

BIOL3020: Animal Physiology, Reproduction and Development

Callaghan

Semester 1 - 2024



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

OVERVIEW

Course Description

The process of sexual reproduction is a critical driver of population genetics, facilitating trait variations that shape our biosphere. This course will establish knowledge of animal physiology and reproduction by examining the tissues, organs and cells that govern the life cycle. The course will uncover the biological processes that drive the formation of the female and male gametes, how these cells form a new body and factors that may disrupt these critical processes. Indeed, the programming, founded in the gametes, provides the trajectory for embryo development and the establishment of a new individual. This course will also focus on the development and physiology of some key organs including the circulatory and nervous systems, as well as the organs that provides reproductive capacity, completing the reproductive life cycle. Animal Physiology, Reproduction and Development focuses on mammalian systems but also uses other animal systems as models to advance our understanding. During the course, we will also discuss the technologies currently used and the latest scientific inroads into assisted reproduction or 'IVF' for mammals, including livestock.

Academic Progress Requirements

Nil

Assumed Knowledge Contact Hours

BIOL1001, BIOL1002 and BIOL2050.

Callaghan Lecture

Face to Face On Campus
3 hour(s) per week(s) for 8 week(s)

Workshop

Face to Face On Campus
1 hour(s) per week(s) for 8 week(s)

Unit Weighting Workload

10
Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

COURSE OUTLINE

CONTACTS

Course Coordinator **Callaghan**
Prof Brett Nixon
Brett.Nixon@newcastle.edu.au
(02) 4921 6977
Consultation: By email.
If urgent by phone or office (Life Sciences Building LS437)

Teaching Staff Other teaching staff will be advised on the course Canvas site.

School Office **School of Environmental and Life Sciences**
Room C228 Chemistry Building
Callaghan
Science-SELS@newcastle.edu.au
+61 2 4921 5080
9am-5pm (Mon-Fri)

SYLLABUS

Course Content

1. Gamete development
2. Fertilisation
3. Molecular mechanisms of early development
4. Amphibian, chicken and mammalian early development
5. Sex differentiation and gonad development
6. Reproductive hormones and regulation of testicular and ovarian function
7. The nervous system (Brain and Spinal Cord)
8. Muscle structure and movement
9. Gas exchange, circulation, metabolism and energetic activities

Course Learning Outcomes

On successful completion of this course, students will be able to:

1. Summarise the processes of spermatogenesis and oogenesis and justify the importance of sperm post-testicular maturation events required for fertilisation;
2. Link the molecular mechanisms of early embryo development and explain the mechanisms involved in embryo development, sexual differentiation and organogenesis;
3. Differentiate the reproductive hormones and describe how reproductive processes are regulated by the endocrine system;
4. Outline the basic structure and control processes of the nervous systems and explain the molecular processes of how muscle movement is achieved;
5. Integrate and explain the basic operations of the nervous and circulatory systems as well as the nutritional requirements of animals;
6. Interpret experimental data, assimilate research articles, prepare figures and tables and communicate an understanding of animal reproduction and physiology via the production of scientific reports.

Course Materials

Recommended Reading:

- Martin H. Johnson (2013) Essential Reproduction (7th edition or newer)
- Scott F. Gilbert (2016) Developmental Biology (11th edition or newer)
- Wolpert L, et al. (2007) Principles of Development (3rd edition or newer)
- Carlson B.M. (1999) Human Embryology and Developmental Biology (2nd edition or newer)

COMPULSORY REQUIREMENTS

In order to pass this course, each student must complete ALL of the following compulsory requirements:

Course Assessment Requirements:

- Assessment 1 - Examination: Formal: Pass Requirement - Students must pass this assessment item to pass the course.
- Assessment 2 - Workshop Exercises & Reports: Attempt / Submission Requirement - Students must attempt/submit this assessment item to pass the course.
- Assessment 2 - Workshop Exercises & Reports: Pass Requirement - Students must pass this assessment item to pass the course.

