GENERAL BIOLOGY 115 LECTURE SCHEDULE

SECTIONS MEETING M/W 5:40 - 7:00 pm

<table>
<thead>
<tr>
<th>Week of:</th>
<th>Lecture I (Monday)</th>
<th>Lecture II (Wednesday)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sept. 4 - 8</td>
<td>No class – Monday=Labor Day</td>
<td>Biology and Learning</td>
</tr>
<tr>
<td>Sept. 11 - 15</td>
<td>Scientific Process/Chemistry</td>
<td>Biological Molecules</td>
</tr>
<tr>
<td>Sept. 18 - 22</td>
<td>Origin of Life</td>
<td>Cell Structure</td>
</tr>
<tr>
<td>Sept. 25 - 29</td>
<td>Membranes &amp; Transport</td>
<td>Metabolism</td>
</tr>
<tr>
<td>Oct. 2 - 6</td>
<td>Photosynthesis</td>
<td>Respiration</td>
</tr>
<tr>
<td>Oct. 9 - 13</td>
<td>Cell Cycle</td>
<td>Meiosis</td>
</tr>
</tbody>
</table>

Sunday Oct 15 - 3:00 - 4:20 pm - Hour Exam I

Hour Exam I will have 70 questions; at least half will be Systems Level questions which will cover material from the Biology and Learning through and including Respiration lectures.

<table>
<thead>
<tr>
<th>Oct. 16 - 20</th>
<th>Mendelian Genetics</th>
<th>Chromosomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct. 23 – 27</td>
<td>DNA</td>
<td>Gene Expression</td>
</tr>
<tr>
<td>Oct. 30 – Nov.3</td>
<td>Gene Regulation</td>
<td>DNA Technology</td>
</tr>
<tr>
<td>Nov. 6 - 10</td>
<td>Human Genetics</td>
<td>Darwinian Evolution</td>
</tr>
</tbody>
</table>

Sunday Nov 12 - 3:00 - 4:20 pm - Hour Exam II

Hour Exam II will be comprehensive and have 70 questions; at least half will be Systems Level questions. While the newest lectures (Cell Cycle through and including Human Genetics) will be emphasized, students will be expected to make connections between the new material and the older material.

<table>
<thead>
<tr>
<th>Nov. 13 - 17</th>
<th>Population Genetics</th>
<th>Speciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 20 – 24</td>
<td>Phylogenetics</td>
<td>Wednesday 11/22 No lecture Follow Friday Schedule</td>
</tr>
<tr>
<td>Nov. 27– Dec. 1</td>
<td>Animal Behavior</td>
<td>Population Ecology</td>
</tr>
<tr>
<td>Dec. 4 - 8</td>
<td>Community Ecology</td>
<td>Ecosystem Ecology</td>
</tr>
<tr>
<td>Dec. 11-15</td>
<td>Biomes /Aquatic Ecology</td>
<td>Conservation Biology</td>
</tr>
</tbody>
</table>

Thursday 12/14 = Reading Day

Sat Dec 16, 1:00 - 4:00 PM FINAL EXAM

The Final Exam is comprehensive and will have 140 questions; at least half will be Systems Level questions; students will be expected to make connections between all the material. 55 questions will emphasize the material from the Bio/Learn through Human Genetics lectures. 85 questions will emphasize the material from Darwinian Evolution through Conservation Biology lectures but will also include questions connecting the new material with the older material.
### GENERAL BIOLOGY 115 LECTURE SCHEDULE

**SECTIONS MEETING Tu/F 12:10 pm - 1:30 pm**

<table>
<thead>
<tr>
<th>Week of:</th>
<th>Lecture I (Tuesday)</th>
<th>Lecture II (Friday)</th>
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<tbody>
<tr>
<td>Sept. 4 - 8</td>
<td>Biology and Learning</td>
<td>Scientific Process/Chemistry</td>
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**Sunday Oct 15 - 3:00 - 4:20 pm - Hour Exam I**

Hour Exam I will have 70 questions; at least half will be Systems Level questions which will cover material from the *Biology and Learning through including Respiration* lectures.

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<tr>
<td>Nov. 6 - 10</td>
<td>Darwinian Evolution</td>
<td>Population Genetics</td>
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**Sunday Nov 12 - 3:00 - 4:20 pm - Hour Exam II**

*Hour Exam II will be comprehensive* and have 70 questions; at least half will be Systems Level questions.

