Revision #4 June, 2015

Student Plan of Study – Biotechnology Research and Development

Name_____ Date_____ School_____

Parent/Guardian Signature_____ Date_____ Advisor/Counselor Signature _____ Date_____

Current Area of Interest: ***Health Science/Biotechnology Research and Development****- This PLAN OF STUDY should serve as a guide for the next four years.* ***Courses listed in this plan are only recommended coursework and should be individualized to meet each student's educational and career goals. All plans will meet minimum high school graduation requirements.*** *Applicants to the University System of Georgia and the Technical College System of Georgia institutions should be advised that meeting minimum requirements will not guarantee admission. Postsecondary institutions may set additional requirements.*

Health Science

Grade Level	I. English/Language Arts Total 4 credits	II. Math Total 4 credits	III. Science Total 4 credits	IV. Social Studies Total 3 credits	V. Health/Personal Fitness Total 1 credit	VII. Possible electives in additional pathways (students should check the local course description catalog for these and other electives) Total 4 credits
9	9th Literature & Composition or Approved Dual Enrollment Course 1 credit Credit Earned ☐	1 CCGPS Cord Algebra 2 CCGPS Analytic Geometry 3 CCGPS Accel Cord Algebra/Analytic Geometry 4 CCGPS Accel Analytic Geometry B/Adv. Algebra 1 credit * Credit Earned ☐	Biology or Approved Dual Enrollment Course 1 credit * Credit Earned ☐	American Government/Civics or AP Government/ Politics US or Approved Dual Enrollment Course ½ credit Credit Earned ☐	Health ½ credit Credit Earned ☐ Personal Fitness ½ credit Credit Earned ☐ ***VI. CTAE Pathway Total 3 credits	Advanced Academic Pathways English/Language Arts, Math, Science, Social Studies An advanced academic pathway may be followed in any one of the content subjects listed above. Upon graduation, students earn an advanced academic pathway when they complete the required coursework to include at least one AP or one IB or one Dual Enrollment course. An advanced academic pathway should also include at least two credits in one world language. AP, Dual Enrollment and Georgia Virtual School courses may be available.
10	10th Literature & Composition or World Literature & Composition or Approved Dual Enrollment Course 1 credit Credit Earned ☐	1 CCGPS Analytic Geometry 2 CCGPS Adv Algebra 3 CCGPS Accel Analytic Geometry/Adv. Algebra 4 CCGPS Pre-Calculus 1 credit * Credit Earned ☐	Physical Science or Physics or AP Physics or Approved Dual Enrollment Course 1 credit * Credit Earned ☐	World History or AP World History or Approved Dual Enrollment Course 1 credit Credit Earned ☐	25.52100 Intro to Healthcare Science or Approved Dual Enrollment Course 1 credit Credit Earned ☐	World Language Pathways **Two credits are required for admissions to University System Institutions. For a listing of world language courses offered at your high school, please check with your advisor, counselor, or local course description catalog. A world language pathway may be followed in any of the world language areas included in the state list of approved courses. Upon graduation, students earn a world language pathway when they complete three credits in one language. The third course may reflect an AP, IB or Dual Enrollment designation. Georgia Virtual School and ACCEL courses may be available.
11	American Literature/ Composition or AP English Language & Composition/American Lit or Approved Dual Enrollment Course 1 credit Credit Earned ☐	1 CCGPS Adv. Algebra 2 CCGPS Pre-Calculus 3 CCGPS Accel Pre-Cal 4 CCGPS Cal or AP Cal 1 credit * Credit Earned ☐	Chemistry or Environmental Science or Earth Systems or AP/IB or Approved Dual Enrollment Course 1 credit * Credit Earned ☐	United States History or AP US History or IB History of the Americas or Approved Dual Enrollment Course 1 credit Credit Earned ☐	25.57000 Essentials of Biotechnology or Approved Dual Enrollment Course 1 credit Credit Earned ☐	Fine Arts/Performing Arts Pathways Visual Arts, Dance, Music, Journalism, Theatre A fine arts pathway may be followed in any one of the five areas listed above. Upon graduation, students complete a fine arts/performing arts pathway when three courses have been successfully completed in any one of the five areas. A student should consult a counselor or advisor for related coursework. AP, Dual Enrollment and Georgia Virtual School courses may be available.
	At the end of the 11th grade, students planning to enter a University System of Georgia Institution or Technical College System of Georgia Institution should take the appropriate admissions test (SAT, ACT, Compass).					Legend: *Science: Approved 4th Sciences may be used to meet both the required science and required elective in a Career, Technical and Agricultural Education (CTAE) sequence of courses; see Fourth Science Requirements for more information. Student may take sciences courses in any sequence. *Math: Select Math sequence 1, 2, 3, 4, based on 9th grade entry course. **Students must complete two credits of the same world language for admission to University System of Georgia institutions. *** Students should complete a CTAE pathway and take the related end of pathway assessment. NOTE: Local systems may offer core courses in a different sequence; not all local systems offer every pathway. Students should explore all credit possibilities including Georgia's Virtual School Program, Dual Enrollment, Advanced Placement (AP), International Baccalaureate (IB) and Work-Based Learning (WBL) to reach their educational and career goals.
12	Advanced Composition or British Literature or AP/IB English Literature & Composition or Approved Dual Enrollment Course 1 credit Credit Earned ☐	CCGPS Pre-Cal or Calculus or AP Calculus or AP Stats or IB Math or Approved Dual Enrollment Course 1 credit * Credit Earned ☐	Microbiology or Hum Anatomy & Physiology or Approved Dual Enrollment Course 1 credit * Credit Earned ☐	Econ/Business/Free Enterprise or AP Macro Econ or AP Micro Econ or IB Econ or Approved Dual Enrollment Course ½ credit Credit Earned ☐	25.56900 Applications of Biotechnology or Approved Dual Enrollment Course 1 credit Credit Earned ☐	
Sample Elective Courses	Other English Elective Courses: Literary Types/Composition Journalism Oral/Written Communication Speech	Other Math Elective Courses: Adv Math Decision Making Math of Ind & Govern Math of Finance	Other Science Elective Courses: AP/IB Science	Other Social Studies Elective Courses: Current Issues or AP/IB Soc Studies or Psychology or Sociology or Humanities	Other CTAE Elective Courses: Other CTAE courses are available to complete a related pathway	