SCHEDULE

Week	Week Begins	Topic	Learning Activity	Assessment Due
1	26 Feb	Lecture 1: Introduction/Spermatogenesis Lecture 2: Spermatogenesis Lecture 3: Oogenesis	Unit 1 Workshop 1.1: Meiosis in spermatocytes/oocytes	
2	4 Mar	Lecture 4: Oogenesis Lecture 5: Post-Testicular Maturation Lecture 6: Capacitation	Unit 1 Workshop 1.2: Spermatocytes/oocyte (self directed)	
3	11 Mar	No Teaching	N/A	Online Quiz 1
4	18 Mar	Lecture 7: Fertilisation in Sea Urchins Lecture 8: Fertilisation in Mammals Lecture 9: Cleavage	Unit 1 Workshop 1.3: DNA damage assays, chromatin and crossing over	
5	25 Mar	Lecture 10: Gastrulation Lecture 11: Amphibian Early Development Lecture 12: Chicken Early Development	Unit 2 Workshop 2.1	11:59pm on Friday 29/03/2023.
6	1 Apr	No Teaching	N/A	
7	8 Apr	Lecture 13: Human Early Development Lecture 14: Sex Differentiation Lecture 15: Reproductive Hormones	Unit 2 Workshop 2.2	
Mid-Semester Recess				
8	29 Apr	Lecture 16: Regulation of Testicular Function Lecture 17: Regulation of Ovarian Function Lecture 18: Steroid Hormones in the Adult		
9	6 May	No Teaching	N/A	11:59pm on Friday 10/05/2023.
10	13 May	Lecture 19: The Nervous System Lecture 20: The Brain and Spinal Cord Lecture 21: Muscle Structure and Movement	Unit 3 Workshop 3.1: Cane toad simulation / biochemistry	Online Quiz 2
11	20 May	Lecture 22: Control of Movement Lecture 23: Circulation, Nutrition and Digestion Lecture 24: Metabolism and Energetic Activities	Unit 3 Workshop 3.2: Exercise physiology?	
12	27 May	No Teaching	N/A	11:59pm on Friday 31/05/2023.
13	3 Jun	No Teaching	N/A	
Examination Period				

ASSESSMENTS

This course has 3 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Examination: Formal	Formal Examination Period	Individual	45%	1, 2, 3, 4, 5
2	Workshop Exercises & Reports	Workshop Report 1 - Week 5 - Friday 29th March Workshop Report 2 - Week 9 - Friday 10th May Workshop Report 3 - Week 12 - Friday 31st May	Individual	45%	6
3	Progress Quiz	Quiz 1 - Week 3 Quiz 2 - Week 10	Individual	10%	1, 2

Late Submissions

The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Examination: Formal

Assessment Type	Formal Examination
Description	Assessment of knowledge of the theoretical components of the course across the entire course. Exam consists of multiple choice and short written answer questions
Weighting	45%
Length	2 hours
Due Date	Formal Examination Period
Submission Method	Formal Exam
Assessment Criteria	The structure of the exam will be provided during the lecture and workshop sessions. See also the Table of Grading Scheme below.
Return Method	Not Returned
Feedback Provided	No Feedback
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 2 - Workshop Exercises & Reports

Assessment Type	Tutorial / Laboratory Exercises
Description	3 Reports - Written scientific formatted reports. The preparation of reports will inform your progression through the course material, as well as providing opportunities to refine your scientific report writing skills.
Weighting	45%
Due Date	Workshop Report 1 - Week 5 - Friday 29th March Workshop Report 2 - Week 9 - Friday 10th May Workshop Report 3 - Week 12 - Friday 31st May
Submission Method	Online Report guides and criteria will be available on Canvas and in the respective workshop sessions. See also the Grading and Assessment Criteria tables below.
Assessment Criteria	See the Table of Grading Scheme below.
Return Method	Online
Feedback Provided	Online - Approximately 2 weeks after due date. Students will be provided with comments on how to improve construction and presentation of a formatted scientific report document.
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 3 - Progress Quiz

Assessment Type	Quiz
Description	2 progress quizzes - completed online. Quizzes will track your progression through the course theory
Weighting	10%
Due Date	Quiz 1 - Week 3 Quiz 2 - Week 10
Submission Method	Online Quiz structure and assessable content will be highlighted in the preceding workshop session.
Assessment Criteria	Matching with the correct answers.
Return Method	Online
Feedback Provided	In Class
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

ADDITIONAL INFORMATION

Grading Scheme This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Communication Methods

Communication methods used in this course include:

- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.
- Email: Students will receive communications via their student email account.
- Face to Face: Communication will be provided via face to face meetings or supervision.

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

Oral Interviews (Vivas)

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of

the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the [Oral Examination \(viva\) Procedure](#). In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the [Student Conduct Rule](#).

Academic Misconduct

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to <https://policies.newcastle.edu.au/document/view-current.php?id=35>.

Adverse Circumstances

The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:

1. the assessment item is a major assessment item; or
2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;
3. you are requesting a change of placement; or
4. the course has a compulsory attendance requirement.

Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at:

<https://policies.newcastle.edu.au/document/view-current.php?id=236>

Important Policy Information

The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at <https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures> that support a safe and respectful environment at the University.

Other Information

If you are registered with AccessAbility and have been provided with a Reasonable Adjustment Plan (RAP), please ensure that you provide your Course Coordinator with a copy as soon as you can, or let your Course Coordinator know that you are still waiting for your RAP.

This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.

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