

## SYLLABUS

<b>CIP CODE:</b>	26.0101
<b>SEMESTER</b>	Feb-06
<b>COURSE TITLE</b>	General Biology
<b>COURSE NUMBER</b>	BIOL 121
<b>CREDIT HOURS</b>	5.0
<b>INSTRUCTOR</b>	DEPARTMENTAL SYLLABUS
<b>OFFICE LOCATION</b>	DEPARTMENTAL SYLLABUS
<b>OFFICE HOURS</b>	DEPARTMENTAL SYLLABUS
<b>TELEPHONE</b>	DEPARTMENTAL SYLLABUS
<b>PREREQUISITES</b>	NONE

**REQUIRED TEXT AND MATERIALS:** See bookstore for current textbook.

### **COURSE DESCRIPTION:**

General Biology introduces fundamental biological principles characteristic of all living things. Lecture and laboratory work will review the scientific method (experimental and observational science), levels of organization and emergent properties of life, molecular and cell biology, bioenergetics, reproduction, genetics, evolution and ecology. A prior course in Chemistry is recommended.

**METHOD OF INSTRUCTION:** A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, and panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

**Online Sections:** Online courses rely on the use of the Internet and a course management system for content delivery. Courses are accessible both on campus and from most remote sites. Specific information regarding computer skills and system requirements can be found at <http://www.kckcc.edu/online/index.html>

**Honors Sections:** An honors section of this course provides a non-traditional environment for learning that incorporates active student participation, critical reflection, use of primary sources and innovative teaching methods. Classes are designated as honors on the transcript. Enrollment in the honors section of this class requires the permission of the Director of Honors Education

**Telecourse Sections:** The telecourse section of this course combines classroom instruction, 30 half-hours of video viewing and outside independent work. Classroom seat time is reduced due

to the more rigorous study required outside the classroom along with the video viewing time. Videos can be checked out from the KCKCC library or can be viewed on Cable Channel 17.

**COURSE OUTLINE** (*the instructor may add and/or delete material as time permits.*)

- I. The nature of science
  - a. Life processes and characteristics
  - b. Scientific methods
  
- II. Levels of organization and emergent properties of life
  - a. Chemical
  - b. Cellular
  - c. Organ / Organ System
  - d. Organismal
  - e. Ecological
  
- III. Bioenergetics
  - a. Enzyme activity
  - b. Metabolism
  - c. Cellular respiration and photosynthesis
  
- IV. Reproduction and the continuity of life
  - a. Mitosis
  - b. Meiosis
  - c. Differentiation/development
  - d. Diversity of reproductive strategies
  
- V. The principles of genetics and the unity and diversity of life
  - a. Classical genetics
  - b. Molecular genetics
  
- VI. Evolution: the mechanism of change in biology
  - a. Natural selection
  - b. Speciation
  - c. Diversity of life/classification
  
- VII. Principles of ecology
  - a. Ecosystem organization
  - b. Ecological interactions
  - c. Environmental issues

**EXPECTED LEARNER OUTCOMES**

1. The learner will understand the methods of science, especially as they relate to

## Biology.

2. The learner will understand the complexities and interrelationships between and within living organisms.
3. The learner will use critical thinking both during and after the class.

## COURSE COMPETENCIES

- I. The nature of science
  1. The learner will be able to describe the scientific “method” of
    - a. observational science: problem identification, hypothesis, data collection and conclusion.
    - b. experimental science: problem identification, hypothesis, experiment and data collection, conclusion.
  2. The learner will be able to know the difference between deductive and inductive reasoning.
  3. The learner will be able to understand the use of controls, dependent variables and independent variables are necessary in the scientific method.
- II. Levels of organization and emergent properties of life
  4. The learner will be able to describe the basic structure of an atom.
  5. The learner will be able to know that electrons determine how atoms interact.
  6. The learner will be able to describe ionic, covalent, and hydrogen bonds.
  7. The learner will be able to describe the four major classes of organic molecules used by cells, their functions, and their building blocks.
  8. The learner will be able to understand the importance of the Miller-Urey experiments that recreated the conditions present in early earth and caused organic molecules to form spontaneously.
  9. The learner will be able to describe the basic tenants of modern cell theory.
  10. The learner will be able to explain why it is necessary that cells be small.
  11. The learner will be able to know the structure and function of the plasma membrane.
  12. The learner will be able to recognize that bacteria, as prokaryotes, are the simplest of cells.
  13. The learner will be able to compare the structure of prokaryotic and eukaryotic cells.
  14. The learner will be able to describe the functions of the cell nucleus and cytoplasmic organelles.
  15. The learner will be able to understand what drives the process of diffusion.
  16. The learner will be able to describe the interaction of organs within organ systems
  17. The learner will be able to recognize the properties of an organism.
  18. The learner will be able to outline the basic organization of global ecology.
- III. Bioenergetics
  19. The learner will be able to explain osmosis and define hypotonic and hypertonic conditions.
  20. The learner will be able to discuss the importance of active transport and the sodium-potassium pump.
  21. The learner will be able to list the functions of plasma membrane proteins, including how cells get chemical and electrical information.

