

**WEST JEFFERSON HILLS SCHOOL DISTRICT
ACADEMIC BIOLOGY CURRICULUM**

GRADE 9

<p style="text-align: center;">PA Academic Standards Student must be able to do</p>	<p style="text-align: center;">Objective Content or process student will be able to know and do</p>	<p style="text-align: center;">Instructional Methods</p>	<p style="text-align: center;">Materials/ Resources Textbooks, trade books, workbooks, software, hardware, etc.</p>	<p style="text-align: center;">*Assessment Procedures *Additional adaptations, modifications, accommodations, and enrichment/ acceleration will be provided per IEP</p>	<p style="text-align: center;">*Additional Learning Opportunities for students who do not meet basic standards *Additional adaptations, modifications, and accommodations will be provided per IEP</p>	<p style="text-align: center;">*Extended Learning Opportunities for students who can go beyond the basic standards. *Additional enrichment/acceleration will be provided per IEP</p>
<p>3.2 Inquiry and Design</p>						
<p>A. Apply knowledge and understanding about the nature of scientific and technological knowledge.</p>	<ul style="list-style-type: none"> • Know that science uses both direct and indirect observation means to study the world and the universe. • Integrate new information into existing theories and explain implied results. • Know and use the ongoing scientific processes to continually improve and better understand how things work. 	<ul style="list-style-type: none"> • Direct Instruction • Partner Work • Group Work • Lab Work • Study Skills • Demonstrations • Movie Clips • Graphing/Analysis • Computer Projects • Cooperative Learning • Independent Reading • Brainstorming • Class discussions • Note guides 	<ul style="list-style-type: none"> • Textbook/Supplements • Transparencies • PowerPoint • Lab Manual Diagrams • Periodic Table • Calculators • Handouts • Lab Equipment • Model Kits • Microscopes • Measuring Devices • Computer (classroom) • Computer (lab) • Chemicals • Videos • Testing Kits/materials • Magazines and Journals • Instructional CD's 	<ul style="list-style-type: none"> • Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Critical Thinking • Case Studies • Essays • Rubric • Peer Evaluation 	<ul style="list-style-type: none"> • Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring • Technology 	<ul style="list-style-type: none"> • Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors Institute • Shadowing Programs

**WEST JEFFERSON HILLS SCHOOL DISTRICT
ACADEMIC BIOLOGY CURRICULUM**

GRADE 9

PA Academic Standards Student must be able to do	Objective Content or process student will be able to know and do	Instructional Methods	Materials/ Resources Textbooks, trade books, workbooks, software, hardware, etc.	*Assessment Procedures *Additional adaptations, modifications, accommodations, and enrichment/ acceleration will be provided per IEP	*Additional Learning Opportunities for students who do not meet basic standards *Additional adaptations, modifications, and accommodations will be provided per IEP	*Extended Learning Opportunities for students who can go beyond the basic standards. *Additional enrichment/acceleration will be provided per IEP
3.2 Inquiry and Design						
B. Apply process knowledge and organize scientific and technological phenomena in varied ways.	<ul style="list-style-type: none"> •Develop appropriate scientific experiments: raising questions, formulating hypotheses, testing, controlled experiments, recognizing variables, manipulating variables, interpreting data, and producing solutions. •Measure materials using a variety of scales. •Interpret results of experimental research to predict new information or improve a solution. 	<ul style="list-style-type: none"> • Direct Instruction • Partner Work • Group Work • Lab Work • Study Skills • Demonstrations • Movie Clips • Graphing/Analysis • Computer Projects • Cooperative Learning • Independent Reading • Brainstorming • Class discussions • Note guides 	<ul style="list-style-type: none"> • Textbook/Supplements • Transparencies • PowerPoint • Lab Manual Diagrams • Periodic Table • Calculators • Handouts • Lab Equipment • Model Kits • Measuring Devices • Computer (classroom) • Computer (lab) • Chemicals • Videos • Testing Kits/materials • Internet • Magazines and Journals ◆ Instructional CD's 	<ul style="list-style-type: none"> • Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Independent Projects • Critical Thinking • Case Studies • Essays • Rubric ◆ Peer Evaluation 	<ul style="list-style-type: none"> • Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring ◆ Technology 	<ul style="list-style-type: none"> • Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors Institute • Shadowing Programs

