Course Description

A. COVER PAGE

1. SCHOOL/DISTRICT INFORMATION
School: Pinole Valley High School
District: West Contra Costa Unified School District
City: Richmond, CA
School/District Web Site: http://www.wccusd.net

School Course List Contact:
Name: Ryan Kolb
Position: Vice Principal
Phone: 510.758.4664
Email address: rkolb@wccusd.net

Teacher Contact Information:
Name: Dan O'Shea
Position: Science Teacher (Biology, Physiology, Sports Medicine, Kinesiology)
Phone Number: 510.758.4664
Email address: doshea@wccusd.net

District Course List Contact:
Name: Antoinette Henry-Evans
Title/ Position: Senior Director, Curriculum and Instruction
Phone: 510. 231.1128
Email address: ahenry-evans@wccusd.net

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2. Course Description: Kinesiology is the study of human movement and addresses the physical performance of the human body. Applications of Kinesiology to biological sciences, medicine, and health involve the study of biomechanics, orthopedics, musculoskeletal anatomy, neuromuscular physiology, and rehabilitation, such as physical therapy and occupational therapy.

Transcript Title(s) / Abbreviation(s) Kinesiology: Applied Anatomy & Physiology; Kinesiology
Transcript Course Code(s) / Number(s)

Seeking "Honors" Distinction ☐ Yes ☒ No

Subject Area ☒ **Laboratory Science – Biological Science**

Grade Level(s) for which this course is designed ☐ **9** ☒ **10** ☒ **11** ☒ **12**

Unit Value ☐ **0.5 (half year or semester equivalent)** ☒ **1.0 (one year equivalent)**
☐ Other: _____

3. Previously Approved Courses

Complete outlines are not needed for courses that were previously approved by U.C.
Was this course previously approved? ___Yes X No
If yes, select all that apply.

__A course reinstated after removal within 3 years.
Year removed from list_____
Same course title? ___Yes ____No
If no, previous course title: _____

___An identical course approved at another school in same district>
Which school? _____
Same course title? ____Yes _____No
If no, course title at other school? _____

___Approved International Baccalaureate (IB) course?
___Approved CDE Agricultural Education course?
___Approved P.A.S.S./Cyber High course
___Approved UCCP/UCI course
___Approved ROP/C course. Name of ROP/C Organization: _____
___Approved A.V.I.C. course
___Approved C.A.R.T. course
___Approved Project Lead the Way course
___Approved Expository Reading and Writing courses

Other. Explain: _____

Advanced Placement Course
If Advanced Placement, has it been authorized by the College Board through the AP Audit process? Yes No
If not, please explain why:_____
If in progress, date submitted to AP:_____

Is this course a resubmission? __X_Yes _ No If yes, date(s) of previous submission?_September 18, 2011 _____
Title of previous submission? __Kinesiology: Applied Anatomy and Physiology_____

Is this an Internet-based course? ___Yes X No
If yes, who is the provider? PASS/Cyber High Other:_____

Is this course modeled after an UC-approved course from another school outside your district? _Yes _X_No
If so, which school(s)? :
(NOTE: We did, however, review multiple college level Kinesiology courses as part of the course development process.)
Is this course classified as a Career Technical Education? (x)__Yes __ No (partially) (While this is not an ROP/D or Project Lead the Way course, it does involves Integration of science and medical applications and may eventually become at ROP course.)
If Yes:
Name of Industry Sector: Health Science and Medical Technology
Name of Career Pathway/s: Diagnostic Services and Therapeutic Services

4. Catalog Description

Brief Course Description: *Kinesiology: Applied Anatomy and Physiology* provides an introduction to essential concepts, principles and practices of the discipline of kinesiology, including the major sub-disciplines related to studying human movement while at the same time engaging students in medical applications of anatomy and physiology. The course emphasizes problem solving, analytical thinking and concept development. Laboratory activities are designed to allow for measurement of phenomenon studied in class, to engage students in learning various procedures and techniques, and to involve students in collecting and analyzing data to answer questions of interest in kinesiology.

Pre-Requisites: Biology or other college preparatory, laboratory science course; Algebra or other college preparatory math course (Required)
Co-Requisites: Enrollment in one or more concurrent Health Academy classes – Health Academy English, Health Academy History, and/or an additional Health Academy laboratory science. (Required)

5. Optional Background Information

Context for Course: Kinesiology is offered as one in a sequence of science and health related courses for students enrolled in a three/four-year Health Academy//Health and Bioscience Academy program. Kinesiology students are also enrolled in Health Academy// Health and Bioscience Academy English, Academy Social Studies, and, typically, an additional Academy science and/or Academy math course --- all of which are flavored with the theme of health and medicine. The Health Academy//Health and Bioscience Academy partners with local colleges and universities as well as with health/medicine professionals and scientists who serve as consultants for student projects.

