

Biology 4540g: Developmental Genetics 2017–18 Course Outline

Prerequisite Requirements

Unless you have either the prerequisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites. The prerequisite for this class is Biology 3338a.

Course Website

Students should check OWL (<http://owl.uwo.ca>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class. Students are responsible for checking OWL on a regular basis.

Course Materials

No Textbook is required.

Learning Outcomes

Student experience

By the end of this course, students will be able to:

- 1.) apply the genetic principles and tools of allele classification, epistasis, complementation, mutant identification and genetic mosaic analysis (etc.) learned in lecture to the analysis of novel data sets.

2.) apply the basic principles of the cellular mechanisms associated with development, such as morphogens, lateral inhibition and induction, learned in lecture to the analysis of novel data sets.

3.) apply the knowledge of the principles that define model organisms to accessing and assessing information found in electronic databases and the primary scientific literature on select model systems used to study development.

4.) read primary scientific papers in the field of developmental genetics at sufficient depth to be able to critically assess and synthesis the information.

Assessment.

1.) The exams. In lecture, principles are taught and applied to specific examples; in the exam undiscussed developmental examples are given and are analyzed and synthesized with the principles and approaches learned.

2.) In tutorial, the principles and approaches to information stored in electronic databases is explored with real time examples followed by an assessment of the application of these approaches in a test.

3.) In tutorial, primary scientific papers are discussed after a quiz on the contents. For the essay, scientific literature is assigned on a topic, which forms the basis of a final term paper that compares, contrasts and synthesizes the information.

Anticipated Lecture Topics

Introduction:

Developmental genetics is the application of genetic dissection to study the process of how a single celled fertilized egg is transformed into a multicellular organism. The central question of development is often formulated as, 'How is information stored in linear DNA transformed into a three-dimensional, multicellular organism over time.'

The course:

4540G consists of 2 one hour lectures each week and approximately 24 hours of tutorial time. The major focus of this course is the application of techniques of genetic dissection to unravel the complex control of developmental processes. The course will focus on examples in the organisms: *Drosophila melanogaster*, *C. elegans*, zebrafish and mice. However, the general principles discussed can be applied to most systems in Biology.

Lecture Schedule:

Jan 8	Lecture 1 Introduction to developmental genetics, What is development?
Jan 10	Lecture 2 Cellular mechanisms of development
Jan 15	Lecture 3 Introduction to genetic dissection: allele classification screens.
Jan 17	Lecture 4 Introduction to genetic dissection cont.: complementation and epistasis.
Jan 22	Lecture 5 <i>Drosophila</i> cell biology
Jan 26	Lecture 6 <i>Drosophila</i> screens
Jan 29	Lecture 7 Modern <i>Drosophila</i> genetics
Jan 31	Lecture 8 CRISPR in <i>Drosophila</i>
Feb 5	Lecture 9 Anterior posterior axis formation: Polar centers
Feb 7	Lecture 10 Anterior posterior axis formation: Bicoid
Feb 12	Lecture 11 Anterior posterior axis formation: Nanos
Feb 14	Lecture 12 Anterior posterior axis formation: Hierarchy of segmentation
Feb 19	SLACK WEEK
Feb 26	Lecture 13 Morphogens: Decapentaplegic

Feb 27	Midterm examination 3:30-6:30PM
Feb 28	Lecture 14 Morphogens: Long range effect
March 5	Lecture 15 Morphogens :Nuclear gradients
March 7	Lecture 16 Habits of developmental signaling pathways
March 12	Lecture 17 <i>C. elegans</i> cell biology.
March 14	Lecture 18 <i>C. elegans</i> genetic analysis.
March 19	Lecture 19 Lateral inhibition—emergent properties in development
March 21	Lecture 20 Induction
March 26	Lecture 21 Evolution of animals.
March 28	Lecture 23 Central problem in Evolution and Development of animals. Essay due.
April 2	Lecture 23 Experimental approaches to Evo Devo
April 4	Lecture 24 Experimental approaches to Evo Devo

Tutorial Schedule:

Jan 16	Tutorial 1 Cell biology and development
Jan 23	Tutorial 2 Epistasis problem solving
Jan 30	Tutorial 3 Quiz 1 Paper1--Drosophila genetic screens
Feb 6	Tutorial 4 Drosophila genetics/searching databases
Feb 13	Tutorial 5 Quiz 2 Paper2--Bicoid
March 6	Tutorial 6 Sex determination
March 13	Tutorial 7 Quiz 3 Paper3 Nanobody& Morphogens
March 20	Tutorial 8 Quiz 4 searching database quiz (mandatory)
March 27	Tutorial 9 Quiz 5 Paper 4

Accessibility

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 ext. 82147 if you have questions regarding accommodation.

Lecture and Instructor Information

Section Time Room Instructor Office

Lectures Monday and Wednesday 11:30-12:30 B&GS 1056

Tutorials Tuesday 3:30-6:30 P&AB 150

If you are contacting your instructor, please use your Western email address.

Email

Dr. Anthony Percival-Smith aperciva@uwo.ca

Evaluation

Senate definition of letter grades

- A+ 90-100 One could scarcely expect better from a student at this level
- A 80-89 Superior work which is clearly above average
- B 70-79 Good work, meeting all requirements, and eminently satisfactory
- C 60-69 Competent work, meeting requirements
- D 50-59 Fair work, minimally acceptable
- F below 50 Fail

Components

The overall course grade, out of 100, will be calculated as listed below. Listed next to the respective components are their maximum contributions toward the course grade.

Component Notes	Value
Tutorial quizzes	10
Essay due March 28, 2018	20
Midterm Tuesday February 27, 2018	30
Final Exam Scheduled by the Registrar	40

No electronic devices may be in your possession during tests and exams with the exception of Quiz 4.

It is Faculty of Science policy that a student who chooses to write a test or exam deems themselves fit enough to do so, and the student must accept the mark obtained. Claims of medical, physical, or emotional distress after the fact will not be considered.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at this website: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to

the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Missed Course Components

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or supporting documentation to the Academic Counselling Office of your home faculty as soon as possible.

If you are a Science student, the Academic Counselling Office of the Faculty of Science is located in WSC 140, and can be contacted at 519-661-3040 or scibmsac@uwo.ca. Their website is http://www.uwo.ca/sci/undergrad/academic_counselling/index.html.

A student requiring academic accommodation due to illness must use the Student Medical Certificate (https://studentservices.uwo.ca/secure/medical_document.pdf) when visiting an off-campus medical facility. For further information, please consult the university's medical illness policy at http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

If a quiz (with the exception of one, quiz 4) is missed the final will be reweighted. For example if one quiz is missed the final will be out of 42%.

The late penalty for the essay is as follows. Essay is out of 20 marks; 4 marks will be deducted from the mark received for the first day late, and 2 marks for each subsequent day late. In addition, non-completion or failure of the essay will result in automatic failure of the course (see Senate rules for essay courses). Therefore, plagiarism results in failure of the course.

If you miss the Final Exam, please contact your faculty's Academic Counselling Office as soon as you are able to do so. They will assess your eligibility to write the Special Exam (the name given by the

university to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a “Multiple Exam Situation” (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

Support Services

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Students who are in emotional/mental distress should refer to Mental Health@Western (http://www.health.uwo.ca/mental_health) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC, <http://westernusc.ca/services>. The website for Registrarial Services is <http://www.registrar.uwo.ca>.