

**Center for Talent Development
Northwestern University
Gifted Learning Links Program**

Honors Biology

This class introduces students to the fundamental concepts upon which modern biology is built. Student biologists learn about the nature of scientific inquiry, the limitations of science and the scientific method, the diversity and interrelations among organisms and environmental issues while exploring energy, matter, cells, and heredity. Readings, problems and laboratory exercises facilitate this challenging course. Among other things, students learn to identify major structures of plants and animals and how they work together to maintain life. Students receive 2 semesters high school credit upon completion.

Outcomes:

Students will demonstrate an understanding of:

The scientific method

Cellular transport mechanisms

Macromolecules

Ethical dilemmas in science

Cellular organelles

Cellular respiration

Photosynthesis

Patterns of inheritance

Mitosis and meiosis

Reproduction

Evolution

Taxonomy

Immunity

Respiration

circulation

Excretion

The nervous system

Genetic engineering

Ecology

Students will be able to:

Identify and explain the variables in an experiment.

Elaborate on the various forms of cell transport

Identify and describe macromolecules

Identify healthy and unhealthy foods

Explain the ethical issues faced by modern science

List and define various cell organelles

Describe the process of cellular respiration, photosynthesis and relate each of these to flow of energy through the ecosystem

Predict genotypes and phenotypes
Explain the difference between mitosis and meiosis
Identify part of the human male and female reproductive system
Explain the concept of evolution and evidence for it
List the 6 kingdoms and describe each
Describe the major types of human immune responses
Trace the route of blood through the human circulatory system
Explain counter current blood flow
Detail the elements that are transported into and out of the nephrons of the kidneys
Explain the action potential.
Explain the process of making, and theory behind, recombinant DNA
Describe the various abiotic cycles involved with the Earth's ecosystem.

Resources and Materials:

Biology: Concepts and Connections, 4th Edition, Campbell, Reece, Mitchell and Tyler, Benjamin/Cummings Press. ISBN 0-8053-6626-1

On-line discussion: In addition to email, discussion boards, collaboration sessions and the Electric Blackboard® will be utilized to address questions that students may have. Some assignments will require students to use these devices in order to facilitate talk between students. Students are encouraged to interact with both the teacher and the other students enrolled in the class.

Homework Assignments: Homework assignments will be given for each unit. Each assignment is vital to understanding the topic and should ALWAYS be completed prior to taking the test for a given unit

Lab Assignments: Lab assignments will be given. These labs can be completed with supplies that are commonly found in the household kitchen or grocery store.

Tests: Tests should be completed only after all other work for the unit is done. Once a test is open it must be completed. You may not attempt to take the test multiple times.

Keeping on Track: Periodically, you may receive emails from me, asking about your progress thus far. As this course is done independently, it is up to you how much you do and when you do it. Unless circumstances dictate otherwise, it is suggested that students complete a unit every two weeks. Below is a schedule to help you keep on material in a timely fashion.

Schedule:

SEMESTER ONE				
	Topic/Focus	Activities & Reading Assignments	What do I need to post to the Discussion Board?	What do I need to turn in?
Week 1	Orientation to Online Learning	Complete the online training	--	--
Week 2	Unit 1, Scientific method and ethical issues in science	Jody v. Mary; Bird flu virus	1 post and 1 response to a post re: Jody v. Mary	Jody v. Mary questions; Bird flu virus questions
Week 3	Unit 1, Scientific method and ethical issues in science	Unit 1 reading; scientific method lecture, Unit 1 test	--	--
Week 4	Unit 2, chemistry and macromolecules	Read chapter 2; food labels; thinking as a scientist	--	Reading questions, chapter 2; thinking as a scientist questions
Week 5	Unit 2, chemistry and macromolecules	read chapter 3; complete pH lab; Unit 2 test	--	Chapter 3 questions; pH lab questions and graphs
Week 6	Unit 3, Parts of the cell/cell transport	Unit 3 reading; unit 3 questions; unit 3 lecture; osmosis and diffusion	--	Unit 3 reading questions; osmosis and diffusion questions
Week 7	Unit 3, Parts of the cell/cell transport	Diffusion and cell membranes lab; cell membrane	--	Diffusion lab questions; cell membrane questions
Week 8	Unit 4, Respiration	organelle exercise; Unit 3 test	--	organelle questions
Week 9	Unit 4, Respiration	Unit 4 reading and questions; Unit 4 lecture; fish environment lab	--	Unit 4 questions; fish lab questions
Week 10	Unit 4, Respiration	summary of cell respiration; Look ma, no oxygen lab; unit 4 test	--	respiration summary; no oxygen questions
Week 11	Unit 5, Photosynthesis	Unit 5 reading and questions; Unit 5 lecture; environmental conditions	--	Unit 5 questions; Conditions questions
Week 12	Unit 5, Photosynthesis	Light/Calvin cycle; Unit 5 test	--	Light/Calvin cycle questions

