

Human Body Systems (PLTW) YAG

PEIMS N1302093 | One Elective Credit | Full Year | 36 Weeks | Grades 9–12 | Project Lead The Way Biomedical Science

Course Information: HBS is a Texas state-approved innovative course in which students examine interactions among human body systems through the themes of identity, communication, power, movement, protection, and homeostasis. Students design experiments, build organs and tissues on a skeletal manikin, use data-acquisition tools to monitor physiological functions, analyze real-world medical cases, and apply biomedical professional practices. The sequence below is anchored to the TEA-approved HBS course description and recommended activities. Experimental design, biomedical tools/technology, analysis of medical evidence, professionalism, collaboration, communication, ethics, and career awareness spiral throughout. ACCESS supports biomedical career and postsecondary exploration.

GP	Wks	Unit & Focus	Major Learning Tasks & Assessments	Integrated EKS	Extension Activities
1	1–2	Unit 1 – HBS Launch: Professionalism, Experimental Design & Anatomical Language	- Establish laboratory, collaboration, communication, ethics and portfolio expectations - Apply directional/regional terminology and build initial tissues/structures on the skeletal manikin - Design a controlled investigation and maintain a repeatable laboratory record - Use measurement tools, data displays and credible research - Explore biomedical careers and professional requirements	- HBS1(A–E) - HBS2(A–E) - HBS3(A–D) - HBS4(A–D) - HBS5(A–M) - HBS7(C) - HBS8(G) - HBS10(A)	- ACCESS: biomedical careers/postsecondary - Career portfolio launch - Manikin/lab notebook
1	3–5	Unit 2 – Identity: Skeletal System, Forensic Anthropology & DNA	- Model skeletal structures and identify bone features contributing to identity - Analyze long-bone measurements and other skeletal evidence in a forensic-anthropology scenario - Review DNA structure, restriction enzymes and gel electrophoresis - Analyze simulated DNA evidence to support identification - Communicate evidence-based conclusions using professional formats	- HBS5(A–M) - HBS7(A–C) - HBS8(A,C–D) - HBS12(F,H,K) - HBS13(A–D) - HBS14(A,J)	- Forensic anthropology investigation - Gel-data analysis - Biomedical professional role
1	6–9	Unit 3 – Communication I: Nervous System, Brain, Neurons & Sensory Response	- Build/model nervous-system structures and major brain regions on the manikin - Explain neuron membrane ion movement, action potentials and signal propagation - Trace stimulus-to-response pathways for voluntary and involuntary actions - Use probes/sensors to investigate reflexes and voluntary responses - Analyze how central nervous system communication breakdown affects body function	- HBS5(A–M) - HBS7(A,C–D) - HBS9(F) - HBS10(D–H) - HBS12(F)	- Reflex/data-acquisition lab - Brain mapping/modeling - Neurology career connection
2	10–12	Unit 4 – Communication II: Senses, Vision, Endocrine Signaling & Homeostasis	- Model eye/sensory structures and investigate visual perception - Compare normal vision with myopia/hyperopia and evaluate visual acuity, depth, color and peripheral vision - Compare electrical and chemical communication - Investigate hormone action, endocrine feedback and a medical mystery involving hormonal imbalance - Explain negative feedback and maintenance of homeostasis	- HBS8(A–B,E) - HBS9(D,F) - HBS10(B–I) - HBS11(A) - HBS14(D)	- Vision-testing lab - Hormone-feedback medical mystery - Endocrine/optometry careers
2	13–15	Unit 5 – Power I: Digestive System, Nutrition, Enzymes & Metabolism	- Build/model digestive structures and trace mechanical/chemical digestion - Investigate enzyme specificity and environmental effects on enzyme function - Analyze a fictional client's metabolic needs, BMR, BMI and diet - Explain macromolecule roles and how body systems obtain/use energy - Prepare an evidence-based nutrition/client report	- HBS5(A–M) - HBS6(A–J) - HBS8(F) - HBS11(B–D) - HBS12(A)	- Digestive-system model - Enzyme investigation - Nutritionist/dietitian simulation
2	16–17	Unit 6 – Power II: Respiratory & Urinary Systems	- Model respiratory and urinary structures and explain their interactions with digestion and circulation - Use spirometry to evaluate lung function and analyze tidal volume, vital capacity and minute volume - Explain gas exchange between air and the body - Complete simulated urinalysis and relate results to kidney/nephron function - Analyze how system dysfunction disrupts homeostasis	- HBS7(D) - HBS8(H) - HBS9(A–B) - HBS11(B–C,E–F) - HBS14(A,C,E–F)	- Spirometry investigation - Urinalysis simulation - Respiratory/renal career connection
2	18	Semester 1 Exam – Human Body Systems	- Cumulative assessment of identity, communication, power, experimental design, medical evidence and biomedical tools - Laboratory/data-analysis component - Semester manikin/portfolio review	Cumulative HBS1–14 as introduced	Targeted review/remediation
3	19–21	Unit 7 – Movement I: Skeletal Joints, Connective Tissue & Biomechanics	- Model skeletal/musculoskeletal structures and identify joint movements - Measure range of motion using a goniometer - Relate cartilage, tendons and ligaments to movement and stability - Analyze fractures and skeletal repair, including osteoblast/osteoclast roles - Interpret X-rays in simulated fracture cases	- HBS7(C) - HBS12(C,F,H,K) - HBS14(A,C,G,I) - HBS8(A)	- Range-of-motion lab - Fracture/X-ray case - Orthopedic/PT career connection

