

Ledyard Public Schools
Science Curriculum

Bioethics

1450

Formerly
Biology 2

Basic Ethical Theories and Their Sources

Suggested Time: 4 – 6 class periods

Essential Question: What is the basis and source of the important ethical theories?

Focus Questions

1. How are personal ethics decisions influenced by family and culture?

Learning objectives – The Student will be able to:

- a. define, in writing, ethics
- b. discuss, orally or in writing, the influence of parents/grandparents, relatives and others on personal ethics.
- c. evaluate how culture and/or religious group affiliation have influenced their ethics.

2. What is the history of the formation of human ethics?

Learning objectives – The Student will be able to:

- a. examine the Hippocratic Oath and discuss its implication in medical decisions.
- b. discuss the basis of the Nuremberg Code and its implications on ethics.
- c. discuss the role of the Nazi Doctors and their research from ≈1938-1944.
- d. discuss the Belmont Report and its impact on American Society.
- e. discuss the importance and effect of the Human Research Subject Protections Act of 1997

3. What is the history and purpose of informed consent relating to medicine and human research?

Learning objectives – The Student will be able to:

- a. explain informed consent as applied to medical procedures of lifetime health.
- b. explain informed consent as applied to experimental procedures on humans.

Assessments:

Science assessment includes: tests, which assess content knowledge and application, skill acquisition and application of knowledge at all levels of critical thinking; quizzes; formal laboratory assessments as full lab reports, parts of lab reports or quiz type lab assessments; a variety of written, oral and visual presentations; as well as a variety of other individual and group work assessments. All tests must include free response questions (or constructed response) as well as appropriate content and/or skill assessment and, except where inappropriate, must be balanced in terms of the critical thinking skills expected of students. Laboratory reports (or parts) will follow the Ledyard High School standard Laboratory format. Other Laboratory assessments should reflect CAPT Style multiple choice and / or open-ended questions.

Required Activities:

Open classroom discussion and sharing ideas about:

- The Hippocratic Oath,
- The Nazi Doctor’s research from 1939 through World War II,
- The Nuremberg Code,
- The Belmont Report,
- The Human Research Subject Protections Act of 1997, and informed consent.

Recommended Activities:

- Interview a Doctor about informed consent and write a one page summary.
- Invite a member of a local hospital’s Bioethics Committee to class for questions and discussion.

Resources:

Students:

- Handouts provided by the teacher.
- On line and print sources available in the LHS media Center or other libraries.

Teachers:

- Recombinant DNA and Biotechnology, A Guide for Teachers,**
Helen Kreuzer and Adrienne Massey, ASM Press, Washington D.C., 1996.
- Intervention and Reflection, Basic Issues in Medical Ethics,**
6th Edition, Ronald Munson, Wadsworth/Thomas Learning, 2000.
- Bioethics Case Studies,** collection by Ronnee Yashon, Tufts University, 1999.

Curriculum Alignment with State of Connecticut Science Standards
All areas address State Standards for Scientific Inquiry, Literacy and Numeracy

Focus Question	Content Standard	Supportive Concepts
1. Personal Ethics	SILN	DINQ.2, DINQ.10
2. History of Ethics	SILN	DINQ.2, DINQ.10
3. Informed Consent	SILN	DINQ.2, DINQ.10

The Bioethics Decision-Making Model

Suggested Time: 2 – 4 class periods

Essential Question:

How does one organize information on a topic to come to a thoughtful, ethical position?

Focus Questions

1. What is an ethical dilemma?

Learning objectives – The Student will be able to:

- a. define, in writing, ethical dilemma
- b. identify situations of importance which may have optional courses of action.

2. What are the basic principles of ethics in any cultural, familial, or national group?

Learning objectives – The Student will be able to:

- a. list and explain the four basic ethical principles. (Kreuzer/Massey, 1996)
- b. list and explain the five secondary principles guiding most ethics. (Kreuzer/Massey, 1996)
- c. discuss examples for each of the principles from their lives or society.

3. What are the basic steps of the decision making model toward taking an ethical position?

Learning objectives – The Student will be able to: (according to Kreuzer/Massey, 1996)

- a. apply the steps while taking ethical positions.
- b. utilize the “boxing” method to organize information and make ethical decisions

4. What are the rules for classroom discussion concerning controversial ethical subjects?

Learning objectives – The Student will be able to:

- a. define, orally or in writing, the rule for classroom discussion and describe their importance
- b. use the guidelines for classroom discussion in discussing controversial ethical subjects?

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It is expected that these activities be formally assessed in a variety of modes such as: persuasive essay, debate, scored discussion, presentation, powerpoint, or other such method in addition to summative test.

