Foundations Notre Dame and Foundations New Orleans
*Pedagogy (Lesson Planning) Phase*

**SCHOOL NAME:** Trinity High School - River Forest, IL

**OUR TOPIC IS:**

The moral questions biotechnologies like CRISPR bring to Catholic Bioethics

**Essential Questions**

**OUR ESSENTIAL QUESTIONS ARE** (minimum of 2, maximum of 4)**:**

1. Within our faith traditions we believe that people are inherently good: so, is CRISPR inherently good as it saves lives by curing genetic disorders?

2. How does our faith dictate our use of medical technology?

3. How has medical technology become an intrinsic part of our lives?

4. If we have an informed conscience, do we all come to the same conclusion about the consequences of biomedical advances?

**The Method**

Lesson timing

a. Three 86 minute periods with an optional additional day for a lab experiment
b. Taught in Moral Issues and IB Biology

**OUR METHOD IS BELOW:**

## Class Period 1 (86 minutes)

1) Teacher introduces CRISPR PowerPoint. CRISPR Explained PPt
2) Teacher explains Think-Pair-Share Questions on Slide #5
3) Student pairs share their thoughts
4) Teacher reinforces the CRISPR basics by showing the short Crisper Video Summary CRISPR Explained - YouTube (1:38)
5) Students form groups of 3-4 students to address the questions on Slide 19 of the PowerPoint.
6) Teacher leads a large group discussion using this question: How do you think this process fits with what we know about church teaching?
7) The students are assigned this article to read for class tomorrow.The Dark Side of Crispr

## Class Period 2 (86 minutes)

1) Teacher will show a select portion of the following narrated by Bob Barren.Abandonment to Divine Providence

2) The teacher will facilitate a discussion of the Catholic moral thought explicit in Dignitas Personae, after the students watch the following video. Discussion of Dignitas Personae Short Video (8:11)

**3)** The teacher will divide the class into three small groups to prepare a presentation, after they have researched certain aspects of the technology of Crispr and its effects. **The Ethics of CRISPR - Small Group Activity**
4) The small groups will present their findings.
5) Each Student will be asked to write a brief reflection on each of the presentations, for homework.
6) Class will conclude with a large group discussion of the article assigned the previous day.

## Class Period 3 (15 minutes)

1) The Teacher will give an explanation of the Crispr Final Assessment Crispr Final Assessment Writing Rubric due days later, and answer any questions the students may have.

## Class Period 4 - Optional

1) Teacher will give directions to the students for the lab experiment.
2) Students will complete the Bacterial Engineering CRISPR Experiment CRISPR Lab
3) Students will complete a formal lab report.

**Resources**

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|---|---|
| CRISPR Explained | PPt Slides, Embedded videos, Probing Questions for Think/Pair/Share |
| CRISPR Explained - YouTube | Short video (1:38) |
| CRISPR: Can we control it? | Avoiding Misuse (14:15) |
| What is CRISPR? | Wonderopolis Article; Vocabulary |
| CRISPR Quizlet | Q&A Practice |
| What is CRISPR Exit Slip | 3 M/C Quiz questions |
| How CRISPR is Revolutionizing Gene Editing | Article with Questions (9/18 not 13) |

USCCB - Genetic Enhancement_4 page article on genetic enhancement and human dignity
Summary of Dignitas Personae/resources_Connection to many current Cath. Resources on Biotechnology
The Place of God in Biotechnology - Scholarly Research Article for Reference
C.C.C. - The Morality of Human Acts - Analysis of human morality in the Catholic Catechism
https://news.harvard.edu/gazette/story/2019/01/perspectives-on-gene-editing/
https://www.scientificamerican.com/article/the-dark-side-of-crispr/
https://med.nyu.edu/departments-institutes/population-health/divisions-sections-centers/medical-ethics/sites/default/files/high-school-bioethics-lesson-plans-crispr.pdf

**Knowledge**.

**The KNOWLEDGE that students participating in our lesson will gain is** (include a minimum of 4 but no more than 8)**:**

1. Compare and contrast biological/genetic characteristics of humans and other related animal species
2. Demonstrate a basic awareness of evolution by natural selection
3. Evaluate the morality of current day bio-ethical practices.
4. Analyze the impact of human bio genetic manipulation on the inherent dignity of the human person.
5. Determine the role of God in bio-ethical practices.

**Skills**

**The SKILLS that students participating in our lesson will gain will be** (please include a minimum of 4 and a maximum of 8)**:**

- Plan and carry out investigations
- Analyze and interpret data
- Construct explanations and design solutions
- Engage in argument from evidence
- Obtain, evaluate, and communicate information
- Synthesize a conclusion based on prior knowledge of academic evidence

**Standards**

**The STANDARDS satisfied in this lesson are:**

**Next Generation Science Standards (NGSS)**

- HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.
- HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
- HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

**United States Conference of Catholic Bishops (USCCB)**

A. Life in Jesus Christ

1. What is Life in Christ?
    a. God's Plan for Us (CCC, nos. 302-314, 1692).
2. God created us in his image and likeness (CCC, nos. 1700-1706).
    b. The dignity of the human person (CCC, no. 1700)
3. God Has Taught us How to Live a New Life in Christ

B. Revelation

4. Fifth Commandment: You shall not kill.
    a. Respect for human life in all its stages and situations (CCC, nos. 2258-2262).

C. Challenges

1. Isn't it wrong for the Church to impose her views of morality on others (CCC, nos. 1949-1960)?
2. Human dignity and the moral code revealed by God are universal, that is, meant for every person (CCC, no. 1700).

D. Living as a Disciple of Jesus Christ in Society - Major Themes of Catholic Social Teaching (CCC, nos. 1877-1948, 2196-2257)

1. The dignity of human life.
2. All human life created and redeemed by God is sacred.
3. Dignity is due to being an image and likeness of God.

E. Sin and Its Social Dimensions

1. The social dimension of the Commandments
2. The last seven Commandments focus on our relationship with others: the moral teaching of our faith must be brought into people's interaction with each other (N.B. [1] positive aspects of commandment, [2] failures to live it).
    a. Fifth Commandment (CCC, nos. 2258-2330).
    b. Fosters a civilization of life and love.
    c. Dishonors human life -- culture of death.
    d. Abortion, euthanasia, physician-assisted suicide, cloning, genetic manipulation.

**Assessments:**

**Formative assessments:**

1) Think-Pair-Share Discussion
2) Key question large group discussion
3) The Dark Side of CRISPR (article) should be read for Class 2 preparation
4) Small Group Presentation: Post Student Presentation Assessment-Every student will be asked to write a brief reflection on each of the presentations. This will be submitted.

**Summative Assessment:**

1. Each student will analyse the information they have gathered about the process and advancements attributed to Crispr, as well as the Catholic response to at least one potential use of Crispr to alter a health concern/tragedy.
   CRISPR Final Assessment Writing Rubric
2. Formal Lab Report: this report is only for those choosing the Optional Day 4
   Formal Lab Rubric

**Description**

Since the emergence of new biotechnologies like CRISPR that target editing of a wide variety of genomes now occurs regularly, applications of CRISPR are going beyond research and biomedical therapies. This lesson looks at the existing ethical concerns present in the global community about the scope of the use of CRISPR. It includes fundamental ethical issues through the lens of the Catholic Church that include the extent to which CRISPR use should be allowed, communities that have access to CRISPR use, and looking at frameworks that involve all types of human genome editing.

**Title:**

The Ethical Questions of CRISPR:  A Catholic Perspective