History of Course Development: For several years, the Health Academy//Health and Bioscience Academy has worked internally and with other Health Academies to increase the academic rigor of this Academy curriculum and has involved postsecondary faculty and health/medical/bioscience professionals from our Advisory Boards in our curriculum redesign work. We also reviewed multiple college preparatory and University-level science courses to inform our course enhancement. Kinesiology has evolved into a challenging course with course content and methodologies designed to both capture the interest of students and to prepare them for success in advanced studies in health, science, medicine, kinesiology, anatomy and physiology, and biomechanics.

6. Texts and Supplemental Instructional Materials

Primary Texts:
Foundations of Kinesiology: Studying Human Movement and Health, Peter Klavora, Sport Books Publisher, Toronto, Canada, 2007.
Anatomy and Physiology: The Unity of Form and Function, Kenneth S. Saladin, McGraw Hill, 6th edition, 2011,
Laboratory Manual for Clinical Kinesiology and Anatomy, Lyn S. Lippert, Mary Allen Duesterhaus Mnior, E.A. Davis Publishing Company, 2011

Supplemental Instructional Materials:
Kinesiology: Scientific Basis of Human Motion, Nancy Hamilton, Wendi Weimar, Kathryn Luttgens, McGraw Hill, 12th Edition, 2011

- Books, articles and reports (both required and recommended reading) etc. as well as online articles
- Various Kinesiology videos available through you-tube, various university/college sites, and other online sites
- DVDs
- Software (e.g., simulators, control, computational, educational software)
- Science Kits
- Laboratory resources
- MIT Open Courseware, other on-line labs/simulations/text, etc.

COURSE CONTENT

Course Purpose: Goals and Objectives

Upon completion of this course, students will be able to:

- Understand the meaning, focus of study, and methods of inquiry in the study of human movement
- Understand the role and applications of anatomy and physiology in the study of

kinesiology

- Understand and articulate the role of kinesiology and its application to human movement
- Explain the relationships among and distinctions between the sub-disciplines in kinesiology
- Students will understand the structural organization of skeletal muscle with respect to neural connections, muscle architecture, and sensory organs of the muscle
- Students will understand the ionic basis of activation of skeletal muscle
- Students will learn how muscle contraction is regulated
- Students will understand the plasticity of muscle in response to use and disuse
- Students will understand the basics of skeletal muscle energetics
- Students will understand the immediate and long term responses of the systems of the body to physical activity
- Students will be familiar with the physiological basis of physical training and the practical applications of kinesiology, biomechanics, and physiology in human health care.
- Students will demonstrate ability to do research, to solve problems and think critically by completing challenging group and individual projects
- Students will understand how principles and concepts underlying a problem can lead to design and production of viable solution
- Students will apply tools and technologies employed by kinesiology professional
- Students will acquire an enhanced understanding of the role of kinesiology and applied anatomy and physiology in today's society.

Expected Outcomes	**Standards**
❑ Biological/Life Science Standards: *Physiology*: 9. Students will understand that as a result of the coordinated structures and functions of organ systems, the internal environment of the human body remains relatively stable (homeostatic) despite changes in the outside environment. a) Students will know how the complementary activity of major body systems provides cells with oxygen and nutrients and removes toxic waste products such as carbon dioxide. B) Students will know how the nervous system mediates communication between different parts of the body and the body's interactions with the environment. c) Students will know how feedback loops in the nervous and endocrine systems regulate conditions in the body. D) Students will know the functions of the nervous system and the role of neurons in transmitting electrochemical impulses. E) Students will know the roles of sensory neurons, interneurons, and motor neurons in sensation, thought, and response; F) Students will know the individual functions and sites of secretion of digestive enzymes (amylases, proteases, nucleases, lipases), stomach acid, and bile salts. G) Students will know the homeostatic role of the kidneys in the removal of nitrogenous wastes and the role of the liver in blood detoxification and glucose balance. H) Students will know the cellular and molecular basis of muscle contraction, including	Biological Science Standards: 9. and 10: Physiology – 9a, 9b, 9c, 9d, 9e, 9f, 9g, 9h, 9i, 10a, 10b, 10c, 10d, 10e, 10f 1: Cell Biology: 1.a, 1.b, 1.c, 1.d, 1.e, 1.g, 1.h, 1.i, 1.j

