

# COURSE SYLLABUS

## COURSE NAME BIOLOGY

### SEMESTER/QUARTER AND YEAR

2017-18 school year

<b>INSTRUCTOR &amp; EMAIL:</b>	Mark Fontaine mfontaine@ccri.edu
<b>ROOM:</b>	200
<b>OFFICE HOURS:</b>	As needed

### COURSE DESCRIPTION/OVERVIEW:

This course provides the student with a basic understanding of general biological principles that are common to all living things. These topics include, but are not limited to, basic chemistry, biochemistry cellular and molecular anatomy and physiology, energy, genetic, and evolution. This course will also provide a general overview of the Domains of life with concentrations on areas that reflect the individual teacher's strengths and student interest. Biology will prepare the student for more advanced science courses at TIMES Squared Academy and beyond.

This curriculum has been developed in consultation with post-secondary institutions and is deemed conducive to student success in collegiate courses.

### GOALS:

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

1. explain the role of science in society and use scientific methodologies to solve hypothetical problems
2. convert units of length, mass, volume, and temperature within the metric system
3. list and describe the characteristics of living things using technological vocabulary
4. draw atoms with the use of the periodic table
5. illustrate and describe the formation of chemical bonds
6. describe the physical and chemical characteristics of water and how they impact the formation of life on the planet
7. identify the basic biomolecules, based on structure, and state their function in living systems
8. illustrate a cell, analyze the relationship between cellular anatomy and physiology
9. illustrate and describe the general formulas as well as the intermediate processes involved in photosynthesis, respiration, and fermentation
10. create a project showing how a molecule of DNA replicates
11. create a project showing how a protein is made
12. describe three levels of regulation of gene expression
13. debate the risks and benefits provided by advances in DNA technologies
14. describe the various stages of mitosis
15. explain the results of meiosis, how they occur, and why they are important
16. solve monohybrid and dihybrid genetics problems
17. explain the role of mutations in the development of a species

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18. defend the modern theory of evolution using evidence from biogeography, paleontology, anatomy, biochemistry, and embryology
19. critically evaluate fossil evidence and create a logical thesis as to what occurred
20. differentiate between the different Taxonomic schemes that have been created and explain why they are constantly being modified
21. describe the similarities and differences between the lytic and lysogenic viral cycles and explain two other viral cycles
22. explain the risks and benefits provided by viruses
23. diagnose and prescribe treatment for fictitious patients suffering from viral diseases
24. describe the general characteristics of the Domains; Archea, Bacteria, and Eukarya and analyze their evolutionary significance
25. describe the general characteristics of the Kingdom Protista and the major phyla of the kingdom and analyze their evolutionary significance
26. describe the general characteristics of the Kingdom Fungi and the major phyla of the kingdom and analyze their evolutionary significance
27. describe the general characteristics of the Kingdom Plantae and the major phyla of the kingdom and analyze their evolutionary significance
28. describe the general characteristics of the Kingdom Anamalia and the major phyla of the kingdom and analyze their evolutionary significance
29. describe, with examples, the increasing complexity and specialization seen throughout the evolution of life on the planet
30. perform a multi-quarter scientific investigation
31. discuss the major historical contributors to the field of biology
32. discuss current scientific events that are covered in the popular press
33. discuss fundamental ecological concepts
34. identify the gross anatomy of the human body
35. discuss the interrelated nature of the anatomy and physiology of the human body

## COMMON CORE STANDARDS OVERVIEW:

### Key Ideas and Details

- [CCSS.ELA-Literacy.RST.11-12.1](#) Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- [CCSS.ELA-Literacy.RST.11-12.2](#) Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
- [CCSS.ELA-Literacy.RST.11-12.3](#) Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

### Craft and Structure

- [CCSS.ELA-Literacy.RST.11-12.4](#) Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
- [CCSS.ELA-Literacy.RST.11-12.5](#) Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.

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- [CCSS.ELA-Literacy.RST.11-12.6](#) Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

### **Integration of Knowledge and Ideas**

- [CCSS.ELA-Literacy.RST.11-12.7](#) Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
- [CCSS.ELA-Literacy.RST.11-12.8](#) Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
- [CCSS.ELA-Literacy.RST.11-12.9](#) Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

### **Range of Reading and Level of Text Complexity**

- [CCSS.ELA-Literacy.RST.11-12.10](#) By the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently.

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## Key Ideas and Details

- [CCSS.ELA-Literacy.RH.9-10.1](#) Cite specific textual evidence to support analysis of primary and secondary sources, attending to such features as the date and origin of the information.
- [CCSS.ELA-Literacy.RH.9-10.2](#) Determine the central ideas or information of a primary or secondary source; provide an accurate summary of how key events or ideas develop over the course of the text.
- [CCSS.ELA-Literacy.RH.9-10.3](#) Analyze in detail a series of events described in a text; determine whether earlier events caused later ones or simply preceded them.

