

CUNY Common Core Course Submission Form

Instructions: All courses submitted for the Common Core must be liberal arts courses. Courses may be submitted for only one area of the Common Core. All courses must be 3 credits/3 hours unless the college is seeking a waiver for a 4-credit Math or Science course (after having secured approval for sufficient 3-credit/3-hour Math and Science courses). All standard governance procedures for course approval remain in place.

College	Kingsborough Community College
Course Number	Bio 33
Course Title	Introduction to Modern Concepts of Biology
Department(s)	Biological Sciences
Discipline	Biology
Subject Area	Life and Physical Sciences
Credits	4
Contact Hours	5
Pre-requisites	none
Catalogue Description	For non-science and liberal arts majors and those who plan to transfer to senior colleges. Focus is on major biological topics and principles, with emphasis on how biology influences human issues and problems. Lectures, discussions and hands-on laboratory experiences provide insight into past, present and future aspects of the diversity of life on earth. Topics considered include: genetics, ecology, evolution, and cell biology.
Syllabus	See pages 6-10 of this document
Waivers for 4-credit Math and Science Courses All Common Core courses must be 3 credits and 3 hours. Waivers for 4-credit courses will only be accepted in the required areas of Mathematical and Quantitative Reasoning and Life and Physical Sciences. Such waivers will only be approved after a sufficient number of 3-credit/3-hour math and science courses are approved for these areas.	
If you would like to request a waiver please check here:	<input checked="" type="checkbox"/> Waiver requested
If waiver requested: Please provide a brief explanation for why the course will be 4 credits.	To satisfy the agreement of articulation requirement of a laboratory science course for mental health major.
If waiver requested: Please indicate whether this course will satisfy a major requirement, and if so, which major requirement(s) the course will fulfill.	This course will satisfy the requirement of the following majors: Liberal Arts Criminal Justice Mental Health

Indicate the status of this course being nominated:

☒ current course ☐ revision of current course ☐ a new course being proposed

CUNY COMMON CORE Location

Please check below the area of the Common Core for which the course is being submitted. (Select only one.)

Required

- ☐ English Composition
☐ Mathematical and Quantitative Reasoning
☒ Life and Physical Sciences

Flexible

- ☐ World Cultures and Global Issues ☐ Individual and Society
☐ US Experience in its Diversity ☐ Scientific World
☐ Creative Expression

Learning Outcomes

In the left column explain the assignments and course attributes that will address the learning outcomes in the right column.

I. Required Core (12 credits)

A. English Composition: Six credits

A course in this area must meet all the learning outcomes in the right column. A student will:

- Read and listen critically and analytically, including identifying an argument's major assumptions and assertions and evaluating its supporting evidence.
- Write clearly and coherently in varied, academic formats (such as formal essays, research papers, and reports) using standard English and appropriate technology to critique and improve one's own and others' texts.
- Demonstrate research skills using appropriate technology, including gathering, evaluating, and synthesizing primary and secondary sources.
- Support a thesis with well-reasoned arguments, and communicate persuasively across a variety of contexts, purposes, audiences, and media.
- Formulate original ideas and relate them to the ideas of others by employing the conventions of ethical attribution and citation.

B. Mathematical and Quantitative Reasoning: Three credits

A course in this area must meet all the learning outcomes in the right column. A student will:

- Interpret and draw appropriate inferences from quantitative representations, such as formulas, graphs, or tables.
- Use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical problems.
- Represent quantitative problems expressed in natural language in a suitable mathematical format.
- Effectively communicate quantitative analysis or solutions to mathematical problems in written or oral form.
- Evaluate solutions to problems for reasonableness using a variety of means, including informed estimation.
- Apply mathematical methods to problems in other fields of study.

