

# **Evolutionary, Developmental and Regenerative Biology**

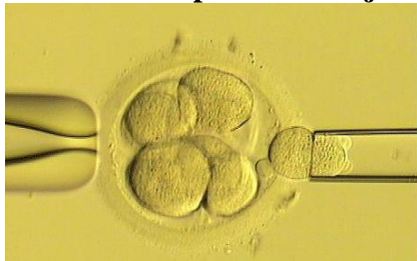
## **Fall 2017**

### **ZOO 3603C**

**Lectures: Tuesdays & Thursdays, period 2 (8.30am – 9.20am).**  
**Location: MCCB (McCarthy Hall B) room G086**

**Laboratories: Mondays, Tuesdays, Wednesdays.**  
**Section 16D1 – Mondays, periods 7-9 (1.55 – 4.55)**  
**Section 16C6 – Tuesdays, periods 7-9 (1.55 – 4.55)**  
**Section 16C9 – Wednesdays, periods 4-6 (10.40 – 1.40)**  
**Location: Carr Hall 109 (Biology Department)**

#### **Course description and objectives**



Surely the most amazing process in biology is the development of a complex adult organism such as a human from a single cell, the fertilized egg. The egg divides to give many millions of cells and these form structures as complex and varied as eyes, arms, heart and brain. How does it do this unbelievable feat of organization? How do the cells arising from early division become different from each other? What controls the behavior of individual cells so that highly organized patterns emerge? How are the organizing principles of development embedded in the DNA of our cells and how is this translated into pattern formation?

This course is designed to answer these exciting questions by studying the developmental principles we see in various organisms – invertebrates such as the fruit fly *Drosophila*, lower vertebrates such as fish and frogs and higher vertebrates such as birds and mammals. The development of individual organ systems such as the brain, the eye and the limbs will also be studied to draw together principles of organization. Amazingly we find that the same signaling pathways are used time and again to turn an apparently homogeneous group of cells into a structure such as a limb or a brain.

By studying the development of these different animal systems we can also draw together principles of development which have stood the test of evolutionary time. Evolution acts on the developing embryo, not on the adult organism which is why the study of development is so important for understanding how evolution works. As an example of this process we will consider how fish came onto land, turned their fins into limbs and became the first land tetrapods.

In addition the course also includes a consideration of the regeneration of complex organ systems such as the limb and the principles involved in this process. Questions such as what is the role of stem cells in complex regeneration, can cells lose their differentiated state and begin

development again will be asked. This will lead us into the medical world of the role that stem cells play in regenerative medicine.

The course consists of two lectures per week and one lab session per week where students can both observe and experiment on embryos. The labs will also test out the experience of on-line labs and compare them to the experience of reality labs. There will be four exams of short answer questions throughout the course and three assignments which will consist of two essays and the writing of a scientific paper based on the result obtained in one of the laboratory experiments. Students will also make presentations on a subject of their choice from a list of relevant topics.

**Course requirements:** Consistent and punctual attendance to all parts of the course is expected and required and a component of the marks is specifically laid aside for this.

**Instructor:** Malcolm Maden

Professor

Department of Biology

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Office Hours: Wednesdays, 9.30 -10.40am

**Teaching Assistants:**

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Francisca Leil – [fleil@ufl.edu](mailto:fleil@ufl.edu)

**Required text:**

‘Developmental Biology’ by Scott Gilbert, 11<sup>th</sup> edn. Sinauer Associates. This is an excellent textbook with multiple websites for more information, videos etc. Older editions are perfectly acceptable.

**Lectures, handouts and supplemental readings:**

Lectures will be posted on the course website on Canvas at least the day before class and it is expected that you will either print the appropriate handouts and bring them to class with you or follow them on Canvas. Laboratory worksheets will also be available on the course website.

Additional reading papers will be posted the previous week.

**Examinations and grading:**

Final grades will be determined by a combination of exams, written assignments, attendance at lectures and labs and participation in the course.

Exams 1, 2, 3 & 4 @ 120 points each           480

Assignments 1, 2 & 3 @ 120 each           360

Laboratory write-ups                           100

Participation                                   60

**Total**   **1000**