



**DB3006**

**Principles of  
Developmental and  
Reproductive  
Biology**

**Course Handbook  
2019-20**

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Cover image:

**Confocal micrograph of fluorescently labelled HeLa cells.**

Nuclei are labelled in blue, tubulin in green and actin fibres in red.

Courtesy of:

Kevin Mackenzie

Microscopy and Histology Core Facility

Institute of Medical Sciences

University of Aberdeen

<http://www.abdn.ac.uk/ims/microscopy-histology>

## Course Summary

The course will cover questions of developmental biology, The life cycle: stages of development, cell-to-cell signalling in development, the concept of morphogens in development, the major model organisms (Arabidopsis, Dictyostelium, Drosophila, C.elegans, zebrafish, Xenopus, chick, mouse), anatomical foundation of embryology, the physiological principles underlying embryonic development and the contribution of genetics to the understanding of the molecular processes regulating embryonic development.

The course will last for 5 weeks, consisting of up to 4 one-hour lectures per week and 1 practical/tutorial session per week.

It is assessed by a 1.5 hour-long written examination (70%) and continuous assessment (30%).

Course Coordinator: Dr Neil Vargesson (ext. 7374) Email: [n.vargesson@abdn.ac.uk](mailto:n.vargesson@abdn.ac.uk)

## Course Aims & Learning Outcomes

1. Provide a solid foundation in the principles of embryonic developmental biology and reproductive biology.
2. Describe the common features underlying developmental in different organisms.
3. Describe the techniques utilised in studying developmental biology.
4. Have an understanding of the different model organisms used to study development and their respective advantages and be able to describe why one would use one organism over another.
5. Explore how advances in developmental biology and reproductive biology impact on society.

## Course Teaching Staff

### Course Co-ordinator(s):

Dr Neil Vargesson (NV), (Course Coordinator) [n.vargesson@abdn.ac.uk](mailto:n.vargesson@abdn.ac.uk)

### Other Staff:

Dr Guy Bewick (GB), ([g.s.bewick@abdn.ac.uk](mailto:g.s.bewick@abdn.ac.uk))

Professor Martin Collinson (MC) ([m.collinson@abdn.ac.uk](mailto:m.collinson@abdn.ac.uk))

Professor Stefan Hoppler (SH), ([s.p.hoppler@abdn.ac.uk](mailto:s.p.hoppler@abdn.ac.uk))

Dr Jonathon Pettitt (JP),([j.pettitt@abdn.ac.uk](mailto:j.pettitt@abdn.ac.uk))

Professor Paul Fowler (PF),([p.a.fowler@abdn.ac.uk](mailto:p.a.fowler@abdn.ac.uk))

Dr Jacqueline Wallace, Rowett ([jacqueline.wallace@abdn.ac.uk](mailto:jacqueline.wallace@abdn.ac.uk))

## Assessments & Examinations

Students are expected to attend all lectures, laboratory classes, and tutorials, and to complete all class exercises by stated deadlines. The minimum performance acceptable is attendance at 75% of the lectures, seminars, practical classes, and presentation of all set course work, written and oral.

Assessment is derived from course work (30%) and a written examination (70%). The continuous assessment (CA) component is based on two practicals, which each contribute 15% of the total course mark.

Written Examination: 70% of the total assessment is based on one 1.5 hour written paper. The student has to answer two questions of equal weighting selected from a list of four.

Common grading scale (CGS) grade: The overall performance of the student is expressed as a grade awarded on the common spine marking scale.

The degree examination is held in December, with the re-sit examination in August.

## Class Representatives

**We value students' opinions in regard to enhancing the quality of teaching and its delivery; therefore in conjunction with the Students' Association we support the Class Representative system.**

In the School of Medicine, Medical Sciences & Nutrition we operate a system of course representatives, who are elected from within each course. Any student registered within a course that wishes to represent a given group of students can stand for election as a class representative. You will be informed when the elections for class representative will take place.

### **What will it involve?**

It will involve speaking to your fellow students about the course you represent. This can include any comments that they may have. You will attend a Staff-Student Liaison Committee and you should represent the views and concerns of the students within this meeting. As a representative you will also be able to contribute to the agenda. You will then feedback to the students after this meeting with any actions that are being taken.

