Summary
The students will learn essentials of cell and developmental biology, with an emphasis on animal model systems and quantitative approaches.

Content
The students will be introduced to fundamental concepts and questions in cell and developmental biology, with an emphasis on animal model systems and quantitative approaches to analyze them. Topics that will be covered include fertilization, cell polarity, genome activation, patterning, axis specification, differentiation, gastrulation, scaling, organogenesis, size control, regeneration, cell death, germ cell specification, cell migration, multicellularity and evolution. Students will learn that developmental systems must have the correct constituents (the what question), positional information (the where question), temporal information (the when question), as well as appropriate relationships between genes, cells, tissues and organisms (the how questions). Parallels will be drawn between various concepts familiar to engineers and developmental systems to highlight underlying guiding principles.

Keywords

Learning Prerequisites
Required courses
Second year Life Sciences BSc, but motivated and equally prepared students from other disciplines are welcome to join.

Learning Outcomes
By the end of the course, the student must be able to:

• Explain principles in cell and developmental biology
• Establish parallels between engineering and development
• Model developmental processes
• Assess / Evaluate strengths and weaknesses of different model systems and approaches
• Draw conclusions from experimental data
• Propose experiments to address an important outstanding issue

Transversal skills
• Demonstrate a capacity for creativity.
• Demonstrate the capacity for critical thinking
• Summarize an article or a technical report.
• Take feedback (critique) and respond in an appropriate manner.

Teaching methods
Each week, typically the first two hours will consist of lectures given by the teachers, whereas the next two hours will consist of reading, demonstrations and/or exercises, including computer simulations (depending on the week).

Expected student activities
The students are expected to participate actively in all four hours of class. Moreover, four hours of personal study per week are expected on average.

Assessment methods
Two continuous evaluations will be performed during the semester (in week 7 and week 14); details of the exam format will be provided in due time.

Supervision
Office hours No
Assistants Yes
Forum No
Others Appointments with the teachers by e-mail.

Resources
Bibliography
Some of the illustrations will be drawn from:
Developmental Biology, Gilbert and Barresi, 11th edition, Sinauer, Oxford
Other sources will be indicated on the lecture slides.

Notes/Handbook
The lectures slides will also be made available through Moodle.