While the newest lectures (*Cell Cycle through and including Human Genetics*) will be emphasized, students will be expected to make connections between the new material and the older material.

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<thead>
<tr>
<th>Nov. 13 - 17</th>
<th>Speciation</th>
<th>Phylogenetics</th>
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<tbody>
<tr>
<td>Nov. 20 – 24</td>
<td>No Lecture</td>
<td><strong>Tuesday=Thursday–follow Thursday Schedule</strong></td>
</tr>
<tr>
<td>Dec. 4 - 8</td>
<td>Ecosystem Ecology</td>
<td>Biomes /Aquatic Ecology</td>
</tr>
<tr>
<td>Dec. 11-15</td>
<td>Conservation Biology</td>
<td><strong>No class</strong></td>
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**Thursday 12/14 = Reading Day**

**Sat Dec 16, 1:00 - 4:00 PM FINAL EXAM**

*The Final Exam is comprehensive* and will have 140 questions; at least half will be Systems Level questions; students will be expected to make connections between all the material.

55 questions will emphasize the material from the *Bio/Learn through Human Genetics* lectures.

85 questions will emphasize the material from *Darwinian Evolution through Conservation Biology* lectures but will also include questions connecting the new material with the older material.
GENERAL BIOLOGY 115 LECTURE SCHEDULE

SECTIONS MEETING Tu/F 8:30 - 9:50 am

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Sunday Oct 15 - 3:00 - 4:20 pm - Hour Exam I

Hour Exam I will have 70 questions; at least half will be Systems Level questions which will cover material from the Biology and Learning through and including Respiration lectures.

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<td>Darwinian Evolution</td>
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Sunday Nov 12 - 3:00 - 4:20 pm - Hour Exam II

Hour Exam II will be comprehensive and have 70 questions; at least half will be Systems Level questions. While the newest lectures (Cell Cycle through and including Human Genetics) will be emphasized, students will be expected to make connections between the new material and the older material.

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<th>Nov. 13 - 17</th>
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<tr>
<td>Nov. 20 – 24</td>
<td>No Lecture Tuesday=Thursday–follow Thursday Schedule</td>
<td>Wednesday 11/22 = Friday Animal Behavior</td>
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Thursday 12/14 = Reading Day

Sat Dec 16, 1:00 - 4:00 PM FINAL EXAM

The Final Exam is comprehensive and will have 140 questions; at least half will be Systems Level questions; students will be expected to make connections between all the material.

55 questions will emphasize the material from the Bio/Learn through Human Genetics lectures.
85 questions will emphasize the material from Darwinian Evolution through Conservation Biology lectures but will also include questions connecting the new material with the older material.
## GENERAL BIOLOGY 115 LECTURE SCHEDULE

### SECTIONS MEETING Tu/Th 3:50 - 5:10 pm

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<tr>
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<td>Meiosis</td>
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### Sunday Oct 15 - 3:00 - 4:20 pm - Hour Exam I

Hour Exam I will have 70 questions; at least half will be Systems Level questions which will cover material from the *Biology and Learning through and including Respiration* lectures.

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### Sunday Nov 12 - 3:00 - 4:20 pm - Hour Exam

*Hour Exam II will be comprehensive* and have 70 questions; at least half will be Systems Level questions. While the newest lectures (*Cell Cycle through and including Human Genetics*) will be emphasized, students will be expected to make connections between the new material and the older material.

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</tr>
</thead>
<tbody>
<tr>
<td>Nov. 20 – 24</td>
<td>Tuesday 11/21=Thursday Schedule</td>
<td>Thursday 11/23 No lecture</td>
</tr>
<tr>
<td></td>
<td>Animal Behavior</td>
<td>Thanksgiving Break</td>
</tr>
<tr>
<td>Dec. 4 - 8</td>
<td>Ecosystem Ecology</td>
<td>Biomes /Aquatic Ecology</td>
</tr>
<tr>
<td>Dec. 11-15</td>
<td>Conservation Biology</td>
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**Thursday 12/14 = Reading Day**

### Sat Dec 16, 1:00 - 4:00 PM FINAL EXAM

*The Final Exam is comprehensive* and will have 140 questions; at least half will be Systems Level questions; students will be expected to make connections between all the material. 55 questions will emphasize the material from the *Bio/Learn through Human Genetics* lectures. 85 questions will emphasize the material from *Darwinian Evolution through Conservation Biology* lectures but will also include questions connecting the new material with the older material.
Skimming and General Biology

Please watch the introduction video on Canvas – Skimming and General Biology prior to starting the course.