### **Training**

Training for class representatives will be run by the Students Association. Training will take place within each half-session. For more information about the Class representative system visit [www.ausa.org.uk](http://www.ausa.org.uk) or email the VP Education & Employability [vped@abdn.ac.uk](mailto:vped@abdn.ac.uk). Class representatives are also eligible to undertake the STAR (Students Taking Active Roles) Award with further information about this co-curricular award being available at: [www.abdn.ac.uk/careers](http://www.abdn.ac.uk/careers).

## Problems with Coursework

If students have difficulties with any part of the course that they cannot cope with, alone they should notify the course coordinator immediately. If the problem relates to the subject matter general, advice would be to contact the member of staff who is teaching that part of the course. Students with registered disabilities should contact Mrs Jenna Reynolds ([medsci@abdn.ac.uk](mailto:medsci@abdn.ac.uk)) in the Medical Sciences Office (based in the Polwarth Building, Foresterhill), or Mrs Sheila Jones ([s.jones@abdn.ac.uk](mailto:s.jones@abdn.ac.uk)) in the Old Aberdeen office associated with the teaching laboratories, to ensure that the appropriate facilities have been made available. Otherwise, you are strongly encouraged to contact any of the following as you see appropriate:

- Course student representatives
- Course co-ordinator
- Convenor of the Medical Sciences Staff/Student Liaison Committee (Professor Gordon McEwan)
- Medical Sciences Disabilities Co-ordinator (Dr Derryck Shewan)

All staff are based at Foresterhill and we strongly encourage the use of email or telephone the Medical Sciences Office. You may have a wasted journey travelling to Foresterhill only to find staff unavailable.

If a course has been completed and students are no longer on campus (i.e work from second semester during the summer vacation), coursework will be kept until the end of Freshers' Week, during the new academic year. After that point, unclaimed student work will be securely destroyed.

## Course Reading List

Slack, J.M.W. Essential Developmental Biology, 3rd Edition (2012) Blackwells.

N.B. The course is based around/upon this book.

There are a range of titles available from the library focusing on developmental biology and embryology and reproductive biology, three examples are below. Whilst most of these are held in the Medical School library at Foresterhill, they can be delivered to Sir Duncan Rice Library for your convenience.

Gilbert, S. Developmental Biology, 10<sup>th</sup> Edition (2014) Sinaeur.

Johnson, M. H. & Everitt, B.J. Essential reproduction. (2000). Malden, Mass: Blackwell Science.

Wolpert, L. et al Principles of Development, 5<sup>th</sup> Edition (2015) Oxford.

## Lecture Synopsis

**Lecture 1: Introduction and Overview – Dr Neil Vargesson**

Introduction to the course and its content, aims and goals.

**Lecture 2: Common Features of Development I – Dr Neil Vargesson**

Introduction to terminology; Gametogenesis and early development.

**Lecture 3: Common Features of Development II –Dr Neil Vargesson**

Morphogenetic processes. Cell death and proliferation.

**Lecture 4: Experimental Embryology – Dr Neil Vargesson**

Cell fate, cloning, acquisition of fate, commitment.

**Lecture 5: Model Organisms – *C. elegans* – Dr Jonathan Pettit**

Development, specification, analysis of cell fate, analysis of cell death.

**Lecture 6: Developmental Genetics – Professor Martin Collinson**

Mutants, screening for mutants, transgenesis, gene duplication.

**Lecture 7: Human Reproduction – Professor Paul Fowler**

Gonadal function, gametogenesis, fertilisation and sex determination,

**Lecture 8: Comparative Reproduction- Professor Paul Fowler**

Anatomy and endocrinology of mammalian reproduction

**Lecture 9: Techniques to study development I – Professor Stefan Hoppler**

Microscopy, visualising development, gene expression.

**Lecture 10: Techniques to study development II – Professor Stefan Hoppler**

Microscopy, visualising development, gene expression.

**Lecture 11: Model Organisms – Chicken – Dr Neil Vargesson**

Development, specification, organogenesis, limb development.

**Lecture 12: Model Organisms – Zebrafish – Dr Neil Vargesson**

Development, specification, mutagenesis screens and imaging

**Lecture 13: Model Organisms – Dictyostelium/Arabidopsis – Professor Martin Collinson**

Development, uses and imaging.

