BS373-15 Principles of Development

23/24

Department
Life Sciences
Level
Undergraduate Level 3
Module leader
Andre Pires da Silva
Credit value
15
Module duration
10 weeks
Assessment
Multiple
Study location
University of Warwick main campus, Coventry

Description

Introductory description

Developmental biology is the study of molecular processes underlying the development of organisms from the fertilized egg to a fully-grown individual. Most of the molecular pathways involved are shared across all animals due to our common evolutionary history. The module is aimed at opening the student's understanding of how these pathways work at the genetic level, and how this translates into organismal phenotypes that can be understood in biomedical, evolutionary, and ecological/environmental contexts.

More specifically, the module aims to impart knowledge in two areas. The first is knowledge of the way that genetic information is decoded in the development of animals. The student will learn how one identifies the genes that control complex biological processes, and how one establishes the exact role of each gene in these events. Secondly, the student will consider examples of complex biological processes during development in experimental models from a rapidly growing range of research species and with new genetic tools. The emphasis is on insights that come from functional and comparative approaches, and how these are incorporated into new conceptual models of how development works. In analysing these examples, the student will extend knowledge acquired in Years 1 and 2, such as signal transduction, translation and transcription.

Module web page

Module aims

The aim of this module is to enable students to make the transition from textbook driven learning to the cutting edge represented in the primary literature. This is done in a rapidly moving, highly topical subject, linking genotype to the dynamic phenotype of animal embryogenesis and post-embryonic development. The subject is notable for integrating all levels of biological organisation. Prior to the course, we expect students to prepare by refreshing their knowledge of transcription, translation and related processes, as this mechanistic understanding will be required to understand how these processes play out in complex communication events within and between cells. At the end of the module, the students should be familiar with a variety of the topical areas of developmental molecular genetics and tissue and organismal form and function. They will be aware of the techniques used to address questions. They should have developed skills in rapidly acquiring knowledge from complex areas of primary research literature, supported by active discussion with fellow students and the lecturers, and further developed via the open-book assessment format.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

The outline for the syllabus is as follows: 1- Model organisms. 2- How to study Developmental Biology. 3- From genes to pathways. 4- Hox gene collinearity, cluster organisation and segment evolution. 5- Axial patterning/wing disc signalling. 6- Morphogenesis and the transgenic tools behind and microscopy work for live imaging. 7- Germ cells and sex determination. 8- Signalling pathways and ageing.

Learning outcomes

By the end of the module, students should be able to:

- Understanding of the integration of several layers of organisation in biological systems
- Understanding of genetics in development, ageing and evolutionary biology
- Understanding of cell biology in development, ageing and evolutionary biology
- Understanding of morphogenesis in development, ageing and evolutionary biology

Indicative reading list

Gilbert SF Developmental Biology 6th edition 2000
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https://www.ncbi.nlm.nih.gov/books/NBK9983/

Subject specific skills

a. Demonstrate clear understanding of the scientific topic
b. Demonstrate evidence of extended reading and lateral integration of material not covered in the

lectures
c. Demonstrate independent thought and deep understanding
d. Demonstrate ability to construct scientific arguments / hypotheses based on primary sources and background research
f. Use multiple sources to construct complex scientific arguments and integrating these to build and develop the student's own scientific conclusions.
g. Demonstrate evidence of extended reading and lateral integration of material not covered in the lectures.

Transferable skills

1. Critical appraisal of source material
2. Self-directed learning

Study

Study time

Type	Required	Optional
Lectures	17 sessions of 1 hour (11%)	
Tutorials	(0%)	4 sessions of
Private study	133 hours (89%)	
Total	150 hours	

Private study description

133 hrs of self-study and directed reading to prepare for the assessments

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group A1

	Weighting	Study time
Test 1	40%	
On line assessment		

	Weighting	Study time
Test 2	60%	
On line assessment		

Assessment group R1

	Weighting	Study time
Essays	100%	

Essay based assessment consisting of 4 questions- students need to answer 2. The essays cannot be answered using lecture notes alone- students will need to perform background research and essays will need to be fully referenced.

Feedback on assessment

Students receive general cohort level feedback on the tests

Availability

Courses

This module is Core optional for:

- UIPA-C1L8 Undergraduate Life Sciences and Global Sustainable Development
  - Year 3 of C1L8 Life Sciences and Global Sustainable Development
  - Year 3 of C1LB Life Sciences and Global Sustainable Development: Ecology
- UIPA-C1L9 Undergraduate Life Sciences and Global Sustainable Development (with Intercalated Year)
  - Year 4 of C1L9 Life Sciences and Global Sustainable Development (with Intercalated Year)
  - Year 4 of C1LD Life Sciences and Global Sustainable Development: Ecology (with Intercalated Year)

This module is Optional for:

- Year 3 of UBSA-C700 Undergraduate Biochemistry
- ULFA-C1A2 Undergraduate Biochemistry (MBio)
  - Year 3 of C1A2 Biochemistry
  - Year 3 of C700 Biochemistry
- Year 4 of ULFA-C702 Undergraduate Biochemistry (with Placement Year)
- Year 3 of ULFA-C1A6 Undergraduate Biochemistry with Industrial Placement (MBio)
- UBSA-3 Undergraduate Biological Sciences
  - Year 3 of C100 Biological Sciences
  - Year 3 of C100 Biological Sciences

- Year 3 of ULFA-C1A1 Undergraduate Biological Sciences (MBio)
- Year 4 of ULFA-C113 Undergraduate Biological Sciences (with Placement Year)
- Year 3 of ULFA-C1A5 Undergraduate Biological Sciences with Industrial Placement (MBio)
- UBSA-C1B9 Undergraduate Biomedical Science
    - Year 3 of C1B9 Biomedical Science
    - Year 3 of C1B9 Biomedical Science
    - Year 3 of C1B9 Biomedical Science
- ULFA-C1A3 Undergraduate Biomedical Science (MBio)
    - Year 3 of C1A3 Biomedical Science
    - Year 3 of C1B9 Biomedical Science
- Year 3 of ULFA-C1A7 Undergraduate Biomedical Science with Industrial Placement (MBio)
- ULFA-CB18 Undergraduate Biomedical Science with Placement Year
    - Year 4 of CB18 Biomedical Science with Placement Year
    - Year 4 of CB18 Biomedical Science with Placement Year
    - Year 4 of CB18 Biomedical Science with Placement Year
- Year 3 of ULFA-B140 Undergraduate Neuroscience (BSc)
- Year 3 of ULFA-B142 Undergraduate Neuroscience (MBio)
- Year 3 of ULFA-B143 Undergraduate Neuroscience (with Industrial Placement) (MBio)
- Year 4 of ULFA-B141 Undergraduate Neuroscience (with Placement Year) (BSc)

This module is Option list B for:

- Year 3 of UMDA-CF10 Undergraduate Integrated Natural Sciences (MSci)