GEORGIA | PEACH STATE PATHWAYS

Career, Technical, & Agricultural Education

HEALTHCARE SCIENCE

PATHWAY: Biotechnology Research & Development
COURSE: Introduction to Biotechnology
UNIT 2: Introduction to Careers in Biotechnology

INTRODUCTION

Annotation:

This unit includes lessons on the different types of careers in the biotechnology pathway. Students will have the opportunity to explore biotechnology-related careers in the academic, governmental and private sectors. Activities include a career research project and creation of a brochure from which information can be used in formulating a detailed career plan later in the course. Students will develop a career portfolio as part of an ongoing project.

Grade(s):

	9th
X	10th
X	11th
X	12th

Time:

Ten 50-minute class periods

Author:

Phyllis Dumas

Students with Disabilities:

For students with disabilities, the instructor should refer to the student's IEP to be sure that the accommodations specified are being provided. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation.

FOCUS STANDARDS

GPS Focus Standards:

HS-IBT-3 **Students will analyze careers in research and development, human health and diagnostics, biomanufacturing, environmental applications, and agriculture that utilize biotechnology.**

a. Describe the educational requirements and responsibilities for various positions within the biotechnology industry.
b. Compare and contrast careers within academic, government, and private sectors.
c. Develop a portfolio documenting education, experiences, and acquired skills for a specific careers.

GPS Academic Standards:

ELA10RC2 **The student participates in discussions related to curricular learning in all subject areas. The student**

c. Relates messages and themes from one subject area to those in another area.

ELA10RL4 **The student employs a variety of writing genres to demonstrate a comprehensive grasp of significant ideas in selected literary works. The student composes essays, narratives, poems, or technical documents. The student**

d. Includes a formal works cited or bibliography when applicable.

UNDERSTANDINGS & GOALS

Enduring Understandings:

Biotechnology offers a vast range of career choices, some of which are scientific and others which are nonscientific. Knowing how to prepare for a career is very important in pursuing careers goals. Creating and maintaining a career portfolio will assist in the employment process so that students can better communicate their education, work experience, accomplishments, skills, and interests.

Essential Questions:

- How do different types of careers in biotechnology compare and contrast in educational requirements, roles and responsibilities in the academic, government, and private sectors of society?
- How can a career portfolio best be developed and organized to assist in the career preparation process?

Knowledge from this Unit:

Students will be able to:

- Describe careers options in various aspects of biotechnology.
- Explain variations in educational requirements for biotechnology careers
- Discuss postsecondary schools offering biotechnology programs of study inside and outside of Georgia
- Describe the importance of a career portfolio
- List similarities and differences in biotechnology careers in the academic, government, and private areas

Skills from this Unit:

Students will be able to:

- Research careers in biotechnology
- Create a multimedia presentation
- Create a career brochure
- Compose a resume', cover letter, and follow up letter
- Create, organize, and maintain a career portfolio for use in career preparation

ASSESSMENTS

Assessment Method Type:

____ Pre-test
X Objective assessment - multiple-choice, true- false, etc.
__ Quizzes/Tests
__ Unit test
X Group project
____ Individual project
X Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
__ Self-check rubrics
__ Self-check during writing/planning process
__ Journal reflections on concepts, personal experiences and impact on one's life
__ Reflect on evaluations of work from teachers, business partners, and competition judges
__ Academic prompts
__ Practice quizzes/tests
____ Subjective assessment/Informal observations
__ Essay tests
__ Observe students working with partners
__ Observe students role playing
____ Peer-assessment
__ Peer editing & commentary of products/projects/presentations using rubrics
__ Peer editing and/or critiquing
____ Dialogue and Discussion
__ Student/teacher conferences
__ Partner and small group discussions
__ Whole group discussions
__ Interaction with/feedback from community members/speakers and business partners
____ Constructed Responses
__ Chart good reading/writing/listening/speaking habits
__ Application of skills to real-life situations/scenarios
____ Post-test

Assessment Attachments and / or Directions:

Biotechnology Career Brochure Rubric
Career Portfolio Rubric

LESSON PLANS

• LESSON 1: INTRODUCTION TO BIOTECHNOLOGY

1. Identify the standards. Standards should be posted in the classroom.

HS-IBT-3 **Students will analyze careers in research and development, human health and diagnostics, biomanufacturing, environmental applications, and agriculture that utilize biotechnology.**

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ELA10RC2 **The student participates in discussions related to curricular learning in all subject areas. The student**

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ELA10RL4 **The student employs a variety of writing genres to demonstrate a comprehensive grasp of significant ideas in selected literary works. The student composes essays, narratives, poems, or technical documents. The student**

d. Includes a formal works cited or bibliography when applicable.