Required Activities:

- Case study #1, Frank and Martin, (Kreuzer/Massey, 1996, page 368)
- Case study #2, Mr. Johnson, (Kreuzer/Massey, 1996, page 372)
- Case study 1, Gene therapy review is required for this, (Kreuzer/Massey, 1996, page 382)

Recommended Activities:

- Case study 2, hormone therapy, legal or illegal, (Kreuzer/Massey, 1996, page 384)
- Case study 1, Genetic screening, (Kreuzer/Massey, 1996, page 392)
- Case study 2, Genetic screening, (Kreuzer/Massey, 1996, page 394)

Resources:

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Curriculum Alignment with State of Connecticut Science Standards **All areas address State Standards for Scientific Inquiry, Literacy and Numeracy**

Focus Question	Content Standard	Supportive Concepts
1.Ethical Dilemma	SILN	DINQ.2, DINQ.10
2. Principles of Ethics	SILN	DINQ.2, DINQ.10
3. Decision Making Model	SILN	DINQ.2, DINQ.10
4. Class discussion rules	SILN	DINQ.2, DINQ.10

Organ Transplants, Cancer and Death

Suggested Time: 6 – 8 class periods

Essential Question:

What are the ethical dilemmas for organ transplant patients, cancer patients, and decisions about death in today's society?

Focus Questions

1. What is the rejection process used by the human body?

Learning objectives – The Student will be able to:

- a. explain the relationship between individual's histo-compatibility complexes.
- b. correlate the role of antibodies, Macrophages, and cytotoxic T cells and rejection.
- c. explain the organ donation eligibility process in the United States.

2. What are the accepted and experimental methods of cancer treatment in most types?

Learning objectives – The Student will be able to:

- a. explain how surgery, chemotherapy and radiation works in cancer treatment.
- b. discuss innovative methods for treatment of cancer.
- c. document some experimental treatments of cancers.

3. What are the National, State and local criteria for a declaration of death?

Learning objectives – The Student will be able to:

- a. generalize the criteria for determination of death.
- b. paraphrase the chain of decision for decisions concerning individuals near death.
- c. explain how a living will affects decisions about dying people.

Assessments:

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Required Activities: Box up and summarize their ethical stance for case studies from *Yashon.

* #3 heart transplant

* #5 transplant

Bone marrow replacement for certain cancer treatments

Declaration of death and organ harvesting

Recommended Activities:

Interview a member of a hospital bioethics committee for the areas in this unit.

Classroom discussion about decisions made by families that students are willing to share.

Resources:

Students:

Handouts provided by the teacher.

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Curriculum Alignment with State of Connecticut Science Standards

All areas address State Standards for Scientific Inquiry, Literacy and Numeracy

Focus Question	Content Standard	Supportive Concepts
1. Organ Transplant	SILN	DINQ.2, DINQ.10
2. Cancer treatment	SILN	DINQ.2, DINQ.10
3. Declaration of Death	SILN	DINQ.2, DINQ.10

Diseases and the Immune System

Suggested Time: 6 – 8 class periods (lab activity may extend for parts of 6 or more classes)

Essential Questions:

1. How does the human immune system fight viruses, bacterial, and parasitic diseases ?
2. How does human behavior, including the use of drugs and antibiotics, help or hinder protection from disease?

Focus Questions

1. What is the difference between humoral and cell mediated response to infection?
Learning objectives – The Student will be able to:
 - a. identify the external, non specific defenses against disease.
 - b. explain the role of B cells in humoral response to infection.
 - c. correlate the role of macrophages and T cells in cell mediated responses to humoral protection against infection.
 - d. explain the role of mast cells in allergic reactions including anaphylactic shock.
2. What are the best human responses to epidemics?
Learning objectives – The Student will be able to:
 - a. detail the history and behavioral responses for protection from HIV.
 - b. explain, using SAARS, Ebola or any other disease from the past, how epidemics have been successfully stopped by human behavior.
3. How do antibiotics work to help fight infection and how are they utilized properly?
Learning objectives – The Student will be able to:
 - a. explain how antibiotics combined with the immune system help fight infection.
 - b. sequence the proper use of antibiotics for human infection.
 - c. discuss the dilemma of antibiotic use in society.
4. What are the affects of antibiotics and antiviral drugs on environmental bacteria?
Learning objectives – The Student will be able to:
 - a. explain the of antibiotics on environmental bacteria
(using microbiological testing methods for data collection and comparison)
 - b. explain the effects of an antiviral drug on environmental bacteria
(using microbiological testing methods of data collection and comparison)
5. What are the uses of antibiotics in society not related to human infection?
Learning objectives – The Student will be able to:
 - a. research the use of antibiotics by humans which are not intended to help human infection directly.
 - b. research the increasing numbers of resistant pathogenic bacteria in the world today.
 - c. write a position paper about antibiotics use in society.

Assessments

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It is expected that these activities be formally assessed in a variety of modes such as: persuasive essay, debate, scored discussion, presentation, powerpoint, or other such method in addition to summative test.

Required Activities:

Laboratory activity to stress environmental bacteria with antibiotics and an antiviral drug
(looking for the effects of total colony growth and density)
Research and writing position paper concerning antibiotic use in society today.
Case study # 7, (Yashon), box up and classroom discussion.
Antibiotic classroom discussion post research paper hand in about antibiotic use.