C. Life and Physical Sciences: Three credits A course in this area <u>must meet all the learning outcomes</u> in the right column. A student will:	
Critically analyze life science principles in both lecture and laboratory sessions and apply such principles in exams and experiments.	<ul style="list-style-type: none"> Identify and apply the fundamental concepts and methods of a life or physical science.
Formulating a hypothesis, design experiments as well as collect and analyze experimental data. Their results will be presented and explained in the form of reports or oral presentations.	<ul style="list-style-type: none"> Apply the scientific method to explore natural phenomena, including hypothesis development, observation, experimentation, measurement, data analysis, and data presentation.
Use laboratory equipment, such as balances, spectrophotometers, and microscopes to perform experiments. Lab experiments are conducted in groups of two to four students.	<ul style="list-style-type: none"> Use the tools of a scientific discipline to carry out collaborative laboratory investigations.
Weekly laboratory sessions introduce students to various scientific disciplines and allow them to collaborate with one another to perform experiments, collect data, and write laboratory reports.	<ul style="list-style-type: none"> Gather, analyze, and interpret data and present it in an effective written laboratory or fieldwork report.
Discuss ethical issues surrounding recent scientific discoveries and the ethics of how research is conducted.	<ul style="list-style-type: none"> Identify and apply research ethics and unbiased assessment in gathering and reporting scientific data.
II. Flexible Core (18 credits) Six three-credit liberal arts and sciences courses, with at least one course from each of the following five areas and no more than two courses in any discipline or interdisciplinary field.	
A. World Cultures and Global Issues	
A Flexible Core course <u>must meet the three learning outcomes</u> in the right column.	
	<ul style="list-style-type: none"> Gather, interpret, and assess information from a variety of sources and points of view.
	<ul style="list-style-type: none"> Evaluate evidence and arguments critically or analytically.
	<ul style="list-style-type: none"> Produce well-reasoned written or oral arguments using evidence to support conclusions.
A course in this area (II.A) <u>must meet at least three of the additional learning outcomes</u> in the right column. A student will:	
	<ul style="list-style-type: none"> Identify and apply the fundamental concepts and methods of a discipline or interdisciplinary field exploring world cultures or global issues, including, but not limited to, anthropology, communications, cultural studies, economics, ethnic studies, foreign languages (building upon previous language acquisition), geography, history, political science, sociology, and world literature.
	<ul style="list-style-type: none"> Analyze culture, globalization, or global cultural diversity, and describe an event or process from more than one point of view.
	<ul style="list-style-type: none"> Analyze the historical development of one or more non-U.S. societies.
	<ul style="list-style-type: none"> Analyze the significance of one or more major movements that have shaped the world's societies.
	<ul style="list-style-type: none"> Analyze and discuss the role that race, ethnicity, class, gender, language, sexual orientation, belief, or other forms of social differentiation play in world cultures or societies.
	<ul style="list-style-type: none"> Speak, read, and write a language other than English, and use that language to respond to cultures other than one's own.