22. The learner will be able to understand that chemical reactions in cells involve the making or breaking of chemical bonds.
  23. The learner will be able to compare exergonic and endergonic reactions.
  24. The learner will be able to discuss how activation energy is lowered by catalysis.
  25. The learner will be able to explain how an enzyme operates.
  26. The learner will be able to understand the basic stages of photosynthesis.
  27. The learner will be able to discuss how the Calvin cycle generates organic molecules.
  28. The learner will be able to list the stages of cellular respiration.
  29. The learner will be able to know where the stages of cellular respiration occur, which ones require oxygen, and the energy yield of each.
  30. The learner will be able to describe what happens in a cell to the products of glycolysis when no oxygen is present.
- IV. Reproduction and maintenance of the continuity of life
31. The learner will be able to explain how prokaryotic binary fission occurs.
  32. The learner will be able to know the significance of mitosis.
  33. The learner will be able to state the events that occur during the stages of mitosis.
  34. The learner will be able to understand that cell division is limited in normal cells, but unlimited in cancer cells.
  35. The learner will be able to understand the stages of meiosis.
  36. The learner will be able to understand the evolutionary significance of internal fertilization and development.
  37. The learner will be able to know the structures involved in the production of sperm.
  38. The learner will be able to describe the process of development of an egg cell from the primary oocyte to ovum stage.
  39. The learner will be able to discuss the events and hormones involved in the menstrual cycle.
  40. The learner will be able to describe the early stages of a zygote as it develops into a morula.
  41. The learner will be able to list the structures of the blastocyst and know the functions of each structure.
  42. The learner will be able to describe what occurs during gastrulation and neurulation.
- V. The principles of genetics and the unity and diversity of life
43. The learner will be able to understand the basic tenets of genetics, and distinguish between dominant and recessive and between homozygous and heterozygous.
  44. The learner will be able to state Mendel's two laws of heredity.
  45. The learner will be able to realize that genes are located along chromosomes.
  46. The learner will be able to describe various inheritance patterns, such as epistasis, pleiotropy, multiple alleles, incomplete dominance and codominance.
  47. The learner will be able to know how many chromosomes are in normal human cells and what causes aneuploidy.
  48. The learner will be able to understand what is meant by "sex-linked" genes, and give examples.
  49. The learner will be able to understand the experiments that led to the discovery that DNA is the genetic material.

50. The learner will be able to describe the double helix structure of DNA in which base pairing occurs.
  51. The learner will be able to describe why DNA replication is semi-conservative.
  52. The learner will be able to describe how mRNA is formed from the transcription of DNA.
  53. The learner will be able to explain how translation proceeds, and know the roles of ribosomes and tRNA in protein synthesis.
  54. The learner will be able to understand how the DNA molecule indicates where to start transcription at the promoter site.
  55. The learner will be able to explain how repressor, activation and enhancer proteins operate to regulate gene expression.
  56. The learner will be able to explain how mutagens may lead to mutations in DNA.
  57. The learner will be able to understand some of the basic procedures used in genetic engineering.
- VI. Evolution: the mechanism of change in biology
58. The learner will be able to understand the underlying principles of evolution.
  59. The learner will be able to describe the principles and data underlying natural selection.
  60. The learner will be able to discuss several methods, occurrences and evidence of speciation.
  61. The learner will be able to describe the diversity of life and describe the Linnean system of classification
- VII. Principles of ecology
62. The learner will be able to describe the organization and patterns of the earth's ecosystems.
  63. The learner will be able to discuss the interactions within the ecology of various ecosystems.
  64. The learner will be able to find, research and discuss current and past environmental issues.

**ASSESSMENT OF LEARNER OUTCOMES MAY INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING.**

- ◆ Regular tests, quizzes, or exams.
- ◆ Reviews and critiques of selected assigned videos.
- ◆ Media reports of biological issues and research and syntheses.
- ◆ The completion of homework and/or other assignments distributed during the course.
- ◆ Review paper of a biological science topic.
- ◆ Presenting the review paper to an audience of peers.