## Craft and Structure

- [CCSS.ELA-Literacy.RH.9-10.4](#) Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, or economic aspects of history/social science.
- [CCSS.ELA-Literacy.RH.9-10.5](#) Analyze how a text uses structure to emphasize key points or advance an explanation or analysis.
- [CCSS.ELA-Literacy.RH.9-10.6](#) Compare the point of view of two or more authors for how they treat the same or similar topics, including which details they include and emphasize in their respective accounts.

## Integration of Knowledge and Ideas

- [CCSS.ELA-Literacy.RH.9-10.7](#) Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.
- [CCSS.ELA-Literacy.RH.9-10.8](#) Assess the extent to which the reasoning and evidence in a text support the author's claims.
- [CCSS.ELA-Literacy.RH.9-10.9](#) Compare and contrast treatments of the same topic in several primary and secondary sources.

## Range of Reading and Level of Text Complexity

- [CCSS.ELA-Literacy.RH.9-10.10](#) By the end of grade 10, read and comprehend history/social studies texts in the grades 9–10 text complexity band independently and proficiently.

## CLASSROOM RULES/PROCEDURES:

### RULES FOR DR. FONTAINE'S STUDENTS

1. All students will be in their seats and ready to begin when the bell rings. Each minute after the bell, without a legitimate pass, will result in the student being assigned two minutes of detention for every minute he or she is late. Detention will be served on the day of the lateness. Time will be rounded up to the next whole minute.
2. All students will bring all necessary materials to class and be prepared to participate fully in every class.
3. All homework will be due on the assigned due date. No credit will be awarded for late assignments.
4. All work missed due to a legitimate absence must be made up within 5 school days of the students returning to school. Extended absences will be dealt with on a case-by-case basis
5. Students will only be allowed to leave the classroom five times per semester unless there is an emergency. Students should utilize passing times to attend to personal needs.

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6. Any student that does not understand something should ask for clarification immediately.
7. Any student that feels he or she needs extra help should talk to Dr. Fontaine immediately and arrange to get whatever extra support is needed.
8. The use of any type of electronic devices, except a calculator, will result in the immediate confiscation of the device, which will be turned over to an administrator. Repeated offences will require a parent conference.

## RULES FOR DR. FONTAINE

1. Dr. Fontaine will be prepared to begin class when the bell rings.
2. Dr. Fontaine will return all assignments (except extra credit work) within three school days of receiving them.
3. Dr Fontaine will post grades to Edline frequently and punctually.
4. There will be a review prior to all tests and quizzes.

## RULES FOR PARENTS

1. Parents should encourage their children to do their best and to seek help from Dr. Fontaine when needed.
2. Parents should help their children in putting together articles.
3. Parents should contact Dr. Fontaine as soon as they have any questions or concerns about their child. The best way to contact Dr. Fontaine is by calling TIMES<sup>2</sup>. Dr. Fontaine can also be reached by e-mail at [mfontaine@ccri.edu](mailto:mfontaine@ccri.edu)

THIS LIST IS REQUIRED TO BE SIGNED BY DR. FONTAINE, THE STUDENT, AND A PARENT OR GUARDIAN BY TBD. THIS LIST SHOULD BE LEFT IN THE STUDENT'S NOTEBOOK OR FOLDER.

**THE EDUCATIONAL EXPERIENCE WORKS BEST WHEN PARENTS, STUDENTS, AND TEACHERS WORK TOGETHER TOWARD A SUCCESSFUL OUTCOME FOR THE STUDENT.**

## GRADING POLICY:

1. Each assignment is given a point value based on the amount of student effort needed to complete the task. For example:
  - a. short in-class assignments where students can use their notes are worth 5 points
  - b. homework assignments are worth 5-15 points
  - c. labs are worth 15-20 points
  - d. tests are worth 20-30 points
2. The point value of each assignment will be announced when the assignment is given.
3. If a student is absent, he or she will have 5 school days to make up any missed work. It is the student's responsibility to inquire about what was missed.
4. The student's average will be calculated as a percentage of the total points possible. For example:

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	Points earned	Points possible
Class assignment	5	5
Homework	8	10
Class assignments	4	5
Lab	13	15
Test	23	25

Student's average:  $53/60 \times 100\% = 88\%$

### COURSE CALENDAR:

DATE (Weekly)	TOPIC(S)	ASSIGNMENT(S)	ASSIGNMENT(S) DUE DATE
TBD	<ol style="list-style-type: none"> <li>1. Discussion about what science is</li> <li>2. Scientific method</li> <li>3. Metric system</li> </ol>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ol style="list-style-type: none"> <li>1. Characteristics of living things</li> <li>2. Types of biologists</li> <li>3. Biological tools and techniques</li> </ol>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ol style="list-style-type: none"> <li>1. Nature of matter</li> <li>2. Characteristics of atoms</li> <li>3. Chemical bonds</li> <li>4. Chemical reactions</li> <li>1. Water: chemical/biological characteristics</li> <li>2. Carbohydrates</li> <li>3. Lipids</li> <li>4. Proteins</li> <li>5. Nucleic acids</li> </ol>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ol style="list-style-type: none"> <li>1. Cell theory</li> <li>2. Cell structure</li> <li>3. Organelle function</li> <li>4. Movement across the membrane</li> <li>5. Cell specialization and organization</li> </ol>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	1. Photosynthesis	Assignments vary	TBD