**Lecture 14: Model Organisms – Mouse – Professor Martin Collinson**

Mammalian fertilisation, specification, development, transgenics, knockout mouse.

**Lecture 15: Model Organisms – Xenopus – Professor Stefan Hoppler**

Oogenesis, maturation, specification, development, and inductive events.

**Lecture 16: Model organisms – Drosophila – Professor Stefan Hoppler**

Development, developmental genetics, homeotic genes.

**Lecture 17: Developmental Biology and Infertility – Prof Paul Fowler**

Discussing issues relating to human fertility and infertility

**Lecture 18: Large animals in reproduction and development – Dr Jacqueline Wallace**

Discussing the use of animals, including farm animals, in research studying effects of environmental toxins on fertility, health and development.

**Lecture 19: Developmental Biology and Stem Cells – Prof Stefan Hoppler**

Discussing issues relating to stem cells and their role in developmental biology and medicine

**Lecture 20: Developmental Biology and Society – Dr Neil Vargesson**

How research in developmental biology has helped us understand the origins of birth defects and prevention of birth defects as well as human disease e.g. folic acid supplements, cancer, regenerative medicine.

## **Practical/Lab/Tutorial Work**

### **1. Simbryo Practical – Dr Neil Vargesson**

Students will use a computer based software programme to further understand Developmental Biology. A worksheet with a series of questions on different aspects of embryogenesis needs to be answered for the Assessment. Short and brief answers for each question (no more than a short paragraph) are required.

### **2. Model Organisms – Dr Neil Vargesson**

Students in small groups (max of 3 per group) will look in-depth at a specific Model Organism and describe advantages, uses, and discoveries made and prepare a short presentation with the key points. It is the content of the presentation that will be assessed, not the presenter's delivery.

Please read the student notes concerned with behaviour and safety in the laboratories.

The practical work required in this course may present difficulties to students with special educational needs. For such students, alternative arrangements will be made. Any student with special needs should make these known to the Course Co-ordinator when registering for the class, and should then also discuss their needs with the School Disabilities Co-ordinator, to ensure that they have the best possible outcome.

## University Policies

Students are asked to make themselves familiar with the information on key institutional policies which have been made available within MyAberdeen (<https://abdn.blackboard.com/bbcswebdav/institution/Policies>). These policies are relevant to all students and will be useful to you throughout your studies. They contain important information and address issues such as what to do if you are absent, how to raise an appeal or a complaint and indicate how seriously the University takes your feedback.

These institutional policies should be read in conjunction with this programme and/or course handbook, in which School and College specific policies are detailed. Further information can be found on the [University's Infohub webpage](#) or by visiting the Infohub.

The information included in the institutional area for 2019/20 includes the following:

- Absence
- Appeals & Complaints
- Student Discipline
- Class Certificates
- MyAberdeen
- Originality Checking
- Feedback
- Communication
- Graduate Attributes
- The Co-Curriculum

## Medical Sciences Common Grading Scale

Grade	Grade Point	Category	Honours Class	Description
A1	22	Excellent	First	<ul style="list-style-type: none"> <li>Outstanding ability and critical thought</li> <li>Evidence of extensive reading</li> <li>Superior understanding</li> <li>The best performance that can be expected from a student at this level</li> </ul>
A2	21			
A3	20			
A4	19			
A5	18			
B1	17	Very Good	Upper Second	<ul style="list-style-type: none"> <li>Able to argue logically and organise answers well</li> <li>Shows a thorough grasp of concepts</li> <li>Good use of examples to illustrate points and justify arguments</li> <li>Evidence of reading and wide appreciation of subject</li> </ul>
B2	16			
B3	15			
C1	14	Good	Lower Second	<ul style="list-style-type: none"> <li>Repetition of lecture notes without evidence of further appreciation of subject</li> <li>Lacking illustrative examples and originality</li> <li>Basic level of understanding</li> </ul>
C2	13			
C3	12			
D1	11	Pass	Third	<ul style="list-style-type: none"> <li>Limited ability to argue logically and organise answers</li> <li>Failure to develop or illustrate points</li> <li>The minimum level of performance required for a student to be awarded a pass</li> </ul>
D2	10			
D3	9			
E1	8	Fail	Fail	<ul style="list-style-type: none"> <li>Weak presentation</li> <li>Tendency to irrelevance</li> <li>Some attempt at an answer but seriously lacking in content and/or ability to organise thoughts</li> </ul>
E2	7			
E3	6			
F1	5	Clear Fail	Not used for Honours	<ul style="list-style-type: none"> <li>Contains major errors or misconceptions</li> <li>Poor presentation</li> </ul>
F2	4			
F3	3			
G1	2	Clear Fail/ Abysmal	-	<ul style="list-style-type: none"> <li>Token or no submission</li> </ul>
G2	1			
G3	0			