2. Review Essential Questions. Post Essential Questions in the classroom.

- What does it mean to have a career in biotechnology?
- How many years of education are required for different biotechnology careers?
- What are the roles and responsibilities of a biotechnology career?
- What kinds of biotechnology careers are available in the academic, government, and private sectors?
- How can a career portfolio help a person get a job in a biotechnology field?

3. Identify and review the unit vocabulary. Terms may be posted on word wall.

Academic	Genetically Modified Food Specialist	Portfolio
Bioinformatics	Genetics Engineer	Process Technicians
Biomedical Engineer	Government	Prosthetist
Biostatistician	Information Technologist	Quality Control Analyst
Biotechnology Research Associate	Job	Research Biologist
Biotechnology Research Scientist	Laboratory Animal Caretakers	Research and Development
Career	Laboratory Technician	Robotics Engineer
Cell Biologist	Maintenance and Instrumentation Technicians	Salary
Clinical Engineer	Medical Scientist	Software Engineer
Chemical Technicians	Medical Writer	Systems Engineer
Chemist	Microbiologist	Veterinarians
Clinical Research Associate	Molecular Biologist	Veterinary Technician
Epidemiologist	Pharmaceutical Project Manager	Veterinary Technologist

4. Lead a brief discussion about biotechnology careers.
   - Ask students, “Do you know of someone who works in biotechnology?”
   - What do you know about the job?
   - What are some careers you think would be associated with biotechnology?
   - What do you think it takes to prepare for a career in this field?

• LESSON 2: BIOTECHNOLOGY CAREERS

1. Review Essential Questions. Post Essential Questions in the classroom.

    - What does it mean to have a career in biotechnology?
    - How many years of education are required for different biotechnology careers?
    - What are the roles and responsibilities of a biotechnology career?

2. Careers Open to Me
    - Show students the **So You Want to Work in Biotechnology** PowerPoint presentation.
        - See attached supplementary files
    - Explain to students that there are many more careers related to biotechnology not mentioned in the PowerPoint.
    - Show the **Career Opportunities** transparency to the class.
        - See attached supplementary files
    - Ask students, "Does it surprise you that any of these careers are associated with biotechnology? Why or why not?"

3. Biotechnology Companies and Products
    - Have students find one biotechnology company in Georgia.
    - Instruct students to record the name, location, and one major product on a sheet of paper.
    - Have students list biotechnology careers from the unit vocabulary which could be used by this company.

• LESSON 3: JOB SECTORS

1. Review Essential Questions. Post Essential Questions in the classroom

    - What kinds of biotechnology careers are available in the academic, government, and private sectors?

2. Careers in Academia
    - Lead a brief discussion about biotechnology careers in the academic sector.
        - Ask students, "Where do you think academic professionals would find jobs in biotechnology?"
        - Why do you think the academic sector needs people with a biotechnology background?
        - What sorts of jobs are available in this sector?
        - Why do you think people would want to work in academia?
    - Have students research careers in academia online and find one biotechnology job for teachers at the grade-school, graduate school, and post-doctoral levels.
        - **Note:** Tell students not all academia careers are strictly related to teaching.

3. Careers in the Government
    - Lead a brief discussion about biotechnology careers in the government sector.
        - Ask students, "Where do you think people can find biotechnology jobs working with the government?"
        - Why do you think the government needs people with a biotechnology background?
        - What sorts of jobs are available in this sector?
    - Explain to students there are seven top-hiring agencies in the government sector which want employees in biotechnology:

- Department of Health and Human Services
  - Tell students this is the government agency in charge of protecting the health and welfare of Americans by providing essential human services including Medicare and Medicaid.
  - HHS engages in heath and social science research about food and drug safety and makes sure all information is readily available and easily accessible for everyone.
- Department of Agriculture
  - Tell students this is the government agency which provides leadership and public policy about agriculture, food, natural resources, and rural development.
- Department of the Interior
  - Tell students this is the government agency in charge of conservation in the continental United States, its territories, and Puerto Rico.
  - DOI's main mission is to preserve environmental and cultural values of public lands, such as Native American reservations.
- National Institutes of Health
  - Tell students this is a department part of HHS which is in charge of conducting and supporting medical research.
- U.S. Forest Service
  - Tell students this is a government agency under the USDA in charge of managing public lands, national forests, and grasslands.
- U.S. Geological Survey
  - Tell students USGS provides scientific information to describe and understand the planet, including studying natural disasters and their effects on humans' environment and quality of life.
- Natural Resources Conservation Service
  - Tell students NRCS is part of the USDA in charge of conserving and restoring natural resources and private lands, and making them more resilient to environmental challenges.

