

Fair Lawn Public Schools

Fair Lawn, NJ

Anatomy & Physiology Honors

August

2015

Updated August 2015
Developed July 2011

Anatomy & Physiology Honors is a high school science class developed by the Fair Lawn Schools high school science faculty and aligned to the 2009 NJCCCS and correlated to the Common Core State Standards for Literacy & Math.

Science Department

Fair Lawn School District

Committee Credits

2004

**MR. PAUL SCHREINER
SUPERVISOR OF SCIENCE K-12**

September 2011

Scope & Sequence Updated To Reflect 2009 Standards

August 2015

Updated to Reflect New Curriculum Requirements

Anatomy & Physiology Honors

I. Course Synopsis

The application of scientific skills and the analysis of anatomy and physiology through laboratory investigations will be a major focus of this course. (5.1.12.A – 5.1.12.D)

II. Philosophy & Rationale

To be competitive in a technological society, it is desirable for students to be well-grounded in all aspects of science, regardless of what their future career goals may be. In particular it is important that students have sufficient exposure to the “hard sciences”, especially physics, which is considered to be the “most basic of the sciences” or the “science of everything”.

The study of physics can enable a student to understand the natural laws that govern the universe. It also helps to improve deductive and inductive reasoning and develop problem-solving skills through the scientific method.

III. Scope & Sequence

Suggested

Unit 1	September
Unit 2	September
Unit 3	September – October
Unit 4	October
Unit 5	October
Unit 6	November
Unit 7	November
Unit 8	December
Unit 9	December
Unit 10	January
Unit 11	January
Unit 12	February
Unit 13	February
Unit 14	March
Unit 15	March
Unit 16	April
Unit 17	April
Unit 18	May
Unit 19	May
Unit 20	June

Unit 1 Introduction to the Human body

- A. Anatomy
- B. Physiology
- C. Structural and Functional

Organization

- D. Homeostasis
 1. Negative Feedback
 2. Positive Feedback
- E. Terminology and Body Plan
 1. Directional Terms
 2. Body Regions
 3. Body Cavities
 4. Serous Membranes

Standards 5.1.12.A, B and C, 5.2.12.A, B, 5.5.12.A.1-3, 9.1.12

5.3.12.A.1 – A.2

Unit 2 The Chemistry of Life

- A. Basic Chemistry 5.6.12.A.1-4, 6 & 8
 1. Structure of an atom
 2. Electrons and chemical bonds
- B. Chemical Reactions 5.6.12.B.1 & 2
- C. Water 5.1.12.A, B, C, 5.4.12.A, B, C, 5.5.12.A, 5.6.12.A, B.
- D. Organic Molecules 5.1.12.A, B, C, 5.2.12.A, B, 5.3.12.A, B,C,D, 5.4.12.A, 5.5.12.A, 5.6.12.A, B

- A. Carbohydrates
- B. Lipids
- C. Proteins
- D. Nucleic Acids

5.3.12

Unit 3 Cell Structures and Their functions

- 5.1.12.A, B, C, 5.2.12.B, 5.3.12.A, B,C, D
- 5.4.12.A, B, C, 5.5.12.A, 5.6.12.B
- A. Organelles
- B. Movement through the Plasma Membrane

All above standards including Math standards

- 5.3.12.A-D
- C. Protein synthesis
- D. Cell Division
- E. Differentiation

5.3.12.A.4-6

Unit 4 Tissues, Glands, and Membranes

- 5.1.12.A, B, C, 5.2.12.A, B, 5.4.12.A, B, C, 5.5.12.A, B, C
- A. Epithelial Tissue
- B. Muscle Tissue
- C. Nervous Tissue
- D. Membranes

For Units 5-20 which are the Human Systems the standards are

- 5.1.12.A, B, C, 5.2.12.A, B, 5.4.12.A, B, C, 5.5.12.A, B, C

5.3.12.A.4-6

Unit 5 Integumentary System

- A. Hypodermis
- B. Skin
- C. Accessory Structures
 1. Hair
 2. Muscles
 3. Glands
 4. Nails
- D. Functions of the Integumentary System
 1. Protection
 2. Temperature Regulation
 3. Vitamin D Production
 4. Sensation
 5. Excretion

5.3.12.A.6

Unit 6 The Skeletal System

- A. Connective Tissue
- B. General features of Bone
 1. Ossification
 2. Growth
 3. Remodeling
 4. Repair
- C. Axial Skeleton
- D. Appendicular Skeleton
- E. Articulation

5.3.12.A.6

Unit 7 The Muscular System

- A. Characteristics
 1. Structure
 2. Membrane potentials
 3. Nerve supply
 4. Muscle contractions- 5.3.12.A-D
- B. Smooth Muscle and Cardiac Muscle
- C. Skeletal Muscle Anatomy