**SPECIAL NOTES:**

*This syllabus is subject to change at the discretion of the instructor. Material included is meant to provide an outline of the course and rules to which the instructor will adhere in evaluating the student's progress. However, this syllabus is not intended to be a legal contract. Questions regarding the syllabus are welcome any time.*

*Kansas City Kansas Community College complies with the Americans with Disabilities*

*Act. If you need accommodations due to a documented disability, please contact Valerie Webb, Room 3354 or 288-7670 V/TDD.*

*Kansas City Kansas Community College is committed to an appreciation of diversity with respect for the differences among the diverse groups comprising our students, faculty, and staff that is free of bigotry and discrimination. Kansas City Kansas Community College is committed to providing a multicultural education and environment that reflects and respects diversity and that seeks to increase understanding and tolerance.*

KANSAS CITY KANSAS COMMUNITY COLLEGE

COMPETENCY INDEX TEMPLATE

Semester/Course Number/Section/Title: BIOL 121 General Biology

Student Name: Student Number:

Instructor: Division:

RATING SCALE for Competency Achievement

4-Superior, 3-Good, 2-Average, 1-Inferior, 0-Failure, NA-not addressed

DIRECTIONS:

Evaluate the student by checking or highlighting the appropriate number to indicate the degree of competency achieved.

COURSE COMPETENCIES:

The nature of science

- 4 3 2 1 0 NA 1. The learner will be able to describe the scientific process of observation, hypothesis, prediction, experimentation, and conclusion.
- 4 3 2 1 0 NA 2. The learner will be able to know the difference between deductive and inductive reasoning.
- 4 3 2 1 0 NA 3. The learner will be able to understand why the use of controls is necessary in experimentation.

Levels of organization and emergent properties of life

- 4 3 2 1 0 NA 4. The learner will be able to describe the basic structure of an atom.
- 4 3 2 1 0 NA 5. The learner will be able to know that electrons determine how atoms interact.
- 4 3 2 1 0 NA 6. The learner will be able to describe ionic, covalent, and hydrogen bonds.
- 4 3 2 1 0 NA 7. The learner will be able to describe the four major classes of organic molecules used by cells, their functions, and their building blocks.
- 4 3 2 1 0 NA 8. The learner will be able to understand the importance of the Miller-Urey experiments that recreated the conditions present in early earth and caused organic molecules to form spontaneously.
- 4 3 2 1 0 NA 9. The learner will be able to describe the basic tenants of modern cell theory.
- 4 3 2 1 0 NA 10. The learner will be able to explain why it is necessary that cells be small.
- 4 3 2 1 0 NA 11. The learner will be able to know the structure and function of the plasma membrane.
- 4 3 2 1 0 NA 12. The learner will be able to recognize that bacteria, as prokaryotes, are the simplest of cells.
- 4 3 2 1 0 NA 13. The learner will be able to compare the structure of prokaryotic and eukaryotic cells.
- 4 3 2 1 0 NA 14. The learner will be able to describe the functions of the cell nucleus and cytoplasmic organelles.
- 4 3 2 1 0 NA 15. The learner will be able to understand what drives the process of diffusion.

- 4 3 2 1 0 NA 16.The learner will be able to describe the interaction of organs within organ systems
- 4 3 2 1 0 NA 17.The learner will be able to recognize the properties of an organism.
- 4 3 2 1 0 NA 18.The learner will be able to outline the basic organization of global ecology.

#### Bioenergetics

- 4 3 2 1 0 NA 16.The learner will be able to explain osmosis and define hypotonic and hypertonic conditions.
- 4 3 2 1 0 NA 17.The learner will be able to discuss the importance of active transport and the sodium-potassium pump.
- 4 3 2 1 0 NA 18.The learner will be able to list the functions of plasma membrane proteins, including how cells get chemical and electrical information.
- 4 3 2 1 0 NA 19.The learner will be able to understand that chemical reactions in cells involve the making or breaking of chemical bonds.
- 4 3 2 1 0 NA 20.The learner will be able to compare exergonic and endergonic reactions.
- 4 3 2 1 0 NA 21.The learner will be able to discuss how activation energy is lowered by catalysis.
- 4 3 2 1 0 NA 22.The learner will be able to explain how an enzyme operates.
- 4 3 2 1 0 NA 23.The learner will be able to understand the basic stages of photosynthesis.
- 4 3 2 1 0 NA 24.The learner will be able to discuss how the Calvin cycle generates organic molecules.
- 4 3 2 1 0 NA 25.The learner will be able to list the stages of cellular respiration.
- 4 3 2 1 0 NA 26.The learner will be able to know where the stages of cellular respiration occur, which ones require oxygen, and the energy yield of each.
- 4 3 2 1 0 NA 27.The learner will be able to describe what happens in a cell to the products of glycolysis when no oxygen is present.

