

BS373-12 Principles of Development

21/22

Department

Life Sciences

Level

Undergraduate Level 3

Module leader

Andre Pires da Silva

Credit value

12

Module duration

10 weeks

Assessment

100% coursework

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 can be used to address biomedical questions.

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. This rapidly growing area of understanding is shedding light on many areas of biology, such as cell biology, disease, evolution and neurobiology. 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 for modern genetics including fruit fly, nematode worms and several vertebrate species. We explore how the underlying genetic circuitry down to the single base pair level has been resolved in recent years as a paradigm for understanding a host of biomedical problems. 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, which is a key to genome analysis of animals and plants. 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. 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 and assembling it into reviews, especially during tutorial work.

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- Morphogenesis and the transgenic tools behind and microscopy work for live imaging.
- 3- How to study Developmental Biology.
- 4- From genes to pathways.
- 5- Hox gene collinearity, cluster organisation and segment evolution.
- 6- Axial patterning/wing disc signalling.
- 7- Germ cells and sex determination.
- 8- Signalling pathways and aging.

Learning outcomes

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

- By the end of the module, it is expected that students will be able to integrate the several layers of organisation in Biological systems, ranging from Genetics, Cell Biology to Morphogenesis in the context of Development, Ageing and in Evolutionary Biology.

Indicative reading list

Gilbert SF Developmental Biology 8th edition 2006

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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.

Transferable skills

1. Critical appraisal of source material
 2. Self directed learning
 3. Adult learning
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Study

Study time

Type	Required
Lectures	18 sessions of 1 hour (15%)
Tutorials	1 session of 1 hour (1%)
Private study	101 hours (84%)
Total	120 hours

Private study description

Independent learning, self directed learning and revision for open book exams.

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 A

	Weighting	Study time
Module Exam 1 (Week 19)	50%	
On line assessment- students have 1 week (open book) to research and answer set questions.		
Module Exam 2 (Week 23)	50%	
On line assessment- students have 1 week (open book) to research and answer set questions.		

Feedback on assessment

Students receive general cohort level feedback on the exams\r\n\r\n\r\n

Availability

Courses

This module is Core for:

- UBSA-3 Undergraduate Biological Sciences
 - Year 3 of C102 Biological Sciences with Cell Biology
 - Year 3 of C105 Biological Sciences with Molecular Genetics

This module is Option list A for:

- Year 3 of UBSA-C700 Undergraduate Biochemistry
- ULFA-C1A2 Undergraduate Biochemistry (MBio)
 - Year 3 of C1A2 Biochemistry
 - Year 3 of C700 Biochemistry
- UBSA-3 Undergraduate Biological Sciences
 - Year 3 of C100 Biological Sciences
 - Year 3 of C100 Biological Sciences
 - Year 3 of C107 Biological Sciences with Virology
- Year 3 of ULFA-C1A1 Undergraduate Biological Sciences (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

This module is Option list B for:

- UBSA-3 Undergraduate Biological Sciences
 - Year 3 of C103 Biological Sciences with Environmental Resources
 - Year 3 of C104 Biological Sciences with Microbiology