5.3.12.A.6

Unit 8 The Nervous System

- A. Division of Nervous System
- B. Cells of Nervous System
- C. Propagation of Action Potential-
5.3.12.A-D
- D. Central Nervous System
 1. Brain
 2. Spinal Cord
- E. Peripheral Nervous System
- F. Autonomic Nervous System
 1. Sympathetic
 2. Parasympathetic

5.3.12.A.6

Unit 9 The Senses

- A. General Senses
- B. Special Senses
- c. Olfaction

D. Taste

E. Vision

1. Accessory Structures
2. Eyebrows, Eyelids
3. Anatomy of the eye

F. Hearing and Balance

1. External ear
2. Middle ear
3. Inner ear

5.3.12.A.6

Unit 10 The Endocrine System

- A. Hormones
 1. Chemistry- 5.6.12.B.1
 2. Hormone Action- 5.6.12.B.1
- B. Glands

5.3.12.A.6

Unit 11 Blood

- A. Plasma
- B. Formed Elements
 1. Erythrocytes
 2. Leukocytes
 3. Platelets
- C. Preventing Blood Loss
 1. Blood Clotting
 2. Control of Clot Formation
- D. Blood Grouping
 1. ABO Blood Group
 2. Rh Blood Group

5.3.12.A.6

Unit 12 The Heart

- A. Size, Form, and Location of the Heart
- B. Anatomy of the heart
 1. Chambers
 2. Blood Supply
- C. Route of Blood Flow Through the Heart
- D. Cardiac Cycle

5.3.12.A.6

Unit 13 Blood Vessels and Circulation

A. General Features of Blood Vessel Structures

1. Arteries
2. Capillaries
3. Veins

B. Blood Vessels of Pulmonary Circulation

C. Blood Vessels of the Systemic Circulation: Arteries

D. Blood Vessels of the Systemic Circulation: Veins

- E. The Physiology of Circulation
 1. Blood Pressure- 5.3.12.A-D

5.3.12.A.6

Unit 14 The Lymphatic System and Immunity

A. Lymphatic System

1. Lymphatic Vessels
2. Lymphatic Organs

B. Immunity

1. Innate Immunity
2. Adaptive Immunity
3. Acquired Immunity

5.3.12.A.6

Unit 15 The Respiratory System

A. Anatomy of the Respiratory System

1. Structures and Function

B. Ventilation and Lung Volumes- 5.3.12.A-D

C. Gas Exchange

1. Oxygen and Carbon Dioxide

D. Control of Respiration

5.3.12.A.6

Unit 16 The Digestive System

A. Anatomy and Histology of the Digestive System

1. Structures and Functions

B. Movement and Secretions in the Digestive System

1. Enzymes
2. Peristalsis

C. Digestion, Absorption, and Transport

1. Macromolecules

5.3.12.A.6

Unit 17 Nutrition, Metabolism and Body

Temperature

A. Nutrition

1. Calories
2. Macromolecules
3. Vitamins
4. Minerals

B. Metabolic Rate

- c. Body Temperature

5.3.12.A.6

Unit 18 Urinary System and Fluid Balance

A. Structures and Functions

B. Urine Production

C. Regulation of Urine concentration and volume

5.3.12.A-D

D. Urine Movement

E. Regulation of Extra-cellular Fluid

F. Regulation of Acid-Base Balance

5.3.12.A.6

Unit 19 The Reproductive System

A. Male Reproductive System

1. Structure and Function

B. Female Reproductive System

2. Structure and Function

5.3.12.A.6

Unit 20 Development, Heredity, and Aging
 A. Prenatal Development
 1. Stages

B. Parturition

5.3.12.A.6

Suggested Activities & Suggested Modifications for Special Education Students, ELL Students, Students at Risk, and Gifted Students:

1. Students with special needs and ELL learners may be provided with key vocabulary terms prior to the unit beginning. In particular, the amount of key vocabulary terms should be reduced for ELL students.
2. ELL students may be provided with additional visual aids. For additional modifications, refer to Classroom Instruction that Works for ELL Learners or the SIOP protocol.
3. Gifted students may be challenged by asking them to form additional connections between biology, chemistry, and physics.