**WEST JEFFERSON HILLS SCHOOL DISTRICT
ACADEMIC BIOLOGY CURRICULUM**

GRADE 9

PA Academic Standards Student must be able to do	Objective Content or process student will be able to know and do	Instructional Methods	Materials/ Resources Textbooks, trade books, workbooks, software, hardware, etc.	*Assessment Procedures *Additional adaptations, modifications, accommodations, and enrichment/ acceleration will be provided per IEP	*Additional Learning Opportunities for students who do not meet basic standards *Additional adaptations, modifications, and accommodations will be provided per IEP	*Extended Learning Opportunities for students who can go beyond the basic standards. *Additional enrichment/acceleration will be provided per IEP
3.2 Inquiry and Design						
C. Apply the elements of scientific inquiry to solve problems.	<ul style="list-style-type: none"> •Generate questions about objects, organisms and/or events that can be answered through scientific investigations. •Evaluate the appropriateness of questions. •Conduct a multiple step experiment. •Suggest additional steps that might be done experimentally. 	<ul style="list-style-type: none"> • Molecular Models • Direct Instruction • Partner Work • Group Work • Lab Work • Study Skills • Demonstrations • Movie Clips • Graphing/Analysis • Computer Projects • Cooperative Learning • Independent Reading • Brainstorming • Class discussions • Note guides • Dissections 	<ul style="list-style-type: none"> • Textbook/Supplements • Transparencies • PowerPoint • Lab Manual Diagrams • Calculators • Handouts • Lab Equipment • Model Kits • Microscopes • Measuring Devices • Computer (classroom) • Computer (lab) • Preserved and Living Specimens • Chemicals • Videos • Testing Kits/materials • Internet • Magazines and Journals • Instructional CD's 	<ul style="list-style-type: none"> • Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Independent Projects • Critical Thinking • Case Studies • Essays • Rubric • Peer Evaluation 	<ul style="list-style-type: none"> • Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring ♦ Technology 	<ul style="list-style-type: none"> • Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors Institute • Shadowing Programs

**WEST JEFFERSON HILLS SCHOOL DISTRICT
ACADEMIC BIOLOGY CURRICULUM**

GRADE 9

PA Academic Standards Student must be able to do	Objective Content or process student will be able to know and do	Instructional Methods	Materials/ Resources Textbooks, trade books, workbooks, software, hardware, etc.	*Assessment Procedures *Additional adaptations, modifications, accommodations, and enrichment/ acceleration will be provided per IEP	*Additional Learning Opportunities for students who do not meet basic standards *Additional adaptations, modifications, and accommodations will be provided per IEP	*Extended Learning Opportunities for students who can go beyond the basic standards. *Additional enrichment/acceleration will be provided per IEP
3.3 Biological Sciences						
A. Explain the structural and functional similarities and differences found among living things.	<ul style="list-style-type: none"> • Describe organizing schemes of classification keys. • Identify and characterize major life forms by kingdom, phyla, class, and order. • Explain how to use a dichotomous key to identify plants and animals • Explain and analyze the relationship between structure and function at the molecular an organ-system level • Explain how cells store and use information to guide their functions. • Explain cell functions and processes in terms of chemical reactions and energy changes. 	<ul style="list-style-type: none"> • Molecular Models • Direct Instruction • Partner Work • Group Work • Lab Work • Study Skills • Demonstrations • Movie Clips • Graphing/Analysis • Computer Projects • Cooperative Learning • Independent Reading • Brainstorming • Class discussions • Note guides • Dissections 	<ul style="list-style-type: none"> • Textbook/Supplements • Transparencies • PowerPoint • Lab Manual Diagrams • Periodic Table • Calculators • Handouts • Lab Equipment • Model Kits • Microscopes • Measuring Devices • Computer (classroom) • Computer (lab) • Preserved and Living Specimens • Chemicals • Videos • Testing Kits/materials • Internet • Magazines and Journals • Instructional CD's 	<ul style="list-style-type: none"> • Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Independent Projects • Critical Thinking • Case Studies • Essays • Rubric • Peer Evaluation 	<ul style="list-style-type: none"> • Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring ◆ Technology 	<ul style="list-style-type: none"> • Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors Institute • Shadowing Programs