We provide you a “Skimming” list rather than a “Reading” list because we want you to skim the book rather than read it. A textbook like Biology is written so that as many instructors will adopt the book (think sales!) and thus any textbook contains more information in any chapter than an individual lecturer would attempt to ask students to learn. Rather than spending your time and energy reading an entire section, much of which you will not be tested on, we want to guide you to the specific concepts that will be addressed and what specifically we expect you to be able to do with this content when you are finished learning. Within a Topic area, the covered concepts are the Outline on your BiOs form and what you will need to do are the Outcomes on your BiOs forms. The Organizer is a visual tool to help you see how all the components relate to each other. The Organizer will also help you recall this organized group of ideas together as a “chunk” during examinations.

Skimming rather than reading will help you better align with your lecturer and what you will need to do with that topic on an exam. Skimming is the very being of the learning process; if you feel that reading will help you, read after you have attended lecture so that you are very clear on your instructor’s expectations.

The Skimming Sequence:

1. Before the lecture, review the outcomes provided for each topic as shown below;
2. then skim the sections indicated before the lecture using the outcome to guide you to the appropriate parts of the assigned sections;
3. complete a BiOs form as you skim. BiOs form files are available on Sakai with copies included at the end of this skimming list as well.

For example: An outcome for Ch. 1.1 is to sequence the scientific method:

**Topic:** The Science of Biology
**First Level of Outline:** What is Biology?
**Second Level of Outline:** a) Define Biology

**Outcome:** Compare and contrast biology with other sciences
**Outcome Details:** Identify types of sciences
**Organizer:** A table comparing types of sciences
b) What is Science?

**Outcome:** Sequence the scientific method
**Outcome Details:** Identify individual steps of scientific method
**Organizer:** A flow chart showing the correct steps of the scientific method.

At the beginning of the semester, we understand that you might not be familiar with this type of structuring in the terminology, but after a couple lectures and workshops, we are confident that you will find both skimming and this way of structuring material to be very helpful. For example, “key terms” (often bold printed terms) are Outcome Details, but by structuring the content this way, one can better understand how different terms relate to each other in hierarchies, systems, and cycles.

Ready for Lecture: With your Skimming complete and a draft BiOs form in hand, you are now well prepared to take notes during lecture. We urge students to actively take hand-written notes as research clearly indicates that it leads to better academic performance than taping, computer use, and worst of all, just taking pictures. See for example: Mueller, P., and Oppenheimer, D. (2014). The Pen Is Mightier Than the Keyboard: Advantages of...
Longhand Over Laptop Note Taking. Psychological Science Vol. 25(6) 1159–1168 https://cpb-us-w2.wpmucdn.com/sites.udel.edu/dist/6/132/files/2010/11/Psychological-Science-2014-Mueller-0956797614524581-1u0h0vu.pdf. We also recommend that you take notes in an outline format so that the structure of the content is reinforced. Use the headings and subheadings provided by your lecturers and indent your notes accordingly as you write them. Paraphrase what your lecturer says; don’t just copy the PowerPoint slide; they only give structure and key terms. Work to capture what your lecturer says.

After Lecture: If you do not feel your written notes are complete after a lecture, work with a classmate to add what you are worried having missed. Also make sure you have the same organization/structure, the same key terms and figures and then either update the BiOs form you made while skimming or make a new BiOs form using both the one you made while skimming and your reviewed notes together. With this new BiOs form, you are both well prepared to “do workshop before workshop” and workshop itself. After workshop, reevaluate your BiOs form to make sure your materials and preparation are well aligned with your lecturers’ expectation (recall the headings and subheadings they provide). And then, practice, practice, practice recalling the Outcomes and making your Organizers. Recall the RU Learning pathway from page 2 and plan your week so that you have time for all activities. Remember, original notes are a requirement for workshop and the more complete your notes, the better you will be able to prepare yourself for both workshops and examinations.

Note: Topics may change during the semester; you are responsible for any changes announced in lecture. Lecturers may not cover all topics within the assigned sections; content reviewed in lecture is the source of exam questions.

Skimming assignments are in the required OpenStax Biology (2nd edition),

https://openstax.org/details/books/biology-2e.