B. U.S. Experience in its Diversity	
A Flexible Core course <u>must meet the three learning outcomes</u> in the right column.	
	<ul style="list-style-type: none"> • Gather, interpret, and assess information from a variety of sources and points of view.
	<ul style="list-style-type: none"> • Evaluate evidence and arguments critically or analytically.
	<ul style="list-style-type: none"> • Produce well-reasoned written or oral arguments using evidence to support conclusions.
A course in this area (II.B) <u>must meet at least three of the additional learning outcomes</u> in the right column. A student will:	
	<ul style="list-style-type: none"> • Identify and apply the fundamental concepts and methods of a discipline or interdisciplinary field exploring the U.S. experience in its diversity, including, but not limited to, anthropology, communications, cultural studies, economics, history, political science, psychology, public affairs, sociology, and U.S. literature.
	<ul style="list-style-type: none"> • Analyze and explain one or more major themes of U.S. history from more than one informed perspective.
	<ul style="list-style-type: none"> • Evaluate how indigenous populations, slavery, or immigration have shaped the development of the United States.
	<ul style="list-style-type: none"> • Explain and evaluate the role of the United States in international relations.
	<ul style="list-style-type: none"> • Identify and differentiate among the legislative, judicial, and executive branches of government and analyze their influence on the development of U.S. democracy.
	<ul style="list-style-type: none"> • Analyze and discuss common institutions or patterns of life in contemporary U.S. society and how they influence, or are influenced by, race, ethnicity, class, gender, sexual orientation, belief, or other forms of social differentiation.
C. Creative Expression	
A Flexible Core course <u>must meet the three learning outcomes</u> in the right column.	
	<ul style="list-style-type: none"> • Gather, interpret, and assess information from a variety of sources and points of view.
	<ul style="list-style-type: none"> • Evaluate evidence and arguments critically or analytically.
	<ul style="list-style-type: none"> • Produce well-reasoned written or oral arguments using evidence to support conclusions.
A course in this area (II.C) <u>must meet at least three of the additional learning outcomes</u> in the right column. A student will:	
	<ul style="list-style-type: none"> • Identify and apply the fundamental concepts and methods of a discipline or interdisciplinary field exploring creative expression, including, but not limited to, arts, communications, creative writing, media arts, music, and theater.
	<ul style="list-style-type: none"> • Analyze how arts from diverse cultures of the past serve as a foundation for those of the present, and describe the significance of works of art in the societies that created them.
	<ul style="list-style-type: none"> • Articulate how meaning is created in the arts or communications and how experience is interpreted and conveyed.
	<ul style="list-style-type: none"> • Demonstrate knowledge of the skills involved in the creative process.
	<ul style="list-style-type: none"> • Use appropriate technologies to conduct research and to communicate.

D. Individual and Society A Flexible Core course <u>must meet the three learning outcomes</u> in the right column.	
	<ul style="list-style-type: none"> • Gather, interpret, and assess information from a variety of sources and points of view.
	<ul style="list-style-type: none"> • Evaluate evidence and arguments critically or analytically.
	<ul style="list-style-type: none"> • Produce well-reasoned written or oral arguments using evidence to support conclusions.
A course in this area (II.D) <u>must meet at least three of the additional learning outcomes</u> in the right column. A student will:	
	<ul style="list-style-type: none"> • Identify and apply the fundamental concepts and methods of a discipline or interdisciplinary field exploring the relationship between the individual and society, including, but not limited to, anthropology, communications, cultural studies, history, journalism, philosophy, political science, psychology, public affairs, religion, and sociology.
	<ul style="list-style-type: none"> • Examine how an individual's place in society affects experiences, values, or choices.
	<ul style="list-style-type: none"> • Articulate and assess ethical views and their underlying premises.
	<ul style="list-style-type: none"> • Articulate ethical uses of data and other information resources to respond to problems and questions.
	<ul style="list-style-type: none"> • Identify and engage with local, national, or global trends or ideologies, and analyze their impact on individual or collective decision-making.
E. Scientific World A Flexible Core course <u>must meet the three learning outcomes</u> in the right column.	
	<ul style="list-style-type: none"> • Gather, interpret, and assess information from a variety of sources and points of view.
	<ul style="list-style-type: none"> • Evaluate evidence and arguments critically or analytically.
	<ul style="list-style-type: none"> • Produce well-reasoned written or oral arguments using evidence to support conclusions.
A course in this area (II.E) <u>must meet at least three of the additional learning outcomes</u> in the right column. A student will:	
	<ul style="list-style-type: none"> • Identify and apply the fundamental concepts and methods of a discipline or interdisciplinary field exploring the scientific world, including, but not limited to: computer science, history of science, life and physical sciences, linguistics, logic, mathematics, psychology, statistics, and technology-related studies.
	<ul style="list-style-type: none"> • Demonstrate how tools of science, mathematics, technology, or formal analysis can be used to analyze problems and develop solutions.
	<ul style="list-style-type: none"> • Articulate and evaluate the empirical evidence supporting a scientific or formal theory.
	<ul style="list-style-type: none"> • Articulate and evaluate the impact of technologies and scientific discoveries on the contemporary world, such as issues of personal privacy, security, or ethical responsibilities.
	<ul style="list-style-type: none"> • Understand the scientific principles underlying matters of policy or public concern in which science plays a role.