	the roles of actin, myosin, Ca+2, and ATP. I) Students will know how hormones (including digestive, reproductive, osmo-regulatory) provide internal feedback mechanisms for homeostasis at the cellular level and in whole organisms. *Physiology*: 10. Students will understand that organisms have a variety of mechanisms to combat disease and to help in the healing/recovery process. A. Students will know the role of skin in providing defenses against infection. B. Students will know the role of antibodies in the body's response to infection. C. Students will know how vaccination protects an individual from infectious diseases. D. Students will know important differences between bacteria and viruses with respect to their requirements for growth and replication, the body's primary defenses against bacterial and viral infections, and effective treatments of these infections. Cell Biology: 1: Students will understand basic cell biology and how fundamental life processes depend on a variety of chemical reactions that occur in specialized areas of the organism's cells (especially as this is related to human cells and human bodies.)	
❑	Health Science and Medical Technology Foundation Standards: 1.0 Academics (academic content needed for college and career readiness) 1.2 (1.a) Students know cells function similarly in all living organisms. 1.2 (5.a) Students know plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism. 1.2 (5.b) Students know organ systems function because of the contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system. (5.c) Students know how bones and muscles work together to provide a structural framework for movement.	Health Science and Medical Technology Foundation Standards 1.0, 1.2 (1.a), (5.a), (5.b), (5.c)
❑	Students understand that kinesiology involves solving problems by applying principles of anatomy, physiology, and biomechanics (& other sciences), mathematics, & technology to the study of the body in motion. Students demonstrate effective use of kinesiology principles & practices in completing lab investigations and in planning & development of projects. Students identify underlying concepts & relationships, analyze different perspectives, synthesize existing ideas, create new ideas, & use knowledge & skills to solve problems. Students frequently apply both Kinesiology process *and* medical scientific inquiry process. Students learn to generate a set of alternative solutions and/or exercise plans and/or treatment plans, select most viable alternative, & design a component, system, or process to	Health Science Pathway Reinforce Geometry Standards: 4.0, 5.0, 7.0, 8.0, 9.0, 10.0, 11.0, 12.0, 13.0, 15.0, 16.0, 20.0, 22.0 Reinforce Chemistry Standards c1a,b,c,d,e; c2a,b,c,d,e Reinforce Physics Standards

implement alternative. Students use technology as a tool for collection, organization, manipulation, & presentation of data.	
❑ Students understand and demonstrate communication skills necessary in the therapeutic Services Pathway. E10 – Students will know how to communicate procedures and goals to patients and clients and members of the health care team by using a variety of strategies. They will know how to evaluate patient needs and communicate appropriate strategies. E2.0 – Students understand protocols and guidelines for collecting and gathering information about patients and reporting results in the appropriate vocabulary to interpret and communicate procedures and observations. E3.0 Students will understand the purpose and components of a treatment plan; understand process of prioritizing and organizing work in accordance with the treatment plan/s. ❑ B1.0 - Students know how to use appropriate methods and technology in a multidisciplinary health care industry to communicate information and observations. B2.0 Students know the process for assessing and reporting the health status of patients. B3.0 Students understand and apply principles of body mechanics. B3.1, B3.2, B3.3, B3.4, B3.5, B3.6; B4.1 Know how to modify communication in accord with understanding; use active listening (reflection, restatement, and clarification techniques); B5.0 – know how to plan, interpret, coordinate, implement	Health Science and Medical Technology Industry Standards Therapeutic Services Pathway E1.0, E2.0, E.2.1, E.2.2, Diagnostic Services Pathway B1.0 B2.0, B3.0, B4.1 Reinforce Language Arts Standards
❑ Students understand measuring systems, methods of dimensioning, application of tolerances, & how measuring instruments are used in & related fields by creating projections, pictorial drawings, and models to scale. (Graphic representations will involve both hand-drawn and computer-assisted drawings and models)	Health Science Pathway: Reinforce Algebra 1: 5.0, 7.0,,8.0,15.0,16.0,17.0, 24.1, 24.2, 24.3, 25.1 Reinforce Geometry: 4.0, 5.0, 7.0, 8.0, 9.0, 10.0, 11.0, 12.0, 13.0, 15.0, 16.0, 20.0, 22.0
❑ Students will examine both historic and modern developments in the fields of kinesiology, biomechanics, and applied anatomy and physiology. Students will understand how advances in kinesiology impact human society, and how human society may determine which new kinesiology areas of study and technologies are developed. Students will be familiar with the education requirements of careers in	History/Social Science: 10.0, 10.3, 10.3.5,

