Implementation date
Fall 2009

PROGRAM CONCENTRATION: Healthcare Science
CAREER PATHWAY: Biotechnology Research and Development
COURSE TITLE: Biotechnology Internship/ Independent Research Project

Course Description: This course is an advanced course primarily designed for seniors which places students in a workplace setting or offers the opportunity for students to complete an independent research project that applies biotechnology. The knowledge and skills gained in this course will enhance students' preparation for continuing a career pathway to post-secondary programs in biotechnology. Recommended course length is a minimum of 135 hours with content focus as delineated in the biotechnology curriculum and performance standards of the Georgia Career Related Education (CRE) Manual. A minimum of 90 internship/independent research project hours is required. The additional 45 hours may be utilized in the class or laboratory based on the guidelines set forth by the instructor and as required by affiliating agencies. This course requires strong commitment from students, parents/guardians, instructors, and affiliating agencies. Students who are participating in the internship must adhere to the Georgia Work Based Learning Standards and Guidelines. Students will be required to make a written and oral presentation at the end of the course summarizing their research project/internship experiences and submit an updated career portfolio.

Pre-requisites:
Introduction to Healthcare Science, Introduction to Biotechnology, and Applications of Biotechnology

HS-BIR-1. Students will satisfactorily meet admission policies and procedures for enrolling in a work-based learning program.

a. Demonstrate satisfactory progress in all subjects based on grades.
b. Demonstrate regular attendance and punctuality consistently.
c. Demonstrate satisfactory conduct consistently.
d. Comply with other system based requirements for enrollment.
e. Demonstrate interest and aptitude for participation in the internship/independent research project.
f. Demonstrate strong communication skills.
g. Demonstrate willingness to comply with program rules/standards.
h. Possess parental/guardian support and reliable transportation.
i. Demonstrate honesty, reliability, and dependability.
j. Demonstrate self-pride.

HS-BIR-2. Students will complete either a research project or an internship in a biotechnology related work setting.

a. Participate in an independent research project that has been approved by the instructor. The research project will be conducted either in the classroom

environment using scientific methodology or in a workplace biotechnology setting. The student will maintain a formal laboratory notebook and make a research report on the project using scientific format (abstract, introduction, materials and methods, results, and discussion) acceptable for publication.

b. Participate in a biotechnology related work based learning experience that has been approved by the supervising instructor. Students will maintain a weekly log documenting their internship hours. (See Georgia Work-Based Learning guidelines and standards.)

Academic Standard:
ELA12LSV2 The student formulates reasoned judgments about written and oral communication in various media genres. The student delivers focused, coherent, and polished presentations that convey a clear and distinct perspective, demonstrate solid reasoning, and combine traditional rhetorical strategies of narration, exposition, persuasion, and description.

HS-BIR-3. Students will incorporate required safety and security practices and knowledge of organizational policies and procedures.

a. Identify unsafe working conditions and identify how to maintain a safe work environment and prevent accidents.
b. Prepare a plan of action in case of accidents that could result from the performance of the project or internship setting.
c. Demonstrate appropriate action when observing a hazardous materials problem.
d. Demonstrate the use of Standard Precautions as described in the rules and regulations set forth by OSHA.
e. Identify and maintain security procedures as designated by each facility.
f. Demonstrate understanding of and adhere to facility based policies and procedures.

Academic Standards:
SCSh2 Students will use standard safety practices for all classroom laboratory and workplace investigations.

ELA9RL5 The student understands and acquires new vocabulary and uses it correctly in reading and writing.

ELA10LSV1 The student participates in student-to-teacher, student-to-student, and group verbal interactions.

INTERPERSONAL

HS-BIR-4. Students will apply principles of communication and customer service in all biotechnology laboratory settings.

a. Demonstrate the ability to communicate effectively with clients and staff members while demonstrating respect for cultural, social, and ethnic diversity in all professional environments.
b. Maintain confidentiality in all forms of communication depending on required regulations.
c. Adhere and implement knowledge of the work place environment to facilitate professional relationships and effective communication.

Academic Standard:
ELA12LSV1 The student participates in student-to-teacher, student-to-student, and group verbal interactions.

