

Developmental Biology (01:146:472, 16:148:504) Syllabus Spring 2025

Engineering Building B120

Office hours via Zoom– Mondays from 11:30a -12:30a or by appointment
See the Canvas Course Site for the link or email for an appointment

COURSE INSTRUCTOR AND CONTACT INFORMATION

Course Coordinator: Dr. Arnold Hyndman, hyndman@rutgers.edu

Additional Instructor: Dr. Natasha O’Brown, natasha.obrown@rutgers.edu

COURSE DESCRIPTION AND LEARNING GOALS

This course considers the genetic, molecular, and cellular processes that lead from egg to embryo to mature organism. Development is the complex cascade of progressive and typically irreversible changes during which cells become specialized and fashioned into functional fabrics with predictable organization along major body axis. It accomplishes two basic functions: it generates cellular diversity and order within each generation and provides continuity of life from one generation to the next. This course will emphasize the cellular and molecular mechanisms underlying pattern formation and cellular specialization and will present model organisms used in the study of developmental processes. You will acquire an understanding of the basic molecular and cellular mechanisms involved in embryogenesis, organ system development and differentiation, the variation in developmental pathways of representative invertebrates and vertebrates, and a modern understanding of how development shapes our understanding of human health, disease, and ethical decision making.

Students will be able to:

Describe the basic molecular and cellular mechanisms involved in embryogenesis, organ system development, and differentiation.

Explain the variation in developmental pathways of representative invertebrates and vertebrates.

Explain how a modern understanding of development shapes our understanding of human health, disease, and ethical decision-making.

Prerequisites: Fund Cell Bio 01:146:270 or Genetics 01:447:380 or Genetic Analysis I 01:447:384

REQUIRED TEXTS AND COURSE MATERIALS



Course Text: DEVELOPMENTAL BIOLOGY, 13th Edition, by Scott Gilbert. Published by Sinauer Associates. Students may use one of two formats of the text: Hardbound ISBN: 978019757451 or the E-version ISBN: 9780197574652. Supplementary reading will be provided throughout the course and uploaded to Canvas.

TECHNICAL / TECHNOLOGY REQUIREMENTS

Students will need a laptop or tablet to take examinations, word processing software for written assignments, PowerPoint, and a PDF reader. You may visit the Rutgers Student Tech Guide website for resources. <https://it.rutgers.edu/technology-guide/students/#new-brunswick>

DEPARTMENT LEARNING GOALS

<https://cbn.rutgers.edu/academics/undergraduate/learning-goals>

Grading Scale

A	90-100%
B+	87-89%
B	80-84%
C+	75-79%
C	70-74%
D	65-69%
F	<65%

ASSESSMENT / GRADING COMPONENTS

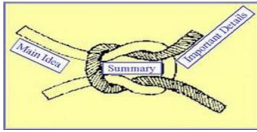
Method of Instruction and Assessment: You will gain information and insight into the course material from lectures, class discussions, the reading of the text, supplementary readings, group work and personal reflection.

Canvas: The course will use the Canvas learning tool to post reading materials and supplementary information. Canvas will also be the site for submission of the learning journals and group. **This site will also contain various tools that you are encouraged to use to enhance your learning experience.**

Examinations: There will be three exams. Two of these exams will be held during regularly scheduled class periods. The last exam will be during the final exam period. All exams will be taken in Canvas, laptop or tablet required. If an emergency should arise that prevents you from taking an examination at the scheduled time, you must notify me (Dr. Hyndman) in writing as soon as you are aware of the emergency and explain why the exam could not be taken as scheduled. Makeup exams should be taken within one week of the scheduled examination. Final approval to give a makeup exam rests with me.

Disability Accommodations: Students in need of disability accommodations must register for accommodations and consult the policies and procedures of the Office of Disability Services website: <https://ods.rutgers.edu>

Learning Journals or Infographic: You are required to maintain a learning journal or



design an Infographic for each unit. A learning journal is a regularly kept record of the ongoing learning process involved in exploring a subject matter. This is a tool to record information, observations, insights and questions that occur as you examine, review and ponder developmental biology lectures and readings. It is designed to reinforce and enrich your learning experience. Journaling in this class has two major components: recording and reflecting, the emphasis should be on reflecting. **Details for how to structure your learning journal will be in Canvas. A learning journal is required for Unit 1.** Infographic is a reflective learning tool. Infographics are collection of imagery, data visualizations including charts and graphs, with minimal text that gives an easy-to understand overview of a topic. The goal is for you to demonstrate your understanding of the unit. **Details for how to structure your infographic will be provided in class with examples found on Canvas. An Infographic is required for Unit 2. Suggested length 1-2 pages (not include the Designer Statement). For Unit 3 students may submit either a learning journal or a detailed infographic together which covers Unit 3. Suggested length of the infographic is 2-4 pages (not including the Designer Statement).**

