SAN LEANDRO UNIFIED SCHOOL DISTRICT
COURSE PROPOSAL: Course of Study
SECTION A. COVER PAGE

1. Course Title: Anatomy and Physiology Honors and CP **If Title Change, Previous Title:** Physiology Honors and CP	**7. Action** ▢ New Course X Course Revision & Title Change
2. Date Submitted:	**8. Grade Level**(s) X10 X11 X12
3. Transcript Title/Abbreviation(s)	**9. Prerequisites** (Please list.) ▢ Recommended ⇒ Algebra (C or higher) ⇒ Biology (C or higher)
4. Transcript Course Code/Course Number :	**10. Seeking Program Distinction?** **X** YES (Check one below.) ▢NO **X** Honors ▢ AP ▢Other
5. Subject Area: Science (BioHealth Pathway)	**11. Is this a CTE course?** ▢ YES X▢ NO **If YES, complete Section C**
6. Department: Science (BioHealth Pathway)	**12. Previously approved by UC?** **X** YES ▢ NO ▢ NA for 6th-8th Year approved Year removed
13. UC ELIGIBILITY **Already eligible?** ▢ NA for 6th-8th **X YES** ▢**NO** **a** ▢ **b**▢ **c**▢ **d**▢ **e**▢ **f**▢ **g X** **Proposing eligibility?** ▢ NA for 6th-8th ▢**YES** ▢**NO** **a** ▢ **b**▢ **c**▢ **d**▢ **e**▢ **f**▢ **g**▢ Please mark one for approved eligibility or proposed eligibility.	**14. Unit Value/Course Credit/Length of Course** ▢ 0.5 (semester or half-year) **X** 1.0 (one year equivalent) ▢ 2.0 (two-year equivalent) ▢ Other
15. School Contact and Course Developer Name: Juanita Abundiz, Gaia Pine and Reginald Richardson Phone: 510-618-4600 Email: jabundiz@slusd.us, gpine@slusd.us, and regrichardson@slusd.us Position: Teacher/Curriculum Writer, Instructional Coach, Principal	
16. Approval Signatures: **Date:** Department Chair: Sarah Kayler	**DISTRICT OFFICE USE ONLY** **Date approved by Board Curriculum Committee 1/24/18** **Date approved by Board**

SECTION B. COURSE CONTENT

17. Course Description

For students interested in pursuing a career in the health and medical fields or who want a better understanding of the structure and function of the human body. This hands on course covers the major organ systems of the body systems: integumentary, skeletal, muscular, nervous, endocrine, cardiovascular, respiratory, digestive, urinary, and reproductive. Dissection of a fetal pig and other animal organs such as the brain, eyes, kidneys and heart will compliment course work in addition to identification of bones, muscles, major organs and tissues. Emphasis will be placed on understanding the causes, risks, treatment and prevention of diseases and disorders associated with each body system such as diabetes, cancer, stroke, meningitis, etc. Student will perform a variety of physiology based labs dealing with such topics as blood pressure, blood typing, lung volumes, PET scans, and exercise physiology. Anatomy and physiology is a lecture and laboratory based study of the human body. This course satisfies the second year life science requirement for college A-G standards (Biology is first year). Successful completion of this course results in 10 credits. The course is broken into 10 units. Each section studies a different topic/body system.

18. Course Goals and/or Major Student Outcomes

Cognitive: Students will understand …

a. how to interpret and analyze data to make predictions and/or defend conclusions
b. how to assess the reliability of sources of information according to scientific standards
c. the importance of accuracy in measuring and calculations to prevent dangerous error in medical procedures and dissection
d. the language of medical terminology to ensure a universally understood language

Affective: Students will …

a. experience reactions ranging from curiosity, wonder, disillusionment, concern, etc. learning about how human body functions and the causes of disease and disorder
b. internalize their own relationship to their body and organ systems and how everyday factors they take for granted (food, exercise, sunshine, stress, etc) have a direct impact on their health
c. listen to and try to understand their peer's reaction to perspectives on major controversial tops in medicine: drug testing on animals, cosmetic surgery, organ donor compensation, stem cell research, designer babies, patient privacy, euthanasia, experimental drug testing, etc.
d. develop necessary background and terminology for further professional training in medical or health fields

Psychomotor: Students will be able to …

a. design and/or evaluate a scientific investigation using evidence of scientific thinking and/or problem solving
b. demonstrate safe practices in using dissection tools and procedures
c. use the metric system and be able to convert key measurements from U.S. to metric
d. evaluate the merits of scientific explanations produced by others
e. explain basic structural organization and function of the human body in normal and disease conditions
f. evaluate disease states
g. solve conceptual and practical anatomy and physiology problems in the form of case studies.