This course has received an ‘Open and Affordable Textbooks Program award from the Rutgers University Libraries. The OAT Program supports textbook affordability at Rutgers by encouraging courses to adopt educational materials that are freely available, available at a low cost (compared to similar courses), or part of the Rutgers University Libraries’ electronic collections, and thereby free of charge to Rutgers University students. In some few cases additional material is referenced in the skimming list. Please use the included link to view the material. Links to additional material are also located in Canvas under the references tab.

<table>
<thead>
<tr>
<th>Lecture Title</th>
<th>Chapter with appropriate section(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Biology and Learning</td>
<td>Ch. 1.1 and Ch. 35.2 – Biology 2nd Ed. and 8.1</td>
</tr>
<tr>
<td></td>
<td>Ch. 8.1 from Psychology 2nd Ed. access 8.1 @ <a href="https://openstax.org/books/psychology-2e/pages/8-1-how-memory-functions">https://openstax.org/books/psychology-2e/pages/8-1-how-memory-functions</a></td>
</tr>
<tr>
<td></td>
<td>Ch. 1.1, 1.2 and Ch. 2.1 and 2.2</td>
</tr>
<tr>
<td>• compare and contrast course components</td>
<td></td>
</tr>
<tr>
<td>• compare and contrast types of learning</td>
<td></td>
</tr>
<tr>
<td>• sequences the process of memory formation</td>
<td></td>
</tr>
</tbody>
</table>

2. Scientific Process/Chemistry

• compare and contrast, sequence levels of biological organization
• sequence the process of science
• compare and contrast the types of chemical bonds
• compare and contrast the emergent properties of water
3. Biological Molecules 
- compare and contrast the functional groups
- compare and contrast the biological molecules
- sequence the process of polymerization
- compare and contrast types hydrolysis and dehydration synthesis
- compare and contrast the levels of protein structure

4. Origin of Life 
- compare and contrast the requirements for the origin life
- compare and contrast the Oparin-Haldane and Iron Sulfur hypotheses
- sequence the process of abiogenesis
- sequence the major events in the evolution of life

5. Cell Structure 
- compare and contrast prokaryotic and eukaryotic cells
- compare and contrast cellular components and organelles
- sequence intracellular transport pathway

6. Membranes & Transport 
- compare and contrast membrane components
- hypothesize and diagnose the fluid mosaic model
- compare and contrast the types of membrane transport
- compare and contrast the types of bulk transport
- sequence the types of bulk transport

7. Metabolism 
- compare and contrast catabolic and anabolic reactions
- sequence how ATP drives chemical work
- sequence energy flow through ecosystems
- sequence enzymatic reactions
- hypothesize and diagnose the impact of variability on enzyme activity
- compare and contrast oxidation and reduction reactions
- sequence NAD+ function in redox reactions

8. Photosynthesis 
- hypothesize and diagnose interactions of light and electrons
- compare and contrast the components of chloroplasts
- compare and contrast photosystems I and II
- compare and contrast the stages of photosynthesis
- sequence the stages of photosynthesis
- hypothesize and diagnose the impact of variability on photosynthesis

9. Respiration 
- sequence the general process of cellular respiration
- hypothesize and diagnose the general process of cellular respiration
- compare and contrast the stages of cellular respiration
- sequence the stages of cellular respiration
- hypothesize and diagnose the impact of variability on cellular respiration
- compare and contrast respiration and photosynthesis
10. Cell Cycle Ch. 10.1, 10.2, and 10.5
- compare and contrast chromosome structure and number
- compare and contrast stages of the cell cycle
- sequence stages of the cell cycle
- hypothesize and diagnose stages of the cell cycle

11. Meiosis Ch. 11.1 and 11.2
- compare and contrast asexual and sexual reproduction
- sequence the general sexual life cycle
- compare and contrast the stages of meiosis
- sequence the process of meiosis
- hypothesize and diagnose the process of meiosis
- compare and contrast mitosis and meiosis

12. Mendelian Genetics Ch. 12.1 and 12.2
- sequence Mendel’s work
- compare and contrast competing hypotheses for inheritance
- compare and contrast the principles of heredity
- apply genetic crosses
- apply probability rules in genetics

13. Chromosomes Ch. 13.1 and 13.2
- sequence Morgan’s experiments
- compare and contrast sex linkage
- hypothesize and diagnose sex linkage
- sequence patterns of inheritance
- hypothesize and diagnose patterns of inheritance