## Course Timetable DB3006: 2019-2020

Date	Time	Place	Subject	Session	Staff
<b>Week 7</b>					
Mon 9 Sep	15:00-16:00	1:147	Lecture 1 – Introduction & Overview	lecture	NV
	16:00-17:00	1:147	Lecture 2 – Common features of development (1)	lecture	NV
Tue 10 Sep	14:00-15:00	LT3	Lecture 3 – Common features of development (2)	lecture	NV
	15:00-16:00	LT3	Lecture 4 - Experimental Embryology	lecture	NV
<b>Week 8</b>					
Mon 16 Sep	15:00-16:00	1:147	Lecture 5 - Model Organisms – C.elegans	lecture	JP
	16:00-17:00	1:147	Lecture 6 – Developmental Genetics	lecture	MC
Tue 17 Sep	14:00-17:00	CR2	Practical 1 – Simbryo Part (1)	practical	NV
Wed 18 Sep	10:00-11:00	MR301	Safety Course Part 1 (Compulsory)	Workshop	GB
	11:00-12:00	MR051	Safety Course Part 2 (Compulsory)	Workshop	GB
Fri 20 Sep	14:00-15:00	1:147	Lecture 7 - Human Reproduction	Lecture	PAF
	15:00-16:00	1:147	Lecture 8 - Comparative Reproduction	Lecture	PAF
<b>Week 9</b>					
Mon 23 Sep	15:00-16:00	1:147	Lecture 9 – Techniques to study development (1)	lecture	SH
	16:00-17:00	1:147	Lecture 10 – Techniques to study development (2)	lecture	SH
Tue 24 Sep	10:00-11:00	1:033/044	Lecture 11 – Model Organisms - Chicken	lecture	NV
	11:00-12:00	1:033/044	Lecture 12 – Model Organisms - Zebrafish	lecture	NV
	14:00-17:00	CR2	Practical 1 – Simbryo Part (2)	practical	NV
<b>Week 10</b>					
Mon 30 Sep	15:00-16:00	1:147	Lecture 13 - Model Organisms - Dictyostelium/Arabidopsis	lecture	MC
	16:00-17:00	1:147	Lecture 14 - Model Organisms - Mouse	lecture	MC
Tue 1 Oct	10:00-11:00	1:033/044	Lecture 15 – Model Organisms – Xenopus	lecture	SH
	11:00-12:00	1:033/044	Lecture 16 – Model Organisms – Drosophila	lecture	SH
	14:00-17:00	CR2	Practical 2 – Model Organisms. Part (1)	Com practical	NV
<b>Week 11</b>					
Mon 7 Oct	15:00-16:00	1:147	Lecture 17 – Developmental Biology and Infertility	lecture	PAF

	16:00-17:00	1:147	Lecture 18: Large animal models in reproduction and development	Lecture	JW
Tue 8 Oct	10:00-11:00	1:143/44	Lecture 19 – Developmental Biology and Stem Cells	Lecture	SH
	11:00-12:00	1:143/44	Lecture 20 – Developmental Biology and Society: Birth defects, Prenatal diagnosis, Regeneration	lecture	NV
	14:00-17:00	CR2	Practical 2 – Model Organisms. Part (2)	Com practica	NV

### Staff

NV – Dr Neil Vargesson, (Course Coordinator)
MC – Dr Martin Collinson,
SH – Prof Stefan Hoppler,
JP – Dr Jonathon Pettitt,
GB - Dr Guy Bewick,
PAF - Prof Paul Fowler,
JW – Dr Jacqueline Wallace, Rowett

### Venues

1:147, 1:155/56, CR2, LT3 Polwarth Building
MR051; MR301 – MacRobert Building, Old Aberdeen