18. Course Objectives (standards)

***Common Core State Standards Connections:* ELA/Literacy -**

RST.11-12.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS1-1)
RST.11-12.9	Synthesize information from a range of sources into a coherent understanding of a process, phenomenon, or concept resolving conflicting information when possible.
WHST.9-12.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS1-1)
WHST.9-12.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-LS1-3)
WHST.11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. *(HS-LS1-3)*
WHST.9-12.9	Draw evidence from informational texts to support analysis, reflection, and research. (HS-LS1-1)

SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. *(HS-LS1-2)*

Next Generation Science Standards –

Unit 1: Introduction to Anatomy and Physiology

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Unit 2: Cytology and Histology

HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

Unit 3: Integumentary System

HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity

HS-LS2-8. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

Unit 4: Skeletal System

HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

Unit 5: Muscular System

HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

HS-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore, mass, are conserved during a chemical reaction.

Unit 6: Body Control (Nervous and Endocrine)

HS-PS3–5. Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction

HS-PS4-5. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

Unit 7: Special Senses

HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

Unit 8: CIR (Cardiovascular/Immune/Respiratory)

HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic

scale can be accounted for as either motions of particles or energy stored in fields.

HS-PS1-5. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.

HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields.

Unit 9: Digestive and Urinary System

HS-PS1-6. Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.

Unit 10: Reproductive System

HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

20. Course Outline

Anatomy and Physiology Course Outline			
Topic/Unit	**Book pages**	**Lecture Topics (2 hours per week)**	**Laboratory (3 hours per week)**
Unit 1: Introduction to Anatomy and Physiology	Chapter 1 pages 1-26	1. Anatomy vs. Physiology 2. Levels of Organization 3. Homeostasis 4. Anatomical Terminology (Positions, Directions, Body Regions)	1. Homeostasis and Exercise Lab, Data Collection and Anaylsis, Digital Graph, Scientific Paper Writing, Metric System Review

		5. Planes 6. Body Cavities 7. Organ System Overview 8. Medical Imaging Techniques	2. Positions, Directions, and Planes Lab 3. Dissection Tools Lab Practical 4. Autopsy of a Pickle
Unit 2: Cytology and Histology	Chapters 3-4 pages 56- 115	1. Cell structure and Organelles 2. Membrane Transport 3. Mitosis and Meiosis 4. Gene Regulation 5. Cancer 6. Stem Cells 7. Epithelia Tissue 8. Connective Tissue 9. Muscle and Neural Tissue 10. Body Membranes 11. Tissue Injury Regeneration vs. Fibrosis Replacement	1. Compound Light Microscope Lab Practical and Mitosis and Meiosis Stages 2. Histology Identification: a. Epithelial Tissue b. Connective Tissue c. Muscle and Neural Tissue
Unit 3: Integumentary System	Chapter 5 pages 116-133	1. Evolution of Human Skin Color and Social Aspects 2. Epidermis 3. Dermis 4. Nail, Nails, Glands, 5. Hypodermis 6. Skin Injury and Repair	1. Stereo (Dissecting) Microscope Lab Practical 2. Case Studies: Epidermolysis Bullosa and Harlequin Ichthyosis 3. Thin vs. Thick skin histology slides, Analysis of Sunscreen 4. Hair and Nail Microscopic analysis 5. Ridge skin and Fingerprints 6. Skin Disorder Research Project/Presentation
Unit 4: Skeletal System	Chapter 6 pages 34-183	1. Skeletal Function, Shape, Divisions 2. Bone Microanatomy and Surface Features 3. Bone Classification 4. Axial Skeleton a. Skull (Sex and Race) b. Vertebrate c. Thoracic Cage 5. Appendicular Skeleton 6. Articulations 7. Bone Formation, Injury and Remodeling	1. Vitruvian Man Lab and Skeletal Proportionality 2. Bone Modeling Lab 3. Skull Identification (Race and Sex) 4. Vertebrate Bone ID 5. Human Bone classification (axial and appendicular) 6. Articulation Lab 7. X-ray Fracture Analysis Lab
Unit 5: Muscular System	Chapter 7 pages 184-235	1. Muscular Functions and Types 2. Muscle Anatomy and terminology 3. Skeletal Muscle Microanatomy 4. Muscle Contractions 5. Muscle Mechanics	1. Sliding Filament Model 2. Case Studies: Dystonia and Spinal Muscular Atrophy Type 2 3. Muscle Stimulation Virtual Lab 4. Muscle Fatigue Clothespin Lab