Kingsborough Community College of the City University of New York

Biology 33 Course Outline

Course Outcomes

1. Apply the scientific method to investigate a scientific problem.
2. Identify the limitations imposed on science and scientists.
3. Identify and distinguish the unity and diversity of living organisms.
4. Analyze the mutual influences between science, technology and society.
5. Demonstrate an awareness of the diversity and fragility of the earth's environments.
6. Appreciate the structure and function of their own bodies utilizing a representative vertebrate organism.

TEXTBOOK AND GRADING POLICIES

TEXTBOOK: Pruitt, Nancy, Underwood, Larry S., Surver, William. BioInquiry: Making Connections in Biology, Third Edition, John Wiley & Sons. 2006

LAB MANUAL: Laboratory Manual for Biology 33/ Introduction to Modern Concepts of Biology. Harcourt College Publishers. 2002.

GRADING POLICIES

LECTURE:

2 Lecture Exams @ 15%	= 30%
Final Exam	= 20%
Total	50%

LABORATORY:

Laboratory Reports	= 25%
Laboratory Quizzes	= 25%
Total	<u>=50%</u>
	100%

Students must wear a laboratory coat to laboratory each week and wear laboratory goggles and gloves when appropriate.

*Students must return all graded laboratory reports at the end of the semester. Failure to comply will result in an incomplete (I) grade.

WEEKLY LECTURE SCHEDULE

Week	Lecture Topic	Reading Assignments
1	Science and Society Biology – The study of Life The Characteristics of Life	Text: pp 1 – 18; 239 – 241 259 – 265
2	Bioethics	Provided by instructor.
2	Principles of Evolution Macroevolution	Text: pp19 – 60; 241-250
3	Human Evolution	
4	Lecture Exam #1 Population Ecology	Text: pp 487 – 521
5	Population Ecology (cont.) Community Interactions Ecosystems	Text: pp 522 – 545; 274-306
6	Ecosystems (cont.) Human Impact on the Biosphere	Text pp 546 – 559
7	Human Impact (cont.) Cell Structure and Function	Text: pp 89 – 114;
8	Lecture Exam #2 Cell Division and Mitosis	Text: pp 115 – 119; 123 – 129
9	Asexual and Sexual Reproduction Meiosis Principles of Inheritance	Text: pp 345 – 356; 61 – 88
10	Principles of Inheritance (cont.) Human Genetics	Text: pp 129 – 134
11	Human Genetics (cont.) Molecular Basis of Genetics	Text: pp 134 – 172
12	Genetic Influences on Evolution Microevolution	Text: pp 211 – 238
13	Final Examination	

WEEKLY LABORATORY SCHEDULE

Week	Laboratory Topic	Reading Assignments
1	Observations	Manual: pp 1 – 8
2	Prey and Predators	Manual: pp 9 – 16; Text: pp 510 – 516
3	Diversity and Classification	Manual: pp 17 – 23 Text: pp 239 – 241; 259 – 265
4	Field Observations *Wk4 during fall semester; Wk6 during Spring semester	Manual: pp 25 – 26, or supplment provided by instructor
5	Photosynthesis	Manual: pp 109 – 120
6	Visit to Marine Aquarium, Education and Demonstration Area – Room M130	Supplement provided by instructor
7	The Microscope and Microecosystems	Manual: pp 39 – 52
8	Cells and Reproduction	Manual: pp 73 – 82
9	Vertebrate Structure – The Digestive System	Manual: pp 173 – 179
10	Vertebrate Structure – The Respiratory and Circulatory Systems	Manual: 179 – 186
11	Vertebrate Structure – The Urinary and Reproductive Systems	Manual: pp 187 – 196
12	Reproduction and Fertilization	Manual: pp 83 - 96