3	22-24	Unit 8 – Movement II: Muscles, Circulation, Exercise & Performance	• Relate muscle attachment to movement and explain contraction mechanisms • Use EMG/data acquisition to investigate muscle activity/fatigue • Model circulatory, respiratory and muscular system interactions • Measure peripheral pulses/Doppler concepts and calculate ABI as appropriate to instructional equipment • Explain physiological responses to exercise	• HBS7(C–D) • HBS8(E) • HBS12(A–E) • HBS14(H–I)	• EMG/muscle-fatigue lab • Exercise physiology investigation • Sports medicine careers
3	25-27	Unit 9 – Integrated Movement & Power: Athlete Training Plan	• Synthesize nutrition, respiration, circulation, muscle function and hydration • Analyze a fictional athlete's data and metabolic/performance needs • Design an evidence-based training plan addressing exercise, diet, hydration and injury prevention • Use multiple data sources and evaluate tradeoffs in biomedical recommendations • Present and defend the plan to a defined audience	• HBS3(A–D) • HBS4(A–D) • HBS6(A–J) • HBS8(A,F) • HBS11(B–F) • HBS12(A–E)	• Athlete case conference • Training-plan presentation • ACCESS: sports medicine pathways
4	28-30	Unit 10 – Protection I: Skin, Burns, Blood & Immune Defense	• Model integumentary, lymphatic/immune and circulatory structures • Analyze skin's protective role and the impact of burns • Explain antigen-antibody interactions and vaccination • Investigate blood-cell surface molecules and transfusion compatibility • Analyze blood-test results and medical interventions	• HBS9(A–B) • HBS12(F–J) • HBS14(A–C,B)	• Burn case study • Blood typing/transfusion simulation • Immunology career connection
4	31-32	Unit 11 – Protection II: Extreme Environments, Injury, Illness & Intervention	• Explain body-system responses to extreme environmental conditions • Analyze events that cause organ-system dysfunction and disease • Compare medical intervention strategies and pharmaceutical effects on body systems • Investigate lifestyle choices and structural dysfunction that affect health • Design or evaluate an intervention for an injury/illness scenario	• HBS6(A–J) • HBS8(A–B,E) • HBS9(A–F) • HBS10(B–C) • HBS14(C,K)	• Extreme-environment case • Medical intervention design • Pharmacology terminology
4	33-35	Unit 12 – Homeostasis Capstone: Integrated Body Systems & Medical Mystery	• Complete an open-ended medical mystery requiring evidence from multiple body systems • Analyze clinical/physiological data and recommend a course of treatment within the simulated case • Explain feedback, homeostasis and system interactions across communication, power, movement and protection • Use biomedical tools/data acquisition as appropriate and evaluate limitations/error • Finalize professional résumé/portfolio and present evidence-based conclusions	• HBS1(A–E) • HBS2(A–E) • HBS3(A–D) • HBS4(A–D) • HBS5(A–M) • HBS6(A–J) • HBS7(A–D) • HBS8(A–H) • HBS9(A–F) • HBS10(A–I) • HBS11(A–F) • HBS12(A–K) • HBS13(A–D) • HBS14(A–K)	• Integrated medical mystery • Portfolio/capstone defense • ACCESS: pathway transition
4	36	Semester 2 Exam & Human Body Systems Showcase	• Cumulative assessment across all HBS knowledge and skills • Physiological-data/clinical-evidence analysis component • Final manikin, laboratory and professional portfolio showcase	• Cumulative HBS1–14	• PLTW-aligned showcase • Targeted remediation