		6. Muscle Energetics (cellular respiration, lactic acid fermentation, ketosis) 7. Axial and Appendicular Muscles by region	5. Muscle Action Lab 6. Fitness Training Design Project 7. Chicken Wing Dissection
Unit 6: Body Control (Nervous and Endocrine Systems)	Chapters 8 and 10 pages 236-291 and pages 330-363	1. Nervous System Division, Gray and White Matter 2. Neurons, Neuroglia, Nerves 3. Action Potentials 4. Neurotransmitters 5. CNS Divisions 6. Cerebral Cortex (Lobes and cortices) 7. Spinal Cord 8. PNS, Cranial Nerves and Reflexes 9. Autonomic Nervous System 10. Endocrine Components (Hypothalamus-Pituitary Axis) 11. Mechanisms of Hormone Action	1. Action Potential Lab 2. Neuron Communication and Drugs 3. Brain PET Scan analysis 4. Brain Lateralization 5. Cerebral Cortices Model lab 6. Reflex and Spinal Nerve Lab 7. Sheep Brain Dissection 8. Endocrine Lab (Hormones and Diabetes Case Study) 9. Endocrine Disorder Research Project/Presentation 10. Fetal Pig Dissection Anatomy and ID
Unit 7: Special Senses	Chapter 9 pages 292-329	1. General Senses 2. Olfaction and Gustation 3. Vision 4. Equilibrium and Hearing	1. Tactile, Temperature and Pain Tolerance Lab 2. Taste and Smell Investigation Lab 3. Vision Lab 4. Sheep Eye Dissection 5. Hearing lab
Unit 8: CIR Cardiovascular Immune/Lymphatic Respiratory Systems	Chapters 11-15 pages 364-513	1. Blood Composition 2. Heart Anatomy 3. Heart Physiology (Conduction, ECG, Cardiac Cycle) 4. Blood Vessels and Circulation 5. Lymphatic Organization 6. Immune System a. Nonspecific Defense b. Specific Defense 7. Immune Disorders 8. Respiratory Anatomy and Organization 9. Respiratory Physiology (Pulmonary Ventilation, Gas Exchange and Transport) 10. CPR	1. Blood Typing and Blood Genetics 2. Blood Test Analysis and Deciphering: CBC, with Hematocrit & WBC differential, Basic Metabolic Panel, Lipid Panel, Glucose, Thyroid 3. Sheep Heart Dissection 4. Blood Pressure Lab 5. Lung Model Lab 6. Lung Capacity 7. CPR 8. Immune Case Studies 9. Fetal Pig Dissection Anatomy and ID
Unit 9: Digestive and Urinary System	Chapters 16-18 pages 514-611	1. Digestive Organs Anatomy and Organization 2. Digestion and Absorption 3. Nutrition and Metabolism 4. Urinary Organ Anatomy and Organization 5. Urine Formation	1. Digestive Systems Lab Activities (Anatomy, Enzymes, Antacids, Nutrients) 2. Kidney Filtration and Reabsorption Lab 3. Urinalysis Lab

		a. Filtration b. Reabsorption c. Secretion 6. Fluid, Electrolyte and Acid-Base Balance	4. Sheep Kidney Dissection 5. Urinary Case Studies 6. Fetal Pig Dissection Anatomy and ID
Unit 10: Reproductive System	Chapters 19-20 pages 612-673	1. Gametes and Fertilization 2. Male Reproductive Anatomy 3. Female Reproductive Anatomy 4. Hormones, Menstrual Cycle, and Menopause 5. Gestational Anatomy 6. Fetal Development 7. Birth Control	1. Reproductive Anatomy Model Identification 2. Gestational stages 3. Fetal Pig Dissection Anatomy and ID

21. Instructional Materials:

Board approved required text: "Essentials of Anatomy and Physiology" 4th Edition, Pearson

Supplementary materials

a. Unit Packets (developed by instructor)
b. Lab Packets (developed by instructor)
c. Medical Documentaries
d. Chromebooks
e. Internet Resources (virtual labs, tutorials, instructional video clips/animations, etc.)
f. Guest speakers
g. Field trips to local community colleges and universities/colleges

22. Instructional Methods and/or Strategies (Key Assignments)

Key Assignments

1. Unit packets will be developed by instructor and will include all Cornell notes pages, practice worksheets, space for opening daily practice problems, enrichment activities from internet, key vocabulary and roots, in addition to a unit packet rubric and student's assessment page so students can evaluate their own learning and progress. This will keep students organized and provide all the unit work up front so that students can see the direction the unit will take and eliminate the use of notebooks or binders with taped/glued in worksheets and notes that is time-consuming and easily disorganized. Packets will be stamped when work is completed and turned in at the end of the unit and graded holistically based on the rubric in five main areas: Complete/Organized/On-time, Cornell Notes, Application Pages, Questions of the Day (Bell Work), and Enrichment Activities. The strategies used in this unit packet were developed using AVID, GLAD, and Cornell Notes taking techniques.

