



Welcome to the Academy of Biomedical Sciences at Washington County Technical High School! We have an impressive and talented group of scholars from across the county joining our Class of 2022. You have taken a big step and I am thrilled to welcome you into our program.

The Academy of Biomedical Sciences offers an immersive, rigorous, and highly engaging learning experience in all of the major fields of Biomedical Science. Through our dynamic project-based learning experiences, you will engage in many areas of study including biomedical engineering, forensic science, microbiology, clinical medicine, immunology, epidemiology, oncology, surgery, genetics, hematology, neuroscience, radiology, cardiology, ophthalmology, and orthopedics. You will use state-of-the-art equipment and continuously updated curricula to reflect current research and technologies in science and medicine. During your time in the Academy of Biomedical Sciences, you will get the opportunity to do things that most students do not see until college or graduate school. These experiences will help you stand out on your college and scholarship applications, enable you to earn college credit, and help give you a jump start on your college studies.

In the Academy of Biomedical Science, emphasis is placed on active, hands-on learning in a collaborative project-based format. You will develop transportable skills in professionalism, communication, critical thinking, and ethical problem solving that will help you in all of your future endeavors.

The following is a list of **required items** for Biomedical Science:

- Three-ring binder (any size) with loose-leaf notebook paper
- Pens (blue/black) and pencils (colored pencils or pens are also helpful)
- Two college-ruled composition notebooks
- PLTW Lab Journal (issued at school)

The uniform for our program is a **monogrammed lab coat**. The lab coat is required for all laboratory work and when representing our program at various events. At the beginning of the school year, we will determine the size for your lab coat and place an order as a class. The cost of the custom embroidered lab coat is approximately \$40.00.

The following items are requested for **donation** for use in our classroom. We go through many of these items in our daily laboratory work and any donations would be most appreciated.

- Liquid hand soap (small containers or refill)
- Disinfecting wipes
- Zippered bags (sandwich, quart, or gallon size)
- Glue sticks



Please join our Google Classroom page (code = k5piaz0) and complete the “Getting to Know You” form. Additional information and resources will be posted there this summer.

You will be a wonderful new member of our program and I am so excited to have you join us this fall! If you have any questions (or just want to talk about science 😊), please do not hesitate to contact me this summer at mcdoneli@wcps.k12.md.us.

Sincerely,
Mrs. Elizabeth McDonald

Principles of Biomedical Science Course Resume

Course resumes showcase the technical skills students obtain in each PLTW course. Each resume outlines the computational skills, analytical skills, and knowledge acquired in the course. Course Resumes also detail student experience with tools, software, lab work, and engineering design. The detailed skills listed within course resumes illustrate the immediate, applicable contributions that students can make within a workplace.

Laboratory Skills

- Aseptic technique
- Bacterial culturing, plating, and identification (Gram staining)
- Blood testing and typing
- Dissection
- DNA extraction
- DNA gel electrophoresis
- Fingerprint and hair analysis
- Karyotyping
- Micropipetting
- Microscopy
- Standard curve creation and utilization

Clinical Skills

- Bloodwork analysis
- Blood drawing
- Blood pressure measurement and analysis
- Clinical empathy
- Heart rate measurement and analysis
- HIPAA legislation and implications understanding
- Scientific terminology and abbreviation usage
- Patient questioning, record keeping and documentation
- Pedigree construction and analysis
- Controlled bleeding techniques
- Triage

Professional Skills

- Group collaboration
- Planning and organizing
- Time management
- Problem-solving
- Technical writing
- Verbal and written communication
- Decision-making
- Creative thinking

Equipment and Software Proficiencies

- ArcGIS
- TinkerCAD
- Google and Microsoft Applications
- Probes and sensors (temperature, respiration, heart rate)
- Data acquisition and analysis software
- Compound and digital microscopes
- Gel electrophoresis
- Micropipettors
- Electronic balance

Scientific Experimentation Skills

- Design and conduct reliable scientific experiments
- Analyze and interpret laboratory data
- Construct graphs (by hand and using graphing software)
- Interpolate and extrapolate data from a graph
- Draw conclusions based on experimental data
- Thoroughly and clearly communicate results and conclusions both orally and in writing

Course Knowledge

- Bioethics
- Biomedical science careers
- Body systems (selected) anatomy and physiology
- Cancer biology
- Cell biology
- Crime scene investigation
- Disease treatment and prevention
- Drug design
- Emergency medicine and medical surge
- Forensic investigation, manner, mechanism and cause of death
- High throughput screening (HTS)
- Homeostasis and positive and negative feedback mechanisms
- Infectious disease transmission
- Inheritance
- Interrelationship between body systems, health, and disease
- Mitosis and meiosis
- Molecular biology
- Pathology of disease: infectious, hereditary, and physiological diseases
- Protein synthesis
- Punnett squares
- Relationship between DNA, mutations, protein structure, and disease or dysfunction
- Relationship between genes, chromosomes, and DNA
- Restriction fragment length polymorphisms (RFLP) analysis
- Structure of DNA

Human Body Systems Course Resume

Course resumes showcase the technical skills students obtain in each PLTW course. Each resume outlines the computational skills, analytical skills, and knowledge acquired in the course. Course Resumes also detail student experience with tools, software, lab work, and engineering design. The detailed skills listed within course resumes illustrate the immediate, applicable contributions that students can make within a workplace.