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	<ol style="list-style-type: none"> <li>2. Cellular respiration</li> <li>3. Fermentation</li> </ol>	with the needs of the class as a whole and individual students	
TBD	<ol style="list-style-type: none"> <li>1. History of the discovery of DNA as the primary genetic molecule</li> <li>2. Structure of DNA</li> <li>3. DNA replication</li> <li>4. RNA structure</li> <li>5. Protein synthesis</li> <li>6. Regulation of gene expression</li> <li>7. DNA technology (electrophoresis, PCR, libraries/registries, probes, recombinant DNA, gene therapy, gene testing, and stem cell research)</li> </ol>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ol style="list-style-type: none"> <li>1. Cell cycle</li> <li>2. Mitosis</li> <li>3. Cytokinesis</li> <li>4. Cancer</li> </ol>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ol style="list-style-type: none"> <li>1. Meiosis</li> <li>2. Gregor Mendel</li> <li>3. Genetics problems</li> <li>4. Mutations</li> <li>5. Genetic disorders</li> </ol>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ol style="list-style-type: none"> <li>1. Theories of evolution</li> <li>2. The age of the earth</li> <li>3. Evidence for evolution</li> </ol>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ol style="list-style-type: none"> <li>1. Are viruses alive</li> <li>2. Viral cycles</li> <li>3. Viral diseases</li> <li>4. Uses of viruses</li> </ol>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	Taxonomy <ol style="list-style-type: none"> <li>1. Historical</li> </ol>	Assignments vary with the needs of the	TBD

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	<ul style="list-style-type: none"> <li>development</li> <li>2. Current system</li> <li>3. Evidence and logic of progression</li> </ul>	class as a whole and individual students	
TBD	<ul style="list-style-type: none"> <li>1. Characteristics of Archea</li> <li>2. Major kingdoms of Archea</li> <li>3. Identification of Archea</li> </ul>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ul style="list-style-type: none"> <li>1. Characteristics of Bacteria</li> <li>2. Major kingdoms of Bacteria</li> <li>3. Identification of Bacteria</li> </ul>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ul style="list-style-type: none"> <li>1. Characteristics of protistans</li> <li>2. Major phyla of protistans</li> </ul>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ul style="list-style-type: none"> <li>1. Characteristics of fungi</li> <li>2. Major phyla of fungi</li> <li>3. Role of fungi in the environment.</li> </ul>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ul style="list-style-type: none"> <li>1. Structure of moss</li> <li>2. Life cycle of moss</li> <li>3. Structure of ferns</li> <li>4. Life cycle of ferns</li> </ul>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ul style="list-style-type: none"> <li>1. Plant anatomy</li> <li>2. Gymnosperms</li> <li>3. Angiosperms</li> <li>4. Evolutionary trends</li> </ul>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ul style="list-style-type: none"> <li>1. Describe the unique characteristics of Porifera</li> <li>2. Differentiate between the major</li> </ul>	Assignments vary with the needs of the class as a whole and individual students	TBD



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	classes of the phylum Porifera		
TBD	<ol style="list-style-type: none"> <li>1. Describe the unique characteristics of Cnidaria</li> <li>2. Differentiate between the major classes of the phylum Cnidaria</li> </ol>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ol style="list-style-type: none"> <li>1. Characteristics of the phyla Platyhelminthes and Nematoda</li> <li>2. Major classes of the phyla Platyhelminthes and Nematoda</li> </ol>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ol style="list-style-type: none"> <li>1. Describe the unique characteristics of Mollusca and Annelida</li> <li>2. Differentiate between the major classes of the phylum Mollusca and Annelida</li> </ol>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ol style="list-style-type: none"> <li>1. Describe the unique characteristics of Arthropoda and Echinodermata</li> <li>2. Differentiate between the major classes of the phylum Arthropoda and Echinodermata</li> </ol>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ol style="list-style-type: none"> <li>1. Describe the unique characteristics of Chordata</li> <li>2. Differentiate between the major classes of the phylum Chordata</li> </ol>	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	<ol style="list-style-type: none"> <li>1. Animal tissues</li> <li>2. Essential functions</li> </ol>	Assignments vary with the needs of the	TBD

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	3. Evolutionary trends	class as a whole and individual students	
TBD	Ecology 1. Definition of terms. 2. Food webs and trophic levels 3. Succession 4. Biomes 5. Man's effect on the environment	Assignments vary with the needs of the class as a whole and individual students	TBD
TBD	1. Long-term scientific/engineering investigation (associated with participation in RISEF) 2. Current events	Project runs throughout the semester Articles are due every Friday	TBD