14. DNA Ch. 14.1 through 14.4
- sequence the major experiments that lead to our understanding of DNA
- compare and contrast the major experiments that lead to our understanding of DNA
- compare and contrast the structure of DNA
- hypothesize and diagnose the structure of DNA
- sequence semi-conservative DNA replication
- hypothesize and diagnose the impact of variability on DNA replication

15. Gene Expression Ch. 15.1 through 15.5
- sequence the flow of genetic information in cells
- compare and contrast the types of RNA
- sequence transcription in eukaryotes
- hypothesize and diagnose transcription in eukaryotes
- sequence translation in eukaryotes
- hypothesize and diagnose the impact of variability on transcription and translation
- compare and contrast DNA replication, transcription, and translation

16. Gene Regulation Ch. 16.1 through 16.5
- sequence Lac operon regulation
- hypothesize and diagnose the impact of variability on Lac operon regulation
- compare and contrast negative and positive regulation of prokaryotic gene expression
- sequence the processes of eukaryotic gene regulation
- compare and contrast the processes of eukaryotic gene regulation
- hypothesize and diagnose the impact of variability on eukaryotic gene regulation
17. DNA Technology 
- sequence PCR
- hypothesize and diagnose the impact of variability on PCR
- sequence dideoxy sequencing
- hypothesize and diagnose the impact of variability on dideoxy sequencing
- apply and hypothesize and diagnose the impact of variability on DNA technologies
- compare and contrast DNA replication, transcription, PCR, and DNA sequencing

18. Human Genetics 
- apply pedigree analysis
- compare and contrast Mendelian inheritance in human traits
- compare and contrast non-Mendelian inheritance in human traits

19. Darwinian Evolution 
- sequence pre-Darwinian ideas and hypotheses
- sequence Darwin’s work and conclusions
- interpret Darwin’s work and conclusions
- compare and contrast the evidence for evolution

20. Population Genetics 
- compare and contrast sources of genetic and phenotypic variation
- apply the Hardy-Weinberg formulae
- compare and contrast the major mechanisms of evolution
- sequence the major mechanisms of evolution
- hypothesize and diagnose the impact of variability on the major mechanisms of evolution

21. Speciation 
- compare and contrast species concepts
- compare and contrast reproductive isolation mechanisms
- sequence reproductive isolation mechanisms
- compare and contrast sympatric and allopatric speciation
- sequence sympatric and allopatric speciation

22. Phylogenetics 
- sequence the Linnaean classification system
- interpret a phylogeny
- compare and contrast monophyletic, paraphyletic, and polyphyletic groups
- sequence making phylogenies
- compare and contrast homologous and analogous traits

23. Animal Behavior 
- compare and contrast proximate and ultimate causation
- compare and contrast stimuli used in animal behavior
- compare and contrast the types of learning and cognition
- compare and contrast evolutionary causes of behavior

- compare and contrast the major concepts of population ecology
- compare and contrast the exponential and logistic growth models
- compare and contrast life history strategies
- compare and contrast density-dependent and density-independent limits to population size
25. Community Ecology  Ch. 45.6
- compare and contrast types of community interactions
- compare and contrast species abundance and species richness
- evaluate the trophic structure of a food web
- hypothesize and diagnose the impact of variability on the trophic structure of a food web
- compare and contrast primary and secondary succession

26. Ecosystem Ecology  Ch. 46.1 through 46.3
- compare and contrast energy production
- sequence the flow of energy through an ecosystem
- hypothesize and diagnose the impact of variability on the flow of energy through an ecosystem
- compare and contrast energy transfer concepts
- sequence energy transfers between trophic levels
- hypothesize and diagnose the impact of variability on energy transfers between trophic levels
- compare and contrast major biogeochemical cycles
- sequence major biogeochemical cycles

27. Biomes/Aquatic Ecology  Ch. 44.1 through 44.2, and 44.4 through 44.5
- compare and contrast macro- and micro-climate
- sequence climate change
- hypothesize and diagnose the impact of variability on climate change
- compare and contrast features of terrestrial biomes
- compare and contrast features of aquatic biomes
- compare and contrast aquatic biomes

28. Conservation Biology  Ch. 47.1 through 47.4
- compare and contrast concepts in biodiversity
- compare and contrast types of conservation strategies
- hypothesize and diagnose the impact of variability on landscape conservation
- compare and contrast the effects of human activity on Earth
- sequence the effects of human activity on Earth
- hypothesize and diagnose the effects of human activity on Earth