- Have students choose one of the previously mentioned government agencies to research and find a biotechnology job at.

4. Careers in the Private Sector
   - Lead a brief discussion about biotechnology careers in the private sector.
     - Ask students, "Where do you think people can find biotechnology jobs working with independent companies?
     - Why do you think companies hire people with a biotechnology background?
     - What sorts of jobs are available in this sector?
   - Instruct students to choose one career from the PowerPoint in Lesson 3 and find a private sector job for it using a job search website.

5. Summary Activity
   - Instruct students to write a two-page paper about the biotechnology careers they found for each sector.
   - The paper should include:
     - Description of duties, educational requirements, and salary for one job in the academic, government, and private sectors
     - Explanation of which sector the student would most like to work in
     - Explanation of which job would best suit the student if he pursued a career in biotechnology

• LESSON 4: CAREER PORTFOLIO

1. Review Essential Questions. Post Essential Questions in the classroom.

    - How can a career portfolio help a person get a job in a biotechnology field?

2. Components of a Career Portfolio
    - Show students the **Career Portfolio** PowerPoint presentation.
        - See attached supplementary files

3. Creating a Career Portfolio
    - Have each student take out two sheets of paper and split each into three columns.
    - Label the columns as:
        - References
        - Awards and Achievements
        - Work Experience
        - Leadership Experience
        - Extracurricular Activities
        - Special Skills
    - Instruct students to fill in as much information as they can into each column, and when they are done, allow students to type up their lists on a computer.
    - Have students use their lists to create a resume, cover letter, and follow-up letter for one of the jobs they wrote their papers about for the Lesson 3 summary activity.
        - **Note:** Though it is usually suggested to not use a resume template in a formal business setting, allow students to follow the format on the PowerPoint presentation for this lesson.
    - Give each student a file folder labeled with their name, and instruct them to put the following items in their "career portfolio:"
        - Summary Activity paper from Lesson 3
        - Columns list of activities and experiences
        - Resume
        - Cover letter
        - Follow-up letter
    - Score the career portfolios using the **Career Portfolio Rubric**.
        - See attached supplementary files

• ATTACHMENTS FOR LESSON PLANS

So You Want to Work in Biotechnology
Career Opportunities
Career Portfolio
Career Portfolio Rubric
Biotechnology Careers Project
Career Brochure Rubric

• NOTES & REFLECTION:

CULMINATING PERFORMANCE TASK

Culminating Unit Performance Task Title:

Biotechnology Careers Project

Culminating Unit Performance Task Description/Directions/Differentiated Instruction:

Break the class into groups of three or four. Have each group choose a different CTAE pathway to research associated biotechnology careers for. Students will research five careers to create a PowerPoint presentation about, and spotlight three of them in a brochure.

Have students present their career projects in front of the class. Allow students to ask questions at the end of each presentation and grade the projects using the attached rubric.

Attachments for Culminating Performance Task:

Biotechnology Careers Project
Career Brochure Rubric

UNIT RESOURCES

Web Resources:

http://jobstar.org/alljobs.php?indpubnum=5378972829083516&q=biotechnology+careers&l=
www.bls.gov
http://www.mschien.com/howto/brochures.htm
http://amby.com/kimeldorf/portfolio/
http://members.shaw.ca/dbrear/dseportfolios.html
http://www.bced.gov.bc.ca/graduation/portfolio/moe_grad_portfolio_p1_s2.pdf

Materials & Equipment:

- Overhead projector
- File folders

21st Century Technology Used:

X	Slide Show Software		Graphing Software		Audio File(s)
	Interactive Whiteboard		Calculator		Graphic Organizer
	Student Response System		Desktop Publishing		Image File(s)
	Web Design Software		Blog		Video
	Animation Software		Wiki		Electronic Game or Puzzle Maker
	Email	X	Website		