Recommended Activities:

Videos from news programs and other sources per antibiotics and or epidemics
which occur during the semester.

Resources:

Students:

Handouts provided by the teacher.
On line and print sources available in the LHS media Center or other libraries.

Teachers:

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Helen Kreuzer and Adrienne Massey, ASM Press, Washington D.C., 1996.

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Curriculum Alignment with State of Connecticut Science Standards

All areas address State Standards for Scientific Inquiry, Literacy and Numeracy

Focus Question	Content Standard	Supportive Concepts
1. Response to infection	B5	57, 58, 59, 60, 61, 62
2. Response to epidemics	B5	59, 60
3. Antibiotics	B5	60, 61, 62
4. Anti-infection drugs	B5	60, 61
5. Other uses of Antibiotics	B5	60, 61

Biotechnology and the Genetics of Health and Food

Suggested Time: 6 – 8 class periods

Essential Question: How is biotechnology being used to enhance human health and nutrition?

Focus Questions

1. How is recombinant DNA being used to treat genetic disorders in humans today?

Learning objectives – The Student will be able to:

- a. explain possible applications of the theory of gene therapy.
- b. summarize gene therapies that have been successful to date.
- c. identify examples of gene products being made via recombinant DNA technology to assist human health.

2. How is recombinant DNA being used to produce enhanced food crops?

Learning objectives – The Student will be able to:

- a. research and discuss food crops which are transgenic and the purpose for this.
- b. hypothesize about outcomes of modifications to food crops world wide.
- c. research and discuss the movement in Europe/USA against genetically modified foods for people or animals.

Assessments:

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It is expected that these activities be formally assessed in a variety of modes such as: persuasive essay, debate, scored discussion, presentation, powerpoint, or other such method in addition to summative test.

Required Activities:

- class discussion/presentation etc
- gene therapy and the use of recombinant drugs.
- the use of recombinant DNA or alternative DNA to produce transgenic plants for human or animal consumption.

Recommended Activities:

- Visit Monsanto/DeKalb or invite a scientist to speak to the class about their work.
- Have a luncheon with only transgenic foods served.
- Observe the video : “Genetically Modified Foods”, PBS special

Resources:

Students:

- Handouts provided by the teacher.
- On line and print sources available in the LHS media Center or other libraries.

Teachers:

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Focus Question	Content Standard	Supportive Concepts
1.DNA and Health	B2	26, 27, 28, 29
2. DNA and Nutrition	B2	26, 27, 28, 29

Current Issues in Bioethics

Suggested Time: 4 – 8 class periods or portions of each class period.

Essential Question: What are some of the biological dilemmas facing humans today?

Possible Focus Questions

1. Is cloning a viable option to help people live happier lives?
Learning objectives – The Student will be able to:
 - a. differentiate between therapeutic cloning and reproductive cloning.
 - b. investigate and discuss the ethics of cloning.

2. Should stem cells be used in research to help human health and medicine?
Learning objectives – The Student will be able to:
 - a. discuss what stem cells are and where they come from.
 - b. explain how stem cells may be used in research.
 - c. list successful research in stem cells to date.

3. What should be done with frozen embryos that are NOT wanted by the original owners?
Learning objectives – The Student will be able to:
 - a. assess the problem of large numbers of frozen human embryos.
 - b. hypothesize about what to do with these unwanted cells.

4. Should humans intervene in environmental situations to attempt to restore nature?
Learning objectives – The Student will be able to:
 - a. box and write up case study # 20 (Yashon), wolves in Yellowstone National Park
 - b. research the present state of this reinstatement by man.

5. Should the use of marijuana be legal for medical purposes?
Learning objectives – The Student will be able to:
 - a. research supporting data for various diseases and how the drug may help.
 - b. discuss the present objections which prevent States from allowing this use.

Assessments:

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It is expected that these activities be formally assessed in a variety of modes such as: persuasive essay, debate, scored discussion, presentation, powerpoint, or other such method in addition to summative test.

Required Activities:

Class discussion/presentation etc about each issue and sharing of positions on various research subjects.

Recommended Activities:

Teacher or student recorded (from television sources) presentations are great warm-ups or major issue introductions for a whole call or future research.
Summary write up of each issue discussed in class.

Resources:

Students:

Handouts provided by the teacher.
On line and print sources available in the LHS media Center or other libraries.

Teachers:

Recombinant DNA and Biotechnology, A Guide for Teachers,

Helen Kreuzer and Adrienne Massey, ASM Press, Washington D.C., 1996.

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Curriculum Alignment with State of Connecticut Science Standards **All areas address State Standards for Scientific Inquiry, Literacy and Numeracy**

Focus Question	Content Standard	Supportive Concepts
1. Cloning	B2, B5	9, 10, 11, 12, 13, 14, 15
2. Stem Cells	B1, B5	1, 2, 4, 5, 7, 8
3. Frozen Embryos	B2	23, 26, 27, 28
4. Environment decisions	B3	30, 31, 32, 36
5. Medical marijuana	B5, SILN	DINQ.2, DINQ.10