**WEST JEFFERSON HILLS SCHOOL DISTRICT
ACADEMIC BIOLOGY CURRICULUM**

GRADE 9

PA Academic Standards Student must be able to do	Objective Content or process student will be able to know and do	Instructional Methods	Materials/ Resources Textbooks, trade books, workbooks, software, hardware, etc.	*Assessment Procedures *Additional adaptations, modifications, accommodations, and enrichment/ acceleration will be provided per IEP	*Additional Learning Opportunities for students who do not meet basic standards *Additional adaptations, modifications, and accommodations will be provided per IEP	*Extended Learning Opportunities for students who can go beyond the basic standards. *Additional enrichment/acceleration will be provided per IEP
3.3 Biological Sciences						
B. Describe and explain the chemical and structural basis of living organisms	<ul style="list-style-type: none"> • Describe the relationship between structure and organic molecules and the function they serve in living organisms. • Identify the specialized structures and the regions of the cell and the functions of each • Explain how cells store and use information to guide their functions. • Explain cell functions and processes in terms of chemical reactions and energy changes. 	<ul style="list-style-type: none"> • Models • Direct Instruction • Partner Work • Group Work • Lab Work • Study Skills • Demonstrations • Movie Clips • Graphing/Analysis • Computer Projects • Cooperative Learning • Independent Reading • Brainstorming • Class discussions • Note guides 	<ul style="list-style-type: none"> • Textbook/Supplements • Transparencies • PowerPoint • Lab Manual Diagrams • Calculators • Handouts • Lab Equipment • Model Kits • Microscopes • Measuring Devices • Computer (classroom) • Computer (lab) • Preserved and Living Specimens • Chemicals • Videos • Testing Kits/materials • Internet • Magazines and Journals • Instructional CD's 	<ul style="list-style-type: none"> • Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Independent Projects • Research Papers • Critical Thinking • Case Studies • Essays • Rubric • Peer Evaluation 	<ul style="list-style-type: none"> • Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring ♦ Technology 	<ul style="list-style-type: none"> • Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors Institute • Shadowing Programs

**WEST JEFFERSON HILLS SCHOOL DISTRICT
ACADEMIC BIOLOGY CURRICULUM**

GRADE 9

PA Academic Standards Student must be able to do	Objective Content or process student will be able to know and do	Instructional Methods	Materials/ Resources Textbooks, trade books, workbooks, software, hardware, etc.	*Assessment Procedures *Additional adaptations, modifications, accommodations, and enrichment/ acceleration will be provided per IEP	*Additional Learning Opportunities for students who do not meet basic standards *Additional adaptations, modifications, and accommodations will be provided per IEP	*Extended Learning Opportunities for students who can go beyond the basic standards. *Additional enrichment/acceleration will be provided per IEP
3.3 Biological Sciences						
C. Describe how genetic information is inherited and expressed.	<ul style="list-style-type: none"> • Compare and contrast the function of mitosis and meiosis. • Describe mutations' effects on trait's expression. • Distinguish different reproductive patterns in living things (e.g., budding, spores, fission). • Compare random and selective breeding practices and their results (e.g., antibiotic resistant bacteria). • Explain the relationship among DNA, genes and chromosomes. • Explain different types of inheritance (e.g., multiple allele, sex-influenced traits). 	<ul style="list-style-type: none"> • Models • Direct Instruction • Partner Work • Group Work • Lab Work • Study Skills • Demonstrations • Movie Clips • Graphing/Analysis • Computer Projects • Cooperative Learning • Independent Reading • Brainstorming • Class discussions • Note guides 	<ul style="list-style-type: none"> • Textbook/Supplements • Transparencies • PowerPoint • Lab Manual Diagrams • Calculators • Handouts • Lab Equipment • Model Kits • Microscopes • Measuring Devices • Computer (classroom) • Computer (lab) • Preserved and Living Specimens • Chemicals • Videos • Testing Kits/materials • Internet • Magazines and Journals • Instructional CD's 	<ul style="list-style-type: none"> • Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Independent Projects • Research Papers • Critical Thinking • Case Studies • Essays • Rubric • Peer Evaluation 	<ul style="list-style-type: none"> • Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring ♦ Technology 	<ul style="list-style-type: none"> • Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors Institute • Shadowing Programs