Current Research Article Review: Students will be required to submit a written review of a current research article in the field of developmental biology. Details for this assignment will be given in class on **March 25th - attendance on this day is critical for the successful completion of this assignment.** Additional graduate student assignments: All graduate students registered for 148:504 will be required to write a short research review paper (6 – 10 pages). The topic of the paper must be approved in advance by me; details will be provided in class.

Group Work: You will be assigned to groups. These groups will be for discussion as breakout sessions during class. Occasionally, groups will be given short-graded assignments. Students must be present in that class to receive credit for these assignments.



Unit Class Forums –At the end of each unit, an online forum will be opened. Its aim is for students to 1) discuss course concepts, 2) present real-world applications, or 3) comment on contributions from other students. Points will be earned by contributing in one of the above elements.

Grading Policy: Grades are not negotiable in this course. Your final grade will be determined based on the in-class assignments, unit forums, examinations, written papers, and learning journal/infographic submissions. In addition, for graduate students, the research paper and presentation will be factored into the final grade. **NO EXTRA CREDIT WORK WILL BE ALLOWED.**

Weighting of Assessments



The final grade will be determined as follows*:

Examination 1	70 points
Examination 2	70 points
Examination 3	150 points
In class assignments	10 points
Unit Forums	18 points
Current Research Article Review (472 students only)	20 points
Unit 1 Learning Journal	20 points
Unit 2 Learning Infographic	20 points
Unit 3 Learning Journal/Infographic	30 points
Reflective Analysis	15 points
TOTAL = 422 points	

Graduate students' grades (504) will also be determined by the Research Review Paper (This paper replaces the current Article Review assignment)

50 points

TOTAL for GRADUATE STUDENTS = 472 points

***This is a guide and is subject to modification.**

SCHEDULE OF TOPICS



topics

	Topic	Readings
Unit 1		
Jan 21	Orientation	Ch. 1 Sections 1.1 - 1.3 & Special Readings*
24	Approaches	Ch. 1 Section 1.4 & Ch. 2 Sections 2.1 - 2.5
28	Patterns of Early Development	Ch. 8. Sections 8.2 - 8.5
31	Genes & Gene expression	Ch. 3
Feb 4	Cell to Cell Communication	Ch. 4
7	Gametogenesis & Fertilization	Ch. 6 Sections 6.1–6.4 & Ch. 7 Sections 7.1–7.2
11	Current Issues	Ch. 14.6 & Special Readings*
14	Examination I	
17	<i>Unit 1 Learning Journal and Class Forum due</i>	

Unit 2

Feb	18	C. elegans	Ch. 9 Section 9.4
	21	Drosophila	Ch. 10
	25	Early Amphibian and Teleost Development	Ch. 12 Obrown
	28	Early Avian & Mammalian Development	Ch. 13

Graduate students must submit research paper topics for approval 3/3/25

Mar	4	Early Human Development	Ch. 14 Sections 14.1 – 14.5
	7	Floral Development	Ch. 7 Section 7.4 & Ch 9 Section 9.2
	11	Current Issues	Ch. 14 & Special Readings*
	14	Examination II	
	14	<i>Infographic and Class Forum due</i>	

March 17 - 21 Spring Break



Unit 3

	25	Organ Assembly	Ch. 19**
		Research Article assignment - details provided in class	
		All students must be in class on this day	
	28	Cardiovascular System	Ch. 20 Sections 20.3 - 20.5
	29	Digestive & Urogenital Systems	Ch. 20 Section 20.1 and Ch. 22
Apr	1	Nervous System I	Ch. 16
	4	Nervous System II	Ch. 17 Sections 17.0 – 17.9 and Ch. 18 Section 18.3
	8	Nervous System III	Ch. 17 Sections 17.10 – 17.11
	11	Development of Limb	Ch. 21 Sections 21.0 – 21.9 Hyndman
	15	Reproductive System	Special Readings*
	18	Postembryonic Development I	Ch. 23 & Ch. 24
	22	Postembryonic Development II – Aging	Special Reading*
		Research Article Review due 4/24/25	
Apr	25	Environmental Regulation of Development	Ch. 25
	29	Ecological Evolutionary Developmental Biology	Ch. 26
		<i>Reflective Analysis Assignment given in class</i>	
		Graduate Students review paper due today	
May	2	Current Issues	Special Readings
	5	<i>Unit 3 Learning Journal or 2 Infographic, Reflective Analysis and Class Forum due</i>	
May	X	Examination III	TBD