Laboratory Skills

- Micropipetting
- DNA gel electrophoresis

Clinical Skills

- EMG analysis
- Spirometry
- Visual perception testing
- Urinalysis
- Ankle Brachial Index
- Blood typing

Professional Skills

- Group collaboration
- Planning and organizing
- Time management
- Problem-solving
- Technical writing
- Verbal and written communication
- Decision-making
- Creative thinking

Equipment and Software Proficiencies

- Microsoft Office (Excel, Word, PowerPoint)
- Vernier probes and sensors
- Data Acquisition Software (Vernier Logger Pro)
- Microscope
- Goniometer

Scientific Experimentation Skills

- Design and conduct reliable scientific experiments
- Analyze and interpret laboratory data
- Construct graphs (by hand and using graphing software)
- Interpolate and extrapolate data from a graph
- Draw conclusions based on experimental data
- Thoroughly and clearly communicate results and conclusions both orally and in writing

Course Knowledge

- **Over-arching Themes**
 - Homeostasis
 - Biomedical science careers
 - Interrelationship between body systems and health/disease
- **Identity**
 - Directional and regional terms
 - Histology
 - Forensic anthropology
 - Restriction Fragment Length Polymorphisms (RFLP) analysis
 - Biometrics
- **Communication**
 - Brain anatomy and physiology
 - Nerve impulse propagation
 - Response time for reflex and voluntary action
 - Endocrinology
 - Positive and negative feedback mechanisms
 - Eye anatomy and physiology
- **Power**
 - Digestive system anatomy and physiology
 - Enzyme/substrate interaction
 - Metabolism and ATP
 - Respiratory system anatomy and physiology
 - Diagnosis, monitoring, and treatment of asthma
 - Basic pharmacology
 - Urinary system anatomy and physiology
 - Nephron action
- **Movement**
 - Joint structure and function and range of motion
 - Physiology of muscle contraction
 - Cardiovascular system anatomy and physiology
 - Peripheral vascular disease
 - Exercise physiology
 - Skin anatomy and physiology
- **Protection**
 - Structure of bone
 - Bone fractures and bone remodeling
 - Lymphatic and immune system anatomy and physiology
 - Antigen/antibody interaction
 - Pedigree construction/analysis

Medical Interventions Course Resume

Course resumes showcase the technical skills students obtain in each PLTW course. Each resume outlines the computational skills, analytical skills, and knowledge acquired in the course. Course Resumes also detail student experience with tools, software, lab work, and engineering design. The detailed skills listed within course resumes illustrate the immediate, applicable contributions that students can make within a workplace.

Laboratory Skills

- Aseptic technique
- Bacterial plating
- Micropipetting
- DNA extraction
- Restriction enzyme digest
- DNA gel electrophoresis
- Protein gel electrophoresis
- Hydrophobic Interaction Chromatography (HIC)
- Bacterial transformation

Professional Skills

- Group collaboration
- Planning and organizing
- Time management
- Problem-solving
- Technical writing
- Verbal and written communication
- Decision-making
- Creative thinking

Clinical Skills

- Karyotyping
- Quantitative Enzyme-linked Immunosorbant Assay (ELISA) analysis
- Interpretation of audiograms
- Blood typing
- Tissue typing

Equipment and Software Proficiencies

- Microsoft Office (Excel, Word, PowerPoint)
- Vernier probes and sensors
- Data Acquisition Software (Vernier Logger Pro)
- Microscope
- Thermal cycler

Scientific Experimentation Skills

- Design and conduct reliable scientific experiments
- Analyze and interpret laboratory data
- Construct graphs (by hand and using graphing software)
- Interpolate and extrapolate data from a graph
- Draw conclusions based on experimental data
- Thoroughly and clearly communicate results and conclusions both orally and in writing

Course Topics

- Over-arching themes
 - Homeostasis
 - Biomedical science careers
 - Bioethics
 - Design process
 - Interrelationship between body systems and health/disease
 - Current and future medical interventions
- Infectious disease
 - Epidemiology
 - Bioinformatics/DNA sequence analysis
 - Antibiotic mode of action and antibiotic resistance
 - Bacterial transduction, transformation, and conjugation
 - Physics of sound and anatomy and physiology of the ear
 - Hearing loss and audiograms
 - Cochlear implant technology
 - Vaccine production and mechanism
- Innovative medicine
 - Prenatal screenings
 - Gene therapy
 - Reproductive technology
 - Xenotransplantation and tissue engineering
- Molecular biology
 - Recombinant DNA technology and genetic engineering
 - DNA microarrays
 - Restriction Fragment Length Polymorphisms (RFLP) and marker analysis
 - Single Nucleotide Polymorphisms (SNPs) and pharmacogenetics
 - Biomanufacturing of human proteins
- Cancer genetics, diagnostics, and treatment
 - Diagnostic imaging
 - Histology
 - Statistical analysis
 - Biofeedback therapy
 - Prosthetic limb technology
 - Nanomedicine
 - Clinical trials
- Organ transplant
 - End Stage Renal Disease
 - Organ allocation policies and organ transplant
 - Laparoscopic surgical techniques
 - Antigen/antibody interactions
 - Pedigree construction/analysis