SAMPLE Pathway OCCUPATIONS See *Georgia's HOT Careers to 2020 for more information on high-skilled, high-wage and high-demand occupations.			
Occupation Specialties	**Entry Level of Education Needed**	**2012 Annual Wage**	**Annual Openings 2012-2020**
Biological Scientists	Master's Degree	$71,000	20
Biomedical Engineers	Bachelor's Degree	$72,300	1310 national projected job openings
Environmental Scientist and Specialists, including Health	Bachelor's Degree	$51,500	60

Source: Georgia Department of Labor/ONET

For more information about your education and career planning, including valuable financial aid information that includes grants and scholarships, see your school counselor.

****Current Georgia Graduation Rule**

Coursework	Credits	Coursework	Credits
I. English/Language Arts	4	V. Health & Physical Education	1
II. Math	4	VI. **Career, Technical & Agricultural Education and/or	
III. *Science	4	***World Languages, and/or Fine Arts	3
IV. Social Studies	3	VII. Electives	4
		TOTAL	23

*Selected 4th Science courses may be used to meet both the required science and required elective in a CTAE sequence of courses.
**Students must complete three credits to complete a CTAE pathway and take the end of pathway assessment.
***Students must complete two credits of the same world language for admission to Georgia Board of Regents colleges/universities.
**** Current graduation requirements should be met in all content areas.
NOTE: This plan represents minimum graduation requirements. Local systems may require additional coursework.

Postsecondary Transition:

- Students who will continue their education in a Program of Study at one of the University System of Georgia institutions should prepare to take the ACT or SAT for admissions. Tests for admissions may vary from institution to institution. Contact the selected institution for specific testing information. Additional admissions information can be found at Staying On Course. (www.usg.edu/student_affairs/documents/Staying_on_Course.pdf)
- Students who will continue their education in a Program of Study at one of the Technical College System of Georgia institutions should prepare to take the COMPASS test for admissions.
- Students who will continue their education and training in the US Military should take the ASVAB assessment.
- Students should utilize electronic college and career databases to select the most appropriate postsecondary opportunities to match their selected career field, including registered apprenticeships.
- Georgia's dual-credit programs have been combined into one program entitled Move on When Ready, in which high school students may earn their high school course credits while taking college courses.

Possible Student Pathway Credentialing Opportunities:

Students completing a pathway are eligible to take a Credentialing/End of Pathway Assessment (EOPA) upon successful completion of the three required courses in the pathway. For specific assessment information, refer to http://www.gadoe.org/Curriculum-Instruction-and-Assessment/CTAE/Pages/CTAE-Georgia-Assessments.aspx

*Related Pathway Occupations:	Other Related Health Science Occupations:
Biological Scientists	Pharmaceutical Scientists
Biologists	Research Scientists
Biomedical Engineers	Clinical Data Managers
Clinical Data Managers	Microbiologists
Clinical Research Coordinators	Nuclear Medical Technologists
Lab Technicians	Cell Biologists
Quality Assurance and Control Technicians	Radiation Therapists
Biostatisticians	*ONET Online

Biotechnology Research and Development

The field of biotechnology combines knowledge from a number of other areas: engineering, biology, chemistry, and medicine. Workers in biotechnology create, design, develop, and evaluate systems and products such as artificial organs, medication information systems, prostheses (artificial devices replacing missing body parts), medical equipment and instrumentation, and heath management and care systems. Tasks associated with careers in biotechnology include researching new materials for biomedical equipment (such as artificial organs), evaluating the safety of such equipment, utilizing computer simulation of the body's organs and systems, designing and developing new procedures and equipment for detecting disease, and advising hospitals and other medical facilities on the use of new and existing medical equipment.

Some workers employed in the field of biotechnology have a solid background in engineering with specialized biomedical training. Specialties within the industry include biomaterials, biomechanics, medical imaging, rehabilitation engineering, and orthopedic engineering.

Biotechnology research and development focuses on cellular life processes to assist in the diagnosis of diseases and produce more effective medications and vaccines for patients.

Careers in the Biotechnology Research and Development pathway involve bioscience research and development as it applies to human health. These scientists may study diseases to discover new treatments or invent medical devices used to directly assist patients or to improve the accuracy of diagnostic tests

Hospitals and doctors' offices are high-tech environments and will continue to require research, development, and evaluation of new biotechnology systems and equipment.