Labs- (Unit Standards are Associated with Labs)

Suggested Lab Activities:

Unit 1 Lab

A. Lab Exercise 8- Organization of the Body

Unit 3 Lab

A. Lab Exercise 2- Cell Anatomy
 B. Lab Exercise 3- Transport through Cell Membrane
 C. Lab Exercise 4- The Cells Life Cycle

Unit 4 Lab

A. Lab Exercise 5- Epithelial Tissue
 B. Lab Exercise 6- Connective Tissue
 C. Lab Exercise 7- Muscle and Nerve Tissue

Unit 5 Lab

A. Lab Exercise 9- The Skin

Unit 6 Lab

A. Lab Exercise 10- Overview of the Skeleton
 B. Lab Exercise 11- The Skull

C. Lab Exercise 12- The Vertebral column and Thoracic Cage

D. Lab Exercise 13- The Appendicular Skeleton

E. Lab Exercise 14- Joints

Unit 7 Lab

A. Lab Exercise 15- Organization of the Muscular System

B. Lab Exercise 16- Muscle Identification

C. Lab Exercise 17- Muscular Contractions

Unit 8 Lab

A. Lab Exercise 18- Nerves and Reflexes
 B. Lab Exercise 19- Spinal Cord and Spinal Nerves

C. Lab Exercise 20- The Brain

Unit 9 Lab

A. Lab Exercise 21- Eye and Vision
B. Lab Exercise 22- The Ear, Hearing
and Equilibrium

Unit 10 Lab

A. Lab Exercise 23- Endocrine Glands
B. Lab Exercise 24- Hormones

Unit 12 Lab

A. Lab Exercise 26- Structure of the
Heart
B. Lab Exercise 28- The Pulse and
Blood Pressure

Unit 13 Lab

A. Lab Exercise 29- The Circulatory
Pathway

Unit 14 Lab

A. Lab Exercise 30- The Lymphatic
System

Unit 15 Lab

A. Lab Exercise 31- Respiratory
Structures
B. Lab Exercise 32- Pulmonary Volumes
and Capacities

Unit 16 Lab

A. Lab Exercise 33- Digestive Structures
B. Lab Exercise 34- Enzymes and
Digestion

Unit 18 Lab

A. Lab Exercise 35- The Urinary System

Materials

I. Textual

Human Anatomy and Physiology
Essentials or Anatomy and Physiology
1996
Study Guide 1996
Lab Manual 1996

II. Audiovisuals

A. Anatomical Charts: Frohse Type
B. Anatomical Models: Various Types
C. Internet Sites

III. Fresh/Preserved Biological Materials

A. Human Skeleton

B. Human Skeleton Bones and Joints

C. Preserved Gross Animal Tissue (Rat)

D. Microscope Human Tissue Slides:
Various Types

Cross-Content Connections:

CCCS Literacy: Click on the link to the High School Evidence Statements to see expectations related to literacy for this unit. In addition, a focus of the course will be on the development of the [LAL standards for science & technical subjects](#).

CCCS Math: Students will be expected to perform measurement, [modeling](#), apply [algebra](#), and [geometry](#) and [statistics](#).

Assessments

Classroom assessments are included to primarily guide instruction (formative assessment) and to support decisions made beyond the classroom (summative assessment).

Interdisciplinary Connections and Alignment to Technology standards

Science classes in the Fair Lawn Public schools promote career-readiness skills related to Personal Financial Literacy (9.1) and Career Awareness, Exploration, and Presentation (9.2). Some course concepts from the Career and Technical Education Standards (9.3), but these are not directly correlated since our district is not a CTE program.

The Fair Lawn Public Schools District fosters an environment that promotes career-readiness skills in all content areas. Whereas [Career Ready Practices](#) are explored consistently, specific alignment to [Personal Finance Literacy \(9.1\)](#) and [Career Awareness, Exploration, and Presentation Standards \(9.2\)](#) are included in the district level document (below). When appropriate, the [Career and Technical Education Standards \(9.3\)](#) have been reviewed and aligned as well.

Examples: 9.2B: Career exploration in each unit of study.

In addition, every effort is made to integrate technology and engineering into our science classes. [Educational Technology \(8.1\)](#) and [Technology Education, Engineering, Design, and Computational Thinking – Programming \(8.2\)](#) standards are cross connected throughout our science programs.

Examples: 8.1A: Use spreadsheets to analyze & interpret data from laboratories, 6-12.
Use the internet to increase productivity and efficiency, 9-12.
8.1B,C: Use data to solve real-world problems, 6-12.
Use online platforms to collaborate & address global issues, 9-12.
8.1F: Collect and analyze data using internet and data simulations, 6-12.
8.2A: Become aware of the invention process, 3-5.

- 8.2B: Become aware of the global impacts on technology, 6-12.
- 8.2C: Apply the design process to pushes & pulls, K-2.
- 8.2D: Use tools to reduce work, K-2.

For additional detail on how these standards are integrated throughout the Fair Lawn Schools curriculum, review the Fair Lawn Public Schools District Alignment to Technology & Career Readiness & 21st Century Skills Standards Curriculum Appendix.