INFORMATION PROCESSING

HS-BIR-5. Students will compile, interpret, process, and communicate pertinent information.

a. Demonstrate basic math skills including, but not limited to: interpreting and recording data on graphs, charts, and tables.
b. Demonstrate prioritization and decision-making skills including identification of conditions or situations which would take priority over others.
c. Demonstrate the ability to identify technical problems and suggest solutions utilizing appropriate resources.
d. Prepare and present an updated career portfolio.

Academic Standards:
MM2P1 Students will solve problems (using appropriate technology).

MM2P4 Students will make connections among mathematical ideas and to other disciplines.

MM1A1 Students will explore and interpret the characteristics of functions, using graphs, tables, and simple algebraic techniques.

ELA9RL5 The student understands and acquires new vocabulary and uses it correctly in reading and writing.

ELA10W1(a) Establishes a clear, distinctive perspective and maintains a consistent tone and focus throughout.

ELA10LSV1 The student participates in student-to-teacher, student-to-student, and group verbal interactions.

ELA12LSV2 The student formulates reasoned judgments about written and oral communication in various media genres. The student delivers focused, coherent, and polished presentations that convey a clear and distinct perspective, demonstrate solid

reasoning, and combine traditional rhetorical strategies of narration, exposition, persuasion, and description.

ELA12W1 The student produces writing that establishes an appropriate organizational structure, sets a context and engages the reader, maintains a coherent focus throughout, and signals a satisfying closure.

ELA12W3 The student uses research and technology to support writing.

EMPLOYABILITY AND LEADERSHIP

HS-BIR-6. Students will demonstrate growth in development of employability and leadership skills as outlined in the Career Related Education Manual.

a. Display a professional attitude.
b. Demonstrate appropriate work behaviors.
c. Build essential work relationships.
d. Show adeptness at managing self and time.
e. Perform well in a team environment.
f. Solve problems effectively.
g. Demonstrate job getting and job keeping skills.
h. Recognize the importance of involvement in a professional organization in leadership development.

INTERNSHIP SPECIFIC

An internship is defined as an extended work-based learning experience in which student interns improve their technical skills while learning the dynamics of a biotechnology research and development related facility.

HS-BIR -7. Students will acquire and apply skills in a biotechnology related setting for a minimum of 90 hours based on guidelines in the Career Education Manual.

a. Demonstrate understanding of and adhere to requirements as outlined in the individual training plan filed with the training facility and school.
b. Demonstrate an understanding of professional ethics and legal responsibilities.
c. Understand and demonstrate standard operating policies and procedures in a biotechnology setting.
d. Adhere to industry dress codes and maintain appropriate hygiene.
e. Understand and apply infection control and safety guidelines.
f. Understand and utilize terminology related to biotechnology.
g. Demonstrate understanding of advanced biotechnology skills.

INDEPENDENT RESEARCH SPECIFIC

HS-BIR-8. Students will conduct an in-depth study of at least one aspect of the biotechnology industry.

a. Arrange and conduct planning meetings with the guidance and support of a mentor or interdisciplinary team under continuous supervision of the teacher.
b. Plan and conduct research according to the scientific process.

HS-BIR-9. Students will participate in a combination of classroom instruction and supervised research equivalent to an average of five periods per week for project development.

a. Identify community, state, national, or global biotechnology issues to select a project for personal enrichment and professional development.
b. Identify and review ethical and legal issues related to the project and meet expectations related to professional conduct.
c. Collect data and conduct research accurately using verbal and nonverbal communication skills to accomplish project goals.

HS-BIR-10. Students will demonstrate the ability to utilize a variety of resources, advanced technology, and communication skills in the development, implementation, and presentation of a project.

a. Prepare a detailed written report of research.
b. Communicate research conclusions clearly and concisely to an audience of professionals.

Academic Standards:
ELA12W1 The student produces writing that establishes an appropriate organizational structure, sets a context and engages the reader, maintains a coherent focus throughout, and signals a satisfying closure.

ELA12W3 The student uses research and technology to support writing.

ELA12W4 The student practices both timed and process writing and, when applicable, uses the writing process to develop, revise, and evaluate writing.

ELA12C2 The student demonstrates understanding of manuscript form, realizing that different forms of writing require different formats.

ELA12C1 The student demonstrates understanding and control of the rules of the English language, realizing that usage involves the appropriate application of conventions and grammar in both written and spoken formats.