2. Lab packets will also be developed by instructor and will include all labs with instructions, pre-lab questions, data tables, calculation and/or graphing space, and conclusion and analysis questions. Lab packets will be stamped when complete and turned in at the end of the unit. Focus is on helping both instructor and students stay organized.

3. Projects will be in two distinct categories: STEM and PBL and research/presentation based. Both will prompt student inquiry and autonomy in directing their own learning by delving deeper into key areas of need and either engineering solutions or analyzing know findings while hypothesizing some of their own. Emphasis in these projects will be on developing good research skills, evaluating and citing sources, and clearly and succinctly presenting ideas.

General Approach to Instruction

1. The purpose of this course is to engage students in the discovery and learning the human body. This approach requires active student engagement and participation with the teacher acting as facilitator.
    a. Lecture will be used following the Cornell Notes style but the emphasis will be on application through STEM projects, research projects, inquiry labs and dissections so students can learn in a hands-on manner.
    b. Whole class activities will involve sharing ideas, knowledge, careful consideration and challenge of others' ideas, and supporting claims with evidence and reasoning.
    c. Individual study will be self-directed with support from teacher. Teacher will meet with individual students frequently to monitor progress and guide the process of self discovery.
    d. While the majority of the learning will be student centered, teacher planning and organization remain valuable requirements. In addition, as the learning is to be student led, the teacher must continuously adjust, amend, and supplement lessons and activities to meet the needs and interests of the students.
    e. **AVID, PBL, GLAD,** and **Digital Literacy** teaching strategies will be interspersed throughout the course to aid in helping students access and understand key concepts and principles.

Modifications, Accommodations and Differentiation to include all students:

1. Notes are typed so that students with various learning abilities, auditory and visual impairments and ELL students all have access to all lesson information.
2. Lecture information has bolded terms to aid students in identifying and highlighting key concepts
3. Difficult terms will be broken down into their roots and prefixes to help students understand etymological origins that can be applied to other terms or to their native language (especially Spanish).

4. Digital copies of all lectures and activities will be posted online for students to access anytime they need.
5. Links to tutorial based-sites, instructional videos, and other tools will be posted online so students can access to review difficult topics and subjects.
6. Homework assignments will be posted online so students can access it anytime especially when absent.
7. All students are allowed to re-take tests or quizzes (different version) as long as they first review with instructor in one-on-one tutoring during office hours.
8. Additional resources and extension practice/projects will be available to students who want to go deeper.
9. Students with IEPs or 504 plans are given additional time and can test in tutorial rooms with notes/book per their modification stipulations

23. Assessment Methods and/or Tools

Students will be assessed using multiple measures:

a. Unit Exams and Quizzes
b. Lab Practical Exam
c. Formal Lab Reports (In Google Docs with Graphing in Google Sheets)
d. Unit Packets (with Cornell Notes, Worksheets, Article Summaries, Enrichment Activities)
e. Lab Packets (with lab data tables, analysis questions, conclusion summaries)
f. Projects (Research Papers, Brochures, Etc)
g. Presentation (in person or Google Slides) using clear rubrics for both individual and group

24. Grading Policy

Grading will follow the San Leandro Unified School District's policy.

SECTION C

25. Context for Course (optional)

San Leandro High School is developing a BioHealth Pathway. This course is an updated version of the Physiology course that was written over 15+ years ago. This course included the most current and updated techniques and information in the fields of Anatomy and Physiology and aligns with NGSS and Chabot College Biology 50 course (Anatomy and Physiology). The goal is to articulate this course next year with Chabot college once it is approved by SLUSD to ensure that students in the BioHealth Pathway have opportunities for dual enrollment, which is one of the major goals of the grant.

26. History of Course Development (optional)

This course is already complete and the content has been taught for over 5 years. I started developing the course since 2011 after I inherited it from retiring teacher Mr. Collamer. I received only a few outdated hard copies or a few labs, lectures

and activities that needed lots of revising with the new NSGG standards. Using tools learned from trainings in Project Based Learning, AVID, Digital Literacy, NGSS and by doing extensive research on Anatomy and Physiology courses offered throughout the SF Bay Area, California, and the rest of the U.S. I was able to create curriculum to address the growing need of student awareness of health and medicine and to prepare students for careers in these fields. This is a fundamental course offered to juniors and seniors in the BioHealth pathway usually taken following the introductory course but prior to the Capstone course.