* Special Readings will be upload to Canvas



Course feedback: Because I am interested in enhancing the learning experience of this course, feedback from you is important. I am open to any constructive comments you would like to make to me personally or via email either during the semester or at the end of the course. I also encourage you to complete the online survey at the end of the semester.

POLICIES

Attendance and Participation

Attendance and participation during regular lecture classes are strongly encouraged, but they will not be graded. In-person attendance is required on days when in-class assignments are scheduled (details will be posted on Canvas).

Students are expected to report absences using the University self-reporting absence system: <https://sims.rutgers.edu/ssra/>

Disability Accommodations

In order to receive consideration for reasonable accommodations, students with a disability must contact the appropriate disability services office at the campus where they are officially enrolled, participate in an intake interview, and provide documentation to the Office of Disability

Services website: <https://ods.rutgers.edu>

Additional resources and policies:

- Academic Calendar: <https://scheduling.rutgers.edu/scheduling/academic-calendar>
- Rosters (with Absence and Warning information): <https://sims.rutgers.edu/rosters>
- Final Exam Scheduling: <https://scheduling.rutgers.edu/scheduling/exam-scheduling>
- Interfaith Calendar: <https://www.interfaith-calendar.org>

Recording devices: Students may use audio recording devices for their own learning purposes. Recordings, course materials, and lecture notes may not be exchanged or distributed for commercial purposes, for compensation, or for any other purpose other than study by students enrolled in this class. No video recordings are allowed of any lecture.



Weather events, Power Outages or other emergencies: In the event of an emergency that prevents a scheduled *Class Meeting*, if possible, we will meet online and a link will be sent to you 1 hour before class. If this is not possible then a recorded lecture will be posted in Canvas as soon as possible.

Academic Integrity Policy



In this course, you are expected to conduct yourself in manner consistent with the Rutgers University Policy on Academic Integrity (<http://academicintegrity.rutgers.edu>). Academic integrity requires that academic work presented in the class for evaluation be wholly the product of the identified individual. Academic misconduct includes: cheating, fabrication, facilitating academic dishonesty, denying others access to information or material, and plagiarism. You should be aware that all allegations of academic dishonesty will be fully investigated and any evidence of academic dishonesty will be handled by me or reported to the Office of Student Judicial Affairs for appropriate action. **Use of AI such as ChatGPT is only permitted to help you brainstorm ideas and/or see examples. For all written assignments, your use of AI must be cited. All material you submit must be your own work. The public posting of course syllabus, exams or other course material is a violation of the University Academic Policy.**

STUDENT SUPPORT AND MENTAL WELLNESS

- Student Success Essentials: <https://success.rutgers.edu>
- Student Support Services: <https://www.rutgers.edu/academics/student-support>
- The Learning Centers: <https://rlc.rutgers.edu/>
- Rutgers Libraries: <https://www.libraries.rutgers.edu/>
- Bias Incident Reporting: <https://studentaffairs.rutgers.edu/bias-incident-reporting>
- Dean of Students – Student Support Office:
<https://success.rutgers.edu/resource/dean-students-student-support-office>
- Office of Veteran and Military Programs and Services:
<https://veterans.rutgers.edu>
- Student Health Services: <http://health.rutgers.edu/>
- Counseling, Alcohol and Other Drug Assistance Program & Psychiatric Services (CAPS): <http://health.rutgers.edu/medical-counseling-services/counseling/>
- UWill: free immediate access to teletherapy; you can choose a therapist based on your preferences including issue, gender, language, ethnicity.
<http://health.rutgers.edu/uwill/>
- Office for Violence Prevention and Victim Assistance: www.vpva.rutgers.edu/
- Office of Disability Services: <https://ods.rutgers.edu/>
- Basic Needs Assistance (food, housing, and other essentials): <https://ruoffcampus.rutgers.edu/basic-needs>
- Rutgers Student Food Pantry: <https://ruoffcampus.rutgers.edu/food-pantry>

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