Week 13	Unit 6, The cell cycle	Unit 6 reading and questions	1 post and 1 response to the question: When, if ever, should we clone human beings?	Unit 6 questions
Week 14	Unit 6, The cell cycle	Unit 6 Lecture; phase of the cell cycle; Unit 6 test	--	Phases of the cell cycle questions
Week 15	Unit 7, Reproduction	Unit 7 reading and questions	--	Unit 7 questions
Week 16	Unit 7, Reproduction	Meiosis lecture; Unit 6/7 test	--	--
Week 17	Unit 8, Patterns of Inheritance	Unit 8 reading and questions; spot exercise; watch movie GATTACA, starring Ethan Hawke and Uma Thurman	1 post and 1 response to the question: Did Vincent do the right thing by lying about who he was?	Unit 8 questions; spot questions
Week 18	Unit 8, Patterns of Inheritance	Genetics problems; dimples pedigree; Unit 8 test	--	Genetics problems; dimples pedigree questions
SEMESTER TWO				
	Topic/Focus	Activities & Reading Assignments	What do I need to post to the Discussion Board?	What do I need to turn in?
Week 19	Unit 9, DNA replication and protein synthesis	Unit 9 reading (chapter 10) and questions; watch DNA replications videos	--	Unit 9 questions (chapter 10)
Week 20	Unit 9, DNA replication and protein synthesis	Unit 9 reading (chapter 12); Unit 9 lecture	1 post and 1 response to the question: Should we use genetic engineering to create a "better" human?	Unit 9 questions (chapter 12)
Week 21	Unit 9, DNA replication and protein synthesis	Watch protein synthesis videos; translation exercise; Unit 9 test	--	Translation questions
Week 22	Units 10/11 Population genetics and evolution	Unit 10/11 reading and questions, chapters 13/14; Hardy Weinberg; evolution lecture	--	Unit 10/11 questions, chapter 13/14; Hardy Weinberg questions
Week 23	Units 10/11 Population genetics and evolution	Unit 10/11 reading and questions, chapter 19; Darwin reaches final frontier	--	Unit 10/11 questions, Darwin reaches final frontier questions
Week 24	Unit 12, Taxonomy	Unit 12 reading; shark key; classification lecture	--	Evolution paper; shark key questions

Week 25	Unit 12, Taxonomy	Isolating mechanisms; biological conundrums; Unit 12 test	--	Isolation mechanisms questions; conundrums questions
Week 26	Unit 13, The origin of life	Unit 13 reading; Which came first?	--	Which came first questions
Week 27	Unit 13, The origin of life	Unit 13 test	--	--
Week 28	Unit 14, Plants and fungi	Unit 14 reading	--	--
Week 29	Unit 14, Plants and fungi	Unit 14 questions	--	Unit 14 questions
Week 30	Unit 15, The animal kingdom	Unit 15 reading and questions; Unit 14/15 test	--	Unit 15 questions
Week 31	Unit 16, Animal form and function	Unit 16 reading and questions	--	Unit 16 questions
Week 32	Unit 17, Respiration and Circulation	Unit 17 reading and questions; Unit 16/17 test	--	Unit 17 questions
Week 33	Unit 18, Immunity and excretion	Unit 18 reading and questions; unit 18 test	--	Unit 18 questions
Week 34	Unit 19, The nervous system	Unit 19 reading and questions	--	Unit 19 questions
Week 35	Unit 20, Ecology	Unit 20 reading and questions	1 post and 1 response: Besides driving, what can you do to reduce your carbon foot print?	Unit 20 questions
Week 36	Unit 20, Ecology	Unit 20 test and catch up	--	--

Student Evaluation and Grading Policies:

A+ 97-100	B+ 87-89	C+ 77-79	D+ 67-69	F Below 60
A 93-96	B 83-86	C 73-76	D 63-66	
A- 90-92	B- 80-82	C- 70-72	D- 60-62	

Instructor Biography

This is Beth Christiansen's third year working with the Center for Talent Development and Gifted Learning Links. A veteran teacher of Evanston Township High School (ETHS), she has taught all levels of biology, including advanced placement biology, for ten years. Previous to this, she obtained her Ph.D. in behavioral neuroscience, from Northwestern

University. At Northwestern, she taught over 15 classes, including five, which she created and designed. Nominated for Northwestern's Distinguished Lecturer award on three occasions, Beth is currently the lead teacher for the freshman research program at ETHS, as well as chair of biological research at the high school.

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