LECTURE SYLLABUS

ORGANIZING CONCEPTS OF BIOLOGY AND THE NATURE OF BIOLOGICAL INQUIRY

Learning Objectives:

1. List the steps in the scientific method, and apply them to investigating a sample scientific problem.
2. State the differences between science and technology.
3. State why scientific knowledge and technology has assumed a position of enormous importance in modern society and the role that citizens should try to follow concerning this knowledge and its applications.
4. Identify the limitations that are imposed on science and scientists.
5. List the characteristics of living things, and state why it is difficult to define life.
6. Arrange in order, from smallest to largest, the levels of organization that occur in nature. Define each as you list it.
7. Although organisms share many characteristics of life, different life forms present a great diversity of characteristics as well. Explain what is meant by the term diversity and discuss its significance.

BIOETHICS

Learning Objectives:

1. Identify major issues for the individual and the society that are considered bioethical.
2. Cite biological facts that do not involve bioethical issues.
3. Identify a single issue that you believe our society will be confronting in the twentyfirst century and how the society could resolve it.
4. Discuss the relationship between science and morality.
5. Contrast the view of human responsibility for the stewardship of "life's continuity on earth", by Stephen Jay Gould with the belief that humans have a right to enjoy and use as much of the world's resources as they want.

PRINCIPLES OF EVOLUTION

Learning Objectives:

1. Describe Lamarck's Theory of Acquired Characteristics and its significance to the study of evolution.
2. Outline the Darwin - Wallace theory of evolution by natural selection.
3. Define macroevolution and explain the value of fossil evidence.
4. Define comparative morphology and distinguish between homologous and analogous structures; relate these terms to morphological divergence and morphological convergence.
5. Describe the role of comparative biochemistry in establishing evolutionary relationships and cite examples.
6. Outline the steps that could account for the origin of life from non-living matter and state what evidence exists to show that these steps occurred.
7. Compare and contrast the early and current atmosphere.
8. State how the earliest organisms changed their environments. How did this lead to the evolution of modern organisms?

POPULATION ECOLOGY: COMMUNITY INTERACTIONS

Learning Objectives:

1. Describe the factors that affect population density, distribution, and dynamics.
2. Explain the meanings of population curves on graphs that take the shape of J and S.
3. Describe the difference between density-dependent and density-independent factors; give and explain examples of both.
4. Indicate how the principles of ecology can influence human social, economic, and political considerations.
5. Explain how the kinds of interactions among species can shape the structure of a biological community.
6. Describe the human population explosion, its causes and probable fate.
7. Describe the characteristics of a community.
8. Define and distinguish between habitat and niche.
9. List and distinguish among the several types of species interactions.

ECOSYSTEMS

Learning Objectives:

1. State what an ecosystem is, list the essential and non-essential components that are usually present, and give the role of each.
2. State the source of energy for most ecosystems.
3. State the Laws of Energy and explain how it applies to ecosystems.
4. State the word equations for photosynthesis and cellular respiration, and explain how these two processes are inter-related to each other.
5. Diagram a simple food web and trace the flow of nutrients and energy through it; give the correct trophic level of each component of the ecosystem.

6. State what is meant by the "productivity of an ecosystem" and list factors that limit productivity in particular types of communities.
7. Explain what is meant by the statement, "Energy enters and leaves an ecosystem, whereas nutrients cycle within it."
8. Diagram a simple nutrient cycle and label its major parts.
9. State the differences between an oligotrophic and a eutrophic lake.
10. Describe what happens when nutrients, pesticides or heat pollutes an oligotrophic lake.
11. Describe to what extent, it is possible to "clean up" a polluted body of water.