**WEST JEFFERSON HILLS SCHOOL DISTRICT
ACADEMIC BIOLOGY CURRICULUM**

GRADE 9

PA Academic Standards Student must be able to do	Objective Content or process student will be able to know and do	Instructional Methods	Materials/ Resources Textbooks, trade books, workbooks, software, hardware, etc.	*Assessment Procedures *Additional adaptations, modifications, accommodations, and enrichment/ acceleration will be provided per IEP	*Additional Learning Opportunities for students who do not meet basic standards *Additional adaptations, modifications, and accommodations will be provided per IEP	*Extended Learning Opportunities for students who can go beyond the basic standards. *Additional enrichment/acceleration will be provided per IEP
3.3 Biological Sciences						
C. Describe how genetic information is inherited and expressed. (Continued)	<ul style="list-style-type: none"> • Describe the role of DNA in protein synthesis as it relates to gene expression. • Identify basic patterns of inheritance (e.g., dominance, recessive, co-dominance). • Describe how traits are inherited. • Describe how selective breeding, natural selection and genetic technologies can change genetic makeup of organisms. • Explain birth defects from the standpoint of embryological development and/or changes in genetic makeup. 					

**WEST JEFFERSON HILLS SCHOOL DISTRICT
ACADEMIC BIOLOGY CURRICULUM**

GRADE 9

PA Academic Standards Student must be able to do	Objective Content or process student will be able to know and do	Instructional Methods	Materials/ Resources Textbooks, trade books, workbooks, software, hardware, etc.	*Assessment Procedures *Additional adaptations, modifications, accommodations, and enrichment/ acceleration will be provided per IEP	*Additional Learning Opportunities for students who do not meet basic standards *Additional adaptations, modifications, and accommodations will be provided per IEP	*Extended Learning Opportunities for students who can go beyond the basic standards. *Additional enrichment/acceleration will be provided per IEP
3.3 Biological Sciences						
D. Explain the mechanisms of the theory of evolution.	<ul style="list-style-type: none"> • Analyze data from fossil records, similarities in anatomy and physiology, embryological studies and DNA studies that are relevant to the theory of evolution. • Explain the role of mutations and gene recombination in changing a population of organisms. • Compare modern day descendants of extinct species and propose possible scientific accounts for their present appearance. • Describe the factors (e.g., isolation, differential reproduction) affecting gene frequency in a 	<ul style="list-style-type: none"> • Models • Direct Instruction • Partner Work • Group Work • Lab Work • Study Skills • Demonstrations • Movie Clips • Graphing/Analysis • Computer Projects • Cooperative Learning • Independent Reading • Brainstorming • Class discussions • Note guides 	<ul style="list-style-type: none"> • Textbook/Supplements • Transparencies • PowerPoint • Lab Manual Diagrams • Calculators • Handouts • Lab Equipment • Model Kits • Microscopes • Measuring Devices • Computer (classroom) • Computer (lab) • Preserved and Living Specimens • Chemicals • Videos • Testing Kits/materials • Internet • Magazines and Journals • Instructional CD's 	<ul style="list-style-type: none"> • Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Independent Projects • Critical Thinking • Case Studies • Essays • Rubric • Peer Evaluation 	<ul style="list-style-type: none"> • Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring ♦ Technology 	<ul style="list-style-type: none"> • Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors Institute • Shadowing Programs

**WEST JEFFERSON HILLS SCHOOL DISTRICT
ACADEMIC BIOLOGY CURRICULUM**

GRADE 9

<p>PA Academic Standards Student must be able to do</p>	<p>Objective Content or process student will be able to know and do</p>	<p>Instructional Methods</p>	<p>Materials/ Resources Textbooks, trade books, workbooks, software, hardware, etc.</p>	<p>*Assessment Procedures *Additional adaptations, modifications, accommodations, and enrichment/ acceleration will be provided per IEP</p>	<p>*Additional Learning Opportunities for students who do not meet basic standards *Additional adaptations, modifications, and accommodations will be provided per IEP</p>	<p>*Extended Learning Opportunities for students who can go beyond the basic standards. *Additional enrichment/acceleration will be provided per IEP</p>
<p>3.3 Biological Sciences</p>						
<p>D. Explain the mechanisms of the theory of evolution. (Continued)</p>	<p>population over time and their consequences.</p> <ul style="list-style-type: none"> • Describe and differentiate between the roles of natural selection and genetic drift. • Describe changes that illustrate major events in the earth’s development based on a time line. • Explain why natural selection can act only on inherited traits. • Apply the concept of natural selection to illustrate and account for a species’ survival, extinction or change over time. 					