b>ECTS Credits</b> 8
<b>Department</b> Life and Health Sciences	<b>Semester</b> Fall, Spring	<b>Prerequisites</b> Biol 206 – Human Anatomy and Physiology II
<b>Type of Course</b> Required	<b>Field</b> Human Biology	<b>Language of Instruction</b> English
<b>Level of Course</b> 1 <sup>st</sup> Cycle	<b>Year of Study</b> 3 <sup>rd</sup>	<b>Lecturer</b> Dr Edna Yamasaki Patrikiou
<b>Mode of Delivery</b> face-to-face	<b>Work Placement</b> N/A	<b>Co-requisites</b> None

## Objectives of the Course:

This course aims to provide the framework for further specialized studies on cell differentiation, human development and embryology, and to train students in developmental biology research techniques. The main objectives of the course are to:

- Examine and discuss the major ideas, current experimental approaches to cell and developmental biology and ethical considerations.
- Review and compare the invertebrate and vertebrate models used to study developmental biology and embryology.
- Use examples to discuss in depth the mechanisms and factors for cell interactions and differentiation during embryonic development.
- Provide students the opportunity to develop specialized laboratory skills to study development through experimentation and to practice in assessing and reporting results from the analysis of experimental data.
- Introduce and discuss state-of-the art research in the area of developmental biology.

## Learning Outcomes:

After completion of the course students are expected to be able to:

1. Compare and discuss the classical methods of analysis of the stages of development and be aware of classic descriptive embryology.
2. Identify and discuss the genetic and molecular basis of human development.
3. Identify and describe the processes and mechanisms operating during human development
4. Critically compare and evaluate the use of experimental models to study

- developmental biology.
5. Practice laboratory skills used in addressing developmental questions.
  6. Use research literature to relate and assess experimental data.
  7. Identify and discuss ethical issues related to genetic determinism and the use of animal models in science research.

### **Course Contents:**

#### **Early Development**

1. Developmental models
2. Gametogenesis; Fertilization; Cleavage and Implantation
3. The Molecular Basis of Embryonic Development; Developmental Genes and Cancer
4. Formation of Germ Layers; Induction of the nervous system.
5. Developmental Disorders

#### **Development of the Body Systems**

6. Integumentary, Skeletal and Muscular Systems
7. Limb Development
8. Nerve cell differentiation and Development of Neural Function
9. Neural Crest
10. Sense Organs; Eye; Ear
11. Digestive and Respiratory Systems and Body Cavities; Urogenital System
12. Cardiovascular System; Fetal Circulation
13. Fetal Growth, Physiology and Birth; Parturition; Adaptations to Postnatal Life

### **Laboratory Sessions:**

1. In Vitro Fertilization
2. Mouse and Frog Embryonic Developmental Stages
3. Effects of Caffeine, Theophylline, Nicotine and Ethanol in the developing chick embryo
  - a. Acute effects on heart rate
  - b. Long term effects on heart rate
  - c. Phenotypical effects on the embryonic development
4. Immunohistochemistry of developmental markers in the chick embryo
  - a. Embryo preparation – treatment, dissection, fixation, sectioning
  - b. Primary antibodies
  - c. Secondary antibodies and visualization
5. Western blot analysis of developmental markers
  - a. Protein extraction, quantification
  - b. Gel electrophoresis and blotting
  - c. Protein visualization, quantification
6. Phenotypic effects on the embryonic development

### **Learning Activities and Teaching Methods:**

Lectures; Laboratory sessions; Demonstrations/slides/video projections Cooperative activities.

**Assessment Methods:**

Laboratory reports, Assignments, Tests and Mid-term Exam; Final Exam
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**Required Textbooks/Reading:**

<b>Authors</b>	<b>Title</b>	<b>Publisher</b>	<b>Year</b>	<b>ISBN</b>
B. Carlson	Human Embryology and Developmental Biology	Mosby	2008, 4th ed.	ISBN-13: 978-0-323-05385-3 ISBN-10: 0-323-05385-8

**Recommended Textbooks/Reading:**

<b>Authors</b>	<b>Title</b>	<b>Publisher</b>	<b>Year</b>	<b>ISBN</b>
1. SF Gilbert	Developmental Biology	Sinauer Associates	2006, 8 <sup>th</sup> ed	ISBN-10:087893250X
2. M.S. Tyler	Developmental Biology: A Guide for Experimental Study	Sinauer Associates	2000, 2nd ed.	ISBN: 0878938435