HUMAN IMPACT ON THE BIOSPHERE

Learning Objectives:

1. Describe the magnitude of pollution problems in the United States.
2. Identify the principle air pollutants, their sources, their effects, and the possible methods for controlling each pollutant.
3. Describe what acid rain does to an ecosystem. Contrast those effects with the action of CFC's.
4. Examine the effects modern agriculture has wrought on desert, grassland, and tropical rain forest ecosystems.
5. Describe the biological basis of the green revolution and explain its impact on human society, economics and ecology. Explain why the green revolution has been less successful in increasing food production than its proponents originally expected.
6. Explain what is meant by the "Tragedy of the Commons" and why it makes environmental problems so difficult to solve.
7. Describe how our fossil fuels and nuclear energy affects ecosystems.

CELL STRUCTURE AND FUNCTION

Learning Objectives:

1. List the basic ideas of the cell theory.
2. State the differences between prokaryote cells and eukaryote cells.
3. Describe the structure of the cell membrane, and relate its structure to its ability to exchange substances with the cell's environment.
4. Give the function(s) of each of the following structures: cell membrane, nucleus, nuclear membrane, ribosome, mitochondrion, cell wall, chloroplast, vacuole, lysosome, endoplasmic reticulum, Golgi complex, cilium, flagellum.
5. List three features that would enable you to tell the differences between a plant and an animal cell.

CELL DIVISION: MITOSIS AND MEIOSIS

Learning Objectives:

1. Explain the significance of cell division as it relates to reproduction.
2. Describe the general functions of both mitosis and meiosis in eukaryotic life.
3. Define chromosome in terms of chemical construction and the different physical forms during cell divisions.
4. Describe, in terms of chromosome number, how mitosis and meiosis maintain a constant chromosome number in the life cycle of a particular species.
5. Explain what is meant by cell cycle and be able to visualize where mitosis fits into the cell cycle.
6. Describe each phase of mitosis.
7. Relate the concept of homologous chromosomes to the haploid and diploid chromosome numbers; explain why gametes must be haploid and a zygote diploid.
8. State the differences between asexual and sexual reproduction and discuss the advantages and disadvantages of each.

PRINCIPLES OF INHERITANCE

Learning Objectives:

1. Give some reasons for Mendel's success in arriving at the laws governing the inheritance of genetic characteristics where others had failed.
2. Define and compare the terms phenotype and genotype and their relationship to the terms dominant and recessive.
3. Use a Punnett square to illustrate a monohybrid cross and an independently assorting dihybrid cross, and work out the genotypic and phenotypic ratios expected from such crosses.
4. State Mendel's laws of segregation and independent assortment.
5. Solve the genetics problems at the end of chapter 3 in your textbook.

CHROMOSOME VARIATION AND HUMAN GENETICS

Learning Objectives:

1. Define sex chromosomes and autosomes; then distinguish the types of alleles found on each.
2. Define karyotype; state why it is useful; describe how karyotyping is done.
3. Describe the characteristics of X-linked inheritance; summarize the characteristics of hemophilia A as an example.
4. Describe how changes in chromosome number and structure affect inheritance.

5. Indicate the benefits of genetic screening and genetic counseling to society.

THE MOLECULAR BASIS OF INHERITANCE

Learning Objectives:

1. Describe the function and structure of DNA.
2. Describe the structure and function of messenger-RNA, transfer-RNA, and ribosomal-RNA.
3. State briefly the techniques used in recombinant DNA, and give an example of a practical application of this technology.

GENETIC INFLUENCES ON EVOLUTIONARY PRINCIPLES

1. Describe how variations occur in populations.
2. List the conditions of stability that must be met before genetic equilibrium is possible.
3. List and define the major forces of microevolution.
4. Describe four kinds of selection mechanisms that help shape populations.
5. Define natural selection and use the term differential selection in the definition.
6. Define speciation and explain the role of divergence and isolation in that process.