Human Body Systems EKS Coverage Checklist

Coverage verification: All 14 Texas innovative-course knowledge and skills strands and all 92 student expectations are intentionally addressed in the 36-week PLTW-aligned sequence.

Strand	SEs	Knowledge & Skills Focus	YAG Placement	Coverage
HBS1	A-E	Career awareness, education/licensure/skills, lifelong learning, deadlines, societal impact	Units 1, 12; career connections throughout	100%
HBS2	A-E	Professionalism, integrity/accountability, privacy, teamwork/quality, ethics, résumé/portfolio	Units 1–12	100%
HBS3	A-D	Audience-specific written/presentation communication, citations, written/electronic conventions	Units 1–12	100%
HBS4	A-D	Respect, team contribution, conflict resolution, peer review	Units 1–12	100%
HBS5	A-M	Experimental protocol, variables/controls, notebook, research, equipment, error/redesign, data/calculations/conclusions	Units 1–12	100%
HBS6	A-J	Open-ended problem solving, enzyme investigation, multiple data sources, persistence, interdisciplinary decisions, risk/failure/creativity	Units 5, 9, 11–12; spiraled	100%
HBS7	A-D	Microscopy, gel electrophoresis, measurement tools, physiological probes/sensors/software	Units 1–3, 6–8, 12	100%
HBS8	A-H	Medical evidence, diagnosis/treatment, skeletal identity/height, pharmaceuticals, metabolism/BMI, anatomical terms, lung data	Units 2–12	100%
HBS9	A-F	Organ-system dysfunction/disease, interventions, lifestyle, hormones, vessels, CNS communication	Units 3–4, 6, 10–12	100%
HBS10	A-I	Tissues, homeostasis/feedback, nervous/endocrine/senses, electrical/chemical communication, action potentials, stimulus-response	Units 1, 3–4, 11–12	100%
HBS11	A-F	Vision, digestive/respiratory/urinary systems, enzymes, gas exchange, nephron/fluid exchange	Units 4–6, 9	100%
HBS12	A-K	Energy, circulatory/respiratory/muscular, joints/muscles/exercise, skeletal/skin/immune/nervous protection, burns/fractures/immunity/blood/calcium	Units 5, 7–10, 12	100%
HBS13	A-D	DNA, restriction enzymes, gel electrophoresis and gel-data analysis	Unit 2; capstone reinforcement	100%
HBS14	A-K	Clinical exams, blood compatibility, interventions, vision, spirometry, urinalysis, ROM, Doppler/ABI, EMG, X-rays, prescription coding	Units 2, 4, 6–8, 10–12	100%

Implementation Notes

- The sequence is anchored to the TEA-approved HBS course description and recommended activities. Teachers with access to PLTW should use the current PLTW activity/project/problem sequence and instructional resources while ensuring every Texas EKS remains addressed.
- The public framework specifically identifies skeletal-manikin construction, forensic anthropology and DNA identity, hormone/feedback investigations, digestive-system modeling and nutrition analysis, spirometry, urinalysis, joint range-of-motion measurement, athlete training-plan design, and investigation of body responses to extreme environments, injury, and illness.
- Data-acquisition software and physiological probes/sensors should be used where available for muscle movement, reflex/voluntary action, respiration, and other appropriate physiological measurements.
- Experimental design, laboratory documentation, analysis of medical evidence, professional communication, collaboration, ethics, career awareness, and open-ended problem solving should spiral throughout the year.
- ACCESS should support biomedical career exploration, education/licensure research, postsecondary planning, and connections to anatomy/physiology, clinical diagnostics, sports medicine, rehabilitation, nutrition, neuroscience, immunology, and other biomedical pathways.
- Weeks 18 and 36 are reserved for cumulative semester exams. No instructional unit crosses the semester boundary.