#### Reproduction and maintenance of the continuity of life

- 4 3 2 1 0 NA 28.The learner will be able to explain how prokaryotic binary fission occurs.
- 4 3 2 1 0 NA 29.The learner will be able to know the significance of mitosis.
- 4 3 2 1 0 NA 30.The learner will be able to state the events that occur during the stages of mitosis.
- 4 3 2 1 0 NA 31.The learner will be able to understand that cell division is limited in normal cells, but unlimited in cancer cells.
- 4 3 2 1 0 NA 32.The learner will be able to understand the stages of meiosis.
- 4 3 2 1 0 NA 33.The learner will be able to understand the evolutionary significance of internal fertilization and development.
- 4 3 2 1 0 NA 34.The learner will be able to know the structures involved in the production of sperm.
- 4 3 2 1 0 NA 35.The learner will be able to describe the process of development of an egg cell from the primary oocyte to ovum stage.
- 4 3 2 1 0 NA 36.The learner will be able to discuss the events and hormones involved in the menstrual cycle.
- 4 3 2 1 0 NA 37.The learner will be able to describe the early stages of a zygote as it develops into a morula.
- 4 3 2 1 0 NA 38.The learner will be able to list the structures of the blastocyst and know the functions of each structure.
- 4 3 2 1 0 NA 39.The learner will be able to describe what occurs during gastrulation and neurulation.

The principles of genetics and the unity and diversity of life

- 4 3 2 1 0 NA 40. The learner will be able to understand the basic tenets of genetics, and distinguish between dominant and recessive and between homozygous and heterozygous.
- 4 3 2 1 0 NA 41. The learner will be able to state Mendel's two laws of heredity.
- 4 3 2 1 0 NA 42. The learner will be able to realize that genes are located along chromosomes.
- 4 3 2 1 0 NA 43. The learner will be able to describe various inheritance patterns, such as epistasis, pleiotropy, multiple alleles, incomplete dominance and codominance.
- 4 3 2 1 0 NA 44. The learner will be able to know how many chromosomes are in normal human cells and what causes aneuploidy.
- 4 3 2 1 0 NA 45. The learner will be able to understand what is meant by sex-linked genes, and give examples.
- 4 3 2 1 0 NA 46. The learner will be able to understand the experiments that led to the discovery that DNA is the genetic material.
- 4 3 2 1 0 NA 47. The learner will be able to describe the double helix structure of DNA in which base pairing occurs.
- 4 3 2 1 0 NA 48. The learner will be able to describe why DNA replication is semiconservative.
- 4 3 2 1 0 NA 49. The learner will be able to describe how mRNA is formed from the transcription of DNA.
- 4 3 2 1 0 NA 50. The learner will be able to explain how translation proceeds, and know the roles of ribosomes and tRNA in protein synthesis.
- 4 3 2 1 0 NA 51. The learner will be able to understand how the DNA molecule indicates where to start transcription at the promoter site.
- 4 3 2 1 0 NA 52. The learner will be able to explain how repressor, activation and enhancer proteins operate to regulate gene expression.
- 4 3 2 1 0 NA 53. The learner will be able to explain how mutagens may lead to mutations in DNA.
- 4 3 2 1 0 NA 54. The learner will be able to understand some of the basic procedures used in genetic engineering.

Evolution: the mechanism of change in biology

- 4 3 2 1 0 NA 55. The learner will be able to understand the underlying principles of evolution.
- 4 3 2 1 0 NA 56. The learner will be able to describe the principles and data underlying natural selection.
- 4 3 2 1 0 NA 57. The learner will be able to discuss several methods, occurrences and evidence of speciation.
- 4 3 2 1 0 NA 58. The learner will be able to describe the diversity of life and describe the Linnean system of classification.

Principles of ecology

- 4 3 2 1 0 NA 59. The learner will be able to describe the organization and patterns of the earth's ecosystems.
- 4 3 2 1 0 NA 60. The learner will be able to discuss the interactions within the ecology of various ecosystems.
- 4 3 2 1 0 NA 61. The learner will be able to find, research and discuss current and past environmental issues.

Instructors: Please check one of the following:

\_\_\_\_\_ I certify that the student completed the course and the competencies indicated as

indicated. (Check for all students receiving a grade of A, B, C, D, F)

\_\_\_\_\_ I certify that the student completed 25% of the course competencies, as indicated.  
(Check only if a W is indicated on the grade roster AND the student completed 25% of the competencies)

Instructor Signature:

Date: