**DEPARTMENT OF NATURAL SCIENCES**

**LAGUARDIA COMMUNITY COLLEGE**

**CITY UNIVERSITY OF NEW YORK**

**STUDENT SYLLABUS**

**Course Title and Section: Topics in Biology SCB101.XXX**

**Course Hours/Credits: 3 hours – 3 credits**

**Prerequisites: CSE099, ENG099, MAT096 or Waivers**

**Instructor:**

**Contact Information:**

Email

**Office Hours:**

**Course Description:**

This course, which is designed for non-biology majors, is intended to introduce students to some of the most important aspects of current biological theory, methodology, and research. The course earns General Education credit under the Life and Physical Sciences category. Successful students will demonstrate the skills necessary to understand and apply scientific concepts and reasoning. Concepts will derive from cell biology, genetics, biotechnology, evolutionary theory, organismal biology and ecology. Students will also be expected to understand application of the scientific method to data collection, analysis and interpretation. In support of these goals, laboratory work will be an integral part of the course, with every other week exercises that parallel topics covered in the lecture class.

**Student Learning Outcomes:**

* Identify and apply the fundamental concepts and methods of a life or physical science.
* Apply the scientific method to explore natural phenomena, including hypothesis development, observation, experimentation, measurement, data analysis, and data presentation.
* Use the tools of a scientific discipline to carry out collaborative laboratory investigations.
* Gather, analyze, and interpret data and present it in an effective written laboratory or fieldwork report.
* Identify and apply research ethics and unbiased assessment in gathering and reporting scientific data.

**Course Coordinators:** Dr. Ana Lucia Fuentes Dr. Claudette P. Davis

**Contact Information:** lfuentes@lagcc.cuny.edu cldavis@lagcc.cuny.edu

M-220F E-263C

**Required Materials:**

**Textbook:**, Biology Now, with Physiology, 2nd Edition (2018), by Anne Houtman, Megan Scudellari, Cindy Malone

##### Laboratory Manual: All laboratory materials are available as open educational resources (OER) and are free to students. Laboratory materials can be found [here](https://lagccnsdoer.commons.gc.cuny.edu/biology/scb-101/).

**COURSE REQUIREMENTS**

**Attendance:** Students are required to attend all lecture and laboratory sessions. Lateness or absence of greater than 10% is considered excessive and could result in a lowering of your course grade.

The **final course** grade will be based on the following:

|  |  |  |
| --- | --- | --- |
| **Lecture:** | | |
|  | 5 Quizzes (5 points each - lowest dropped) | 20% |
|  | Midterm Examination | 15% |
|  | Final Examination | 15% |
|  | Assignments\* | 15% |
| **Laboratory:** | | |
|  | 6 lab reports (3 points each – lowest dropped) | 15% |
|  | Lab Midterm Examination | 10% |
|  | Lab Final Examination | 10% |

*\*The nature of the assignments will be announced in class.*

**No make-ups** will be permitted on quizzes missed due to absence or lateness. However, the lowest quiz grade will be dropped.

Make-ups on midterms and finals will be permitted only with documented absence (e.g. doctor’s note). However, make-up examinations will tend to be considerably more difficult that the scheduled examinations.

**Grade Standards:**

**Quizzes:** There will be five quizzes, each quiz of about twenty five minutes duration, throughout the semester (see Course Schedule below).

***The College’s regulations regarding cheating will be strictly enforced. The policy on academic integrity is available at the following address:***

http://library.laguardia.edu/files/pdf/academicintegritypolicy.pdf

**Course Grade:**

A = 93-100

A- = 90-92.9

B+ = 87-89.9

B = 83-86.9

B- = 80-82.9

C+ = 77-79.9

C = 73-76.9

C- = 70-72.9

D+ = 67-69.9

D = 63-66.9

D- = 60-62.9

F < 59.9

**Grading:** A minimum of 60% of the possible points must be earned in order to receive a passing grade for the course.

**Artifact Assessment**

This class will be depositing student work for this semester. Students will be depositing an assignment for the Inquiry and Problem Solving competency and Written Communication ability.

For a tutorial on how to deposit student work, go to: <http://eportfolio.lagcc.cuny.edu/support/tutorials.htm> and find the section called, “Assessment for Students.” Click on the adobe flash button for “Depositing Assessment Artifact in Digication Instructions for Students.” You will see a brief video on how to deposit.

**Important Dates:**

**SCB 101 Lecture Syllabus**

***Biology Now, with Physiology*, 2nd Edition**

**by A. Houtman, M. Scudellari and C. Malone**

|  |  |  |
| --- | --- | --- |
| **Week** | **Topic** | **Chapter Reading** |
| 1 (2 hour)  1 (1 hour) | The Nature of Science  Evaluating Scientific Claims | Chapter 1  Chapter 2 |
| 2 (2 hour) | Chemistry of Life   * Atomic structure * Chemical bonds | Chapter 3 |
| 3 (2 hour)  3 (1 hour) | **Quiz #1 (Chapters 1, 2, 3)**  Chemistry of Life   * Macromolecules   Cell membrane and transport | Chapter 3  Chapter 4 |
| 4 (2 hour) | Cell Division | Chapter 6 |
| 5 (2 hour)  5 (1 hour) | **Quiz #2 (Chapter 3, 4, 6)**  Patterns of Inheritance  Chromosomes & Human Genetics | Chapter 7  Chapter 8 |
| 6 (2 hour) | **Midterm Exam** |  |
| 7 (2 hour)  7 (1 hour) | What are genes?  How genes work? | Chapter 9  Chapter 10 |
| 8 (2 hour) | How genes work? (*cont’d*) | Chapter 10 |
| 9 (2 hour)  9 (1 hour) | **Quiz #3 (Chapters 9, 10)**  Homeostasis  Reproduction and Development | Chapter 22 |
| 10 (2 hour) | Digestion, nutrition  Cellular respiration | Chapter 23  Chapter 5 |
| 11 (2 hour)  11 (1 hour) | **Quiz 4 (Chapters 22, 23, 5)**  Evolution  Mechanisms of Evolution | Chapter 11  Chapter 12 |
| 12 (2 hour) | **Quiz 5 (Chapters 11, 12)**  Adaptation and species  Ecology | Chapter 13  Chapter 18 |

**Learning Outcomes**

**Chapter 1: The Nature of Science**

* Explain the purpose of the scientific method
* Describe the process of the scientific method
* Explain the importance of a controlled experiment
* Explain biological hierarchy
* State the characteristics of living organisms
* Terminology to define:
  + Science
  + Variable
    - Independent variable
    - Dependent variable
  + Control and experimental groups

**Chapter 2: Evaluating Scientific Claims**

* Give examples of scientific claims
* Differentiate between correlation and causation
* Differentiate between pseudoscience and real science
* Distinguish between primary and secondary literature

**Chapter 3: Chemistry of Life**

* Describe components of atoms
* Describe how atoms interact to form chemical bonds (ionic, covalent, hydrogen)
* Describe the properties of water and why it is considered the universal solvent
* Differentiate between hydrophobic and hydrophilic molecules
* Explain the relationship between hydrogen ion concentration and pH
* State characteristics of four macromolecules
* Terminology to define:
  + Atom
  + Proton
  + Neutron
  + Electron
  + Element
  + Chemical reaction
  + Biomolecules
  + Monomers
  + Polymers

**Chapter 4: Cell membrane and Cellular Transport**

* State the three principles of the cell theory
* Describe the composition of the plasma membrane
* Describe how substances move into and out of cells
* Compare and contrast active transport and passive transport
* Compare and contrast simple diffusion and facilitated diffusion
* Explain the process of osmosis
* Differentiate between isotonic, hypertonic, hypotonic
* Terminology to define:
  + Virus
  + Nucleotide
  + Phospholipid bilayer

**Chapter 5: How cells work**

* Briefly describe the purpose of cellular respiration
* Describe the function of ATP
* State the function of enzymes
* Terminology to define:
  + Catabolism
  + Anabolism
  + ATP
  + Induced fit
  + Active site

**Chapter 6: Cell Division**

* Describe the stages of the cell cycle
* Explain the difference between benign tumor and malignant tumor
* State cellular events occurring during interphase
* Describe the five stages of mitosis
* State the importance of mitosis
* State the importance of cell cycle regulatory protein
* State the importance of meiosis
* Differentiate between haploid and diploid
* State the purpose of meiosis I and meiosis II
* Terminology to define:
  + Chromosome
  + Interphase
  + Prophase
  + Metaphase
  + Anaphase
  + Cytokinesis
  + Gametes
  + Crossing over
  + Recombination

**Chapter 7: Patterns of Inheritance**

* Differentiate between genotype and phenotype
* Explain how genetic traits are inherited
* Demonstrate how to use the Punnett square
* Terminology to define:
  + DNA
  + Chromosome
  + Gene
  + Genetic trait
  + Allele
  + Dominant
  + Recessive
  + Homozygous
  + Heterozygous
  + Law of independent assortment
  + Law of segregation

**Chapter 8: Chromosomes and Human Genetics**

* Interpret family pedigree chart
* Evaluate human karyotype
* Describe how X-linked recessive conditions are inherited
* Terminology to define:
  + Autosomes
  + Sex chromosomes
  + Locus
  + Genetic loci

**Chapter 9: What Genes Are**

* Describe the structure of DNA; label a diagram
* State nucleotide complementary base pairing rules
* Terminology to define:
  + Mutation
  + Sickle-cell disease

**Chapter 10: How Genes Work?**

* State the purpose of transcription
* State the purpose of translation
* Explain the role of messenger RNA (mRNA)
* State the function of the ribosome in translation
* Terminology to define:
  + Codon
  + Anticodon
  + Start codon
  + Stop codon
  + Genetic code
  + Amino acid

**Chapter 11: Evidence for Evolution**

* Differentiate between artificial and natural selection
* Give an examples of homologous and vestigial traits; explain how these traits support the theory of common descent
* Explain why distantly related species could have high DNA sequence similarities
* Explain how evolution is supported by embryonic development
* Terminology to define:
  + Evolution
  + Natural selection
  + Adaptation
  + Define natural selection
  + Embryonic development

**Chapter 12: Mechanisms of Evolution**

* Explain and give examples of - four mechanisms of evolution (natural selection, mutation, gene flow, genetic drift)
* Define and give examples of: directional selection, stabilizing selection, disruptive selection
* Relate the process of genetic drift to genetic bottlenecks and the founder effect
* Terminology to define:
  + Genetic mutation
  + Allele
  + Gene flow
  + Horizontal gene transfer
  + Genetic bottleneck
  + Founder effect

**Chapter 13: Adaptation and Species**

* Describe the relationships between adaptive traits, reproductive fitness and evolution by natural selection
* Explain the limitations of the biological species concept
* Describe two processes that promote speciation
* Describe the effect of speciation on geographically isolated populations
* Differentiate between allopatric speciation and sympatric speciation
* Describe the reproductive barriers that isolate two species in the same geographic region
* Terminology to define:
  + Adaptive traits
  + Adaptation
  + Species
  + Speciation
  + Allopatric speciation
  + Sympatric speciation
  + Coevolution

**Chapter 18: General Principles of Ecology**

* Give examples of abiotic and biotic factors
* Contrast climate and weather
* Describe the greenhouse effect
* Compare and contrast the water cycle and carbon cycle
* Terminology to define:
  + Biosphere
  + Biotic
  + Abiotic
  + Global warming
  + Climate change

**Chapter 22: Homeostasis, Reproduction, and Development**

* State the importance of negative and positive feedback loops
* Explain the meaning of homeostasis. Give an example.
* State the mature cells formed from oogenesis and spermatogenesis
* Explain the importance of hormones estrogen and testosterone in reproduction
* Describe the role of FSH, estradiol, LH and progesterone in human menstrual cycle
* Describe the path sperm and egg follow to allow for fertilization to occur in oviduct
* State the role of oxytocin in childbirth
* Terminology to define:
  + Reproductive system
  + Sexual reproduction
  + Hormone
  + Fertilization
  + Ovary
  + Testes
  + Zygote
  + Embryo
  + Fetus

**Chapter 23: Digestive System and Nutrition**

* Describe the function of vitamins
* State the importance of vitamin D
* Differentiate between essential and non-essential amino acids
* State the function of the digestive system
* State the organs of the digestive system
* Terminology to define
  + Vitamins
  + Nutrients

**LABORATORY**

**All laboratory materials will be available on The Natural Sciences Open Education Resources webpage: https://lagccnsdoer.commons.gc.cuny.edu/**

**Schedule**

|  |  |  |
| --- | --- | --- |
| **WEEK** | **LAB** | **TOPIC** |
| 2 | 1, 2, 3 | Metric system & Scientific Method |
| 4 | 4 & 5 | Microscope & Cell structure |
| 6 | 7 | Connecting Meiosis and Genetics |
| 7 |  | Mid-term Lab Exam |
| 8 | 8 | DNA Isolation/Biotechnology |
| 10 | 9 & 10 | Fetal Pig Anatomy  & Food Analysis |
| 12 | 12 | Ecosystems |
| 13  Finals Week |  | Final Lab Exam |

**LAGUARDIA RESOURCES**

**Please note while we are in distance learning mode, you should visit** [**https://www.laguardia.edu/coronavirus/campus-services/**](https://www.laguardia.edu/coronavirus/campus-services/) **where you will find information on each LaGuardia Community College center listed below.**

**Tutoring:**

Science Study Center - Rm E-342

Anatomy and Physiology Study Center – Rm E-312

Academic Peer Instruction - Rm E-115

Student Government Association Tutoring Program - Rm M-159

**Disabilities Act:**

If you have a physical, psychological or learning disability which may interfere with your ability to complete assignments, then please contact Disabled Student Services (DSS), Room M-102 / 718-482-5279. They will review your concerns and determine with you, what accommodations are necessary and appropriate. All documentation of and information regarding disabilities is confidential. **You must register with the Disabilities Office to receive special accommodations**.

**The Writing Center:**

The Writing Center, Room B-200, offers tutoring in writing skills and assistance on individual papers, both for this class and others. The Center is open Monday-Friday from 9:15am-9:00pm.

**The Health Services Center:**

The Health Services Center promotes health, safety, and the well-being of the college community. The goal is to help each student achieve optimum health to ensure their participation in the educational opportunities at LaGuardia Community College.

Among the services offered are:

1. Immunization
2. Health Counseling
3. Health education
4. Personal Counseling (i.e., family issues, anxiety, depression, etc.)

Services are free to LAGCC students and the Center is located in MB-40 and can be reached at 718-482-5280.

*Revised: 06/14/2021—C. Davis*