ELA12LSV2 The student formulates reasoned judgments about written and oral communication in various media genres. The student delivers focused, coherent, and polished presentations that convey a clear and distinct perspective, demonstrate solid

reasoning, and combine traditional rhetorical strategies of narration, exposition, persuasion, and description.

Reading Across the Curriculum

Reading Standard Comment

After the elementary years, students engage in reading for learning. This process sweeps across all disciplinary domains, extending even to the area of personal learning. Students encounter a variety of informational as well as fictional texts, and they experience text in all genres and modes of discourse. In the study of various disciplines of learning (language arts, mathematics, science, social studies), students must learn through reading the communities of discourse of each of those disciplines. Each subject has its own specific vocabulary, and for students to excel in all subjects, they must learn the specific vocabulary of those subject areas in *context*.

Beginning with the middle grades years, students begin to self-select reading materials based on personal interests established through classroom learning. Students become curious about science, mathematics, history, and literature as they form contexts for those subjects related to their personal and classroom experiences. As students explore academic areas through reading, they develop favorite subjects and become confident in their verbal discourse about those subjects.

Reading across curriculum content develops both academic and personal interests in students. As students read, they develop both content and contextual vocabulary. They also build good habits for reading, researching, and learning. The Reading Across the Curriculum standard focuses on the academic and personal skills students acquire as they read in all areas of learning.

CTAE-RC-1 Students will enhance reading in all curriculum areas by:

Reading in All Curriculum Areas

-Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas.
-Read both informational and fictional texts in a variety of genres and modes of discourse.
-Read technical texts related to various subject areas.

Discussing Books

-Discuss messages and themes from books in all subject areas.
-Respond to a variety of texts in multiple modes of discourse.
-Relate messages and themes from one subject area to messages and themes in another area.
-Evaluate the merit of texts in every subject discipline.
-Examine author's purpose in writing.
-Recognize the features of disciplinary texts.

Building Vocabulary Knowledge

-Demonstrate an understanding of contextual vocabulary in various subjects.
-Use content vocabulary in writing and speaking.
-Explore understanding of new words found in subject area texts.

Establishing Context

-Explore life experiences related to subject area content.
-Discuss in both writing and speaking how certain words are subject area related.
-Determine strategies for finding content and contextual meaning for unknown words.

CTAE Foundation Skills

The Foundation Skills for Career, Technical and Agricultural Education (CTAE) are critical competencies that students pursuing any career pathway should exhibit to be successful. As core standards for all career pathways in all program concentrations, these skills link career, technical and agricultural education to the state's academic performance standards.

The CTAE Foundation Skills are aligned to the foundation of the U. S. Department of Education's 16 Career Clusters. Endorsed by the National Career Technical Education Foundation (NCTEF) and the National Association of State Directors of Career Technical Education Consortium (NASDCTEc), the foundation skills were developed from an analysis of all pathways in the sixteen occupational areas. These standards were identified and validated by a national advisory group of employers, secondary and postsecondary educators, labor associations, and other stakeholders. The Knowledge and Skills provide learners a broad foundation for managing lifelong learning and career transitions in a rapidly changing economy.

CTAE-FS-1 Technical Skills: Learners achieve technical content skills necessary to pursue the full range of careers for all pathways in the program concentration.

CTAE-FS-2 Academic Foundations: Learners achieve state academic standards at or above grade level.

CTAE-FS-3 Communications: Learners use various communication skills in expressing and interpreting information.

CTAE-FS-4 Problem Solving and Critical Thinking: Learners define and solve problems, and use problem-solving and improvement methods and tools.

CTAE-FS-5 Information Technology Applications: Learners use multiple information technology devices to access, organize, process, transmit, and communicate information.

CTAE-FS-6 Systems: Learners understand a variety of organizational structures and functions.

CTAE-FS-7 Safety, Health and Environment: Learners employ safety, health and environmental management systems in corporations and comprehend their importance to organizational performance and regulatory compliance.

CTAE-FS-8 Leadership and Teamwork: Learners apply leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.

CTAE-FS-9 Ethics and Legal Responsibilities: Learners commit to work ethics, behavior, and legal responsibilities in the workplace.

CTAE-FS-10 Career Development: Learners plan and manage academic-career plans and employment relations.

CTAE-FS-11 Entrepreneurship: Learners demonstrate understanding of concepts, processes, and behaviors associated with successful entrepreneurial performance.