Dr. Allison Edgar
BIOL 342: Developmental Biology
Fall 2025

Schedule: W/F 1:00 - 2:20 pm
Appointment scheduling link: https://calendar.app.google/yDawBKGmZhvzM4ij7

Semester schedule summary

Date	Topic		Date	Topic
Sept 3	Overview, concepts, and principles of embryology; **informational quiz and graded pre-assessment**		Oct 24	**Mid-term exam**
Sept 5	Differential gene expression		Oct 29	Axis specification in arthropods
Sept 10	Gene regulatory networks		Oct 31	Germ layers I
Sept 12	Cell communication, **paper discussion**		Nov 5	Germ layers II
Sept 17	Stem cells and gametes		Nov 7	Neural crest and its derivatives, **discussion**
Sept 19	Maternal provisioning and polarity		Nov 12	Segmentation and regionalization of the gut tube and neural tube
Sept 24	Fertilization		Nov 14	Organ systems: the tetrapod limb
Sept 26	Cortical rotation and cleavage		Nov 19	Organ systems: evolution of limb structures, **discussion**
Oct 1	No in-person class; **work on paper analysis**		Nov 21	Organ systems: eye development
Oct 3	Echinoderm early development and the principle of induction, **paper discussion**		Nov 26	Class on Zoom: review, final exam practice
Oct 8	No in-person class; **work on paper analysis**		Dec 3	Metamorphosis, **discussion**
Oct 10	Left-right axial patterning and spiralian early development, **paper discussion**		Dec 5	Sex determination
Oct 15	No in-person class; **work on paper analysis**		Dec 10	Regeneration, **discussion**
Oct 17	Gastrulation I, **paper discussion**		Dec 12	No class (reading day), optional office hours during normal class time
Oct 22	Gastrulation II, **time to answer questions for the exam**		TBD	**Final exam**

Students will learn:

1. To describe the general strategy that allows a single fertilized egg to grow into a multicellular adult animal with integrated organ systems
2. To understand at a mechanistic level how cell biology, signaling pathways, and outside influences engage information encoded within organismal genomes to faithfully recapitulate adult forms generation after generation
3. To generate hypotheses about developmental mechanisms and design experiments to test those hypotheses – to have a working knowledge of developmental mechanisms
4. To read and interpret foundational and current scientific literature in the field of developmental biology
5. How key experiments are designed, performed, and interpreted in developmental biology
6. To relate gene regulation with cell identity, morphology, and physiology
7. How cell-to-cell signaling coordinates the behaviors and identities of cells in multicellular organisms, and to describe the main signaling pathways that play important roles in development
8. To appreciate the deep conservation of molecular pathways of development, and how evolutionary changes in developmental programs cause both major and minor changes in phenotype
9. To name, describe and order the main stages of development common to most animals
10. To identify the cellular behaviors that lead to morphological change during development

Students will have opportunities to learn and demonstrate mastery of the following skills:

1. Describe how developmental processes connect levels of biological organization, such as connecting gene sequence to gene expression to cell behaviors and physiology to morphogenetic outcomes
2. Describe key features, processes, and stages in animal development and compare and contrast these processes in different organismal contexts
3. Integrate temporal and spatial information and translate visual representations of developmental processes from different views and time points
4. Impute a gene regulatory network, including transcription factors and signaling pathways, from empirical data
5. Explain how morphology arises from differential physical properties of cells, and how those physical properties arise from differences in gene expression
6. Locate and evaluate from primary literature scientific arguments about causal mechanisms for organismal phenotype; parse claims, evidence, justification, and caveats
7. Recognize testable research questions in developmental biology, formulate clear hypotheses, and identify and the type(s) of experiments that could answer them, including necessary controls and justified choice of experimental organism(s)
8. Explain the connection of developmental biology to evolution, of normal development to disease, and the role of studying diverse species in addressing fundamental questions that affect human health

9. Compare and contrast developmental phenomena in animal embryonic development with related phenomena, such as animal regeneration, plant development, fungal life cycles, and facultative multicellularity in diverse organisms
10. Read and critique scientific literature; weigh the strength of evidence for a scientific claim and understand what areas of development remain unknown

Grading:

Item/group	Percentage
Exam I	25
Final Exam (comprehensive)	25
Quizzes, paper analyses, and problem sets	25
Participation and preparation (polls, mini-quizzes, discussion boards, case studies, etc.) Note that Canvas attendance default setting is in use, this gives 80% credit for late arrivals; this will have a negligible impact (likely none) on your final grade as it will be outweighed by the assignments in this category	25

I cannot accept late work without prior arrangement. No late work can be accepted after the final class. I aim to grade and/or return (as appropriate) all work within 2 weeks. However, I cannot return any work while there are still outstanding makeups so this is not entirely within my control.

Regrade policy: If you do not understand your grade or think I have made an error in grading, please submit your request using the request form on the course site within 1 week. Any regrades (beyond trivial issues such as addition errors, misspelling leading to an incorrect mark on a fill-in-the-blank via Canvas, etc.) will require a full regrade of the entire assessment and may therefore result in either gaining or losing points. Grading issues need to be discussed in writing but discussions about how to improve answers can be in any format.

Please use the course question forum in Canvas to ask questions about course content.

Grade	Percentage	Significance (per NJIT grading policies)
A	90-100%	Superior
B+	86-89%	Excellent
B	80-85%	Very Good

Grade	Percentage	Significance (per NJIT grading policies)
C+	75-79%	Good
C	70-74%	Acceptable
D	65-69%	Minimum
F	0-64%	Inadequate

Extra credit: The only extra credit available will be available to everyone. There will be no ad-hoc extra credit. Extra credit will be available through Canvas assignments/quizzes noted as extra credit, unannounced quizzes, and questions embedded within the regular exams (some of which may appear to be regular questions). These cannot be made up or accepted late, and they are exempt from regrade requests.

Assessments: Exams and quizzes will be comprehensive, but with a focus on recent material. Any assessment may include material covered at any prior point in the class; this spaced repetition is intended to improve your learning and help you integrate concepts across units.

Specific instructions will be given for each assessment, indicating whether any resources may be used. Many quizzes are open note, open book, or allow you to work with a partner. If a resource is not explicitly allowed then you may not use it.

In-class quizzes that allow partner work cannot be taken in the testing center because they are more like an active learning activity than a regular quiz. The intended benefit to you is in discussing with a partner so having more time to work alone would not be an advantage.

Quizzes and exams will include a variety of question styles, including multiple choice, short answer, and fill-in-the-blank questions. The final exam will be oral and comprehensive.

Make up exams/quizzes will be written or oral, at my discretion, and may include very different material from the rest of the class. Students arriving late to a quiz/test will not be given extra time. If the University is officially closed on an exam day, the exam will be held on the next regularly scheduled class day. Accommodations for religious or cultural holidays must be requested via the informational quiz during the first week of classes.

Academic honesty: All assessments will clearly indicate if they may be completed in collaboration with partners and whether notes, books, or other tools are allowed. If not otherwise specified, then no collaboration or resources may be used. Any suspected use of generative AI, cheating, and plagiarism will be referred to the Dean of Students office.

Office hours: After class and by appointment using the provided link: https://calendar.app.google/yDawBKGmZhvzM4ij7 Please book in advance and send me a message on

Canvas to let me know you have booked, whether you would like to meet in person on on Zoom, and the subject(s) you wish to discuss so I can prepare to help you best. I can arrange other times to meet with you if you can't find any openings that work for your schedule; again, send a message on Canvas to arrange this.