kinesiology, biomechanics, and applied anatomy and physiology as well as related health and medical fields.	
❑ Students will be able to locate and utilize appropriate research material to solve questions concerning medical science and technologies and their social, historical, scientific, and technological implications. ❑ Read a variety of articles in magazines, newspapers, and on-line information as well as analyze and synthesize information for their presentation ❑ Students select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators to perform tests, collect data, analyze relationships, and display data. ❑ Students formulate explanations by using logic and evidence. ❑ Students analyze situations and solve problems that require combining and applying concepts from more than one area of science. ❑ Combine narration, exposition, and description as well as utilize research, organization, and the writing process to develop and deliver focused, coherent presentations	Social Science and Science Research; Investigation and Experimentation 1.a, 1.d, 1.l Language Arts: Oral and Written Communications
❑ Students will identify a societal need, determine the magnitude of the problem and quantify the specifications for a solution. Students will make a presentation of their problem and solution to an audience of health and medical professionals and members of the community.	Language Arts: Research and research presentations 1.6,2.3 Language Arts: Oral and Written Communications Critical Thinking 5.3
❑ Students understand the methods of creating both written and digital portfolios and give effective oral presentations.	- Portfolio Standards A8.0;

Course Outline.

FIRST SEMESTER:

Unit I: Introduction to the Study of Kinesiology: Applied Anatomy and Physiology; Introduction to the Importance of Movement in Health and Wellness; the Science of Kinesiology

Introduction /Overview of the Course
Purpose of the Study of Kinesiology

- Improving human performance by analysis of motion;
- Helping others perform safely, effectively and efficiently;
- Understanding and contributing to clinical and ergonomic applications

- Understanding and utilizing applications of human anatomy and physiology
- Understanding the interrelationships of systems within the body and, in particular, the role and inter-relationships of the respiratory and circulatory systems with regard to the functions of muscle system and the skeletal system

Biomechanics, Kinesiology, and Occupational Therapy – multidisciplinary basis for understanding human movement

- Beliefs and definitions
- Mechanistic and transformative philosophies
- Integration of biomechanics with kinesiology models of practice

The Study of Human Movement: Concepts from Related Fields

- Concepts from Medicine
- Concepts from Physics

Review of class procedures
Classroom and Lab Safety overview

□ Reviewing What we Already Know and Increasing Our Understanding of Health and Wellness

- Health and Wellness: Definitions and Dimensions
  - Physical health, Social health, emotional health, environmental health, mental health
  - Health and Wellness as a Personal Journey
  - Influences on Health: Family, Media, Social/Peer, Cultural
  - Review Anatomy of the skeletal system and muscle system
  - Review and understand the terminology used to describe body part locations, reference positions, and anatomical directions
  - Review the planes of motion and their respective areas of rotation in relation to human movement
  - Describe and understand the various types of bones and joints in the human body and their characteristics
  - Describe and demonstrate joint movements

  Students will: * define health and its various dimensions; * describe factors influencing personal health and wellness; * examine and discuss value systems that influence personal decisions and actions related to health and wellness; * demonstrate an understanding that health is a personal responsibility

Several overall learning goals introduced in Unit I:

- Establish professional relationships with practicing medical professionals to serve as consultants and mentors
- Understanding your interests, motivations & aptitudes
- The importance of lifelong learning
- Developing communication and critical thinking skills
- Apply valid scientific methodology to problem solving in biomedical labs.
- Demonstrate facility in using resource materials, technical

equipment/instrumentation to determine experimental outcomes.
- Communicate concepts and experimental results in clear and logical fashion, both verbally and in writing.
- Work with tools and materials for individual, small group and large group projects.
- Demonstrate cooperative planning & problem solving with individuals of diverse ethnicity, cultural background & gender.
- Demonstrate knowledge of the historical and evolving role of kinesiology Demonstrate reading, writing, problem-solving, analytical thinking, oral and listening skills

Interactive Lecture: Teacher PowerPoint explaining various disciplines of Biomedicine; Review and practice of Cornell note-taking

Learning Activity: Kinesiology, Medicine, and Health Science Professional Panel Discussion featuring medical and kinesiology professionals from local organizations and colleges

Self-Assessment of Knowledge and Skills for Kinesiology: Applied Anatomy and Physiology Students: (See Assessment section)

Blog/Learning Log/Journal Entry: You have worked hard to be able to be successful in high school and to be studying kinesiology. Discuss some of your hopes, dreams, fears, and expectations for this year. What are your academic goals for this year? What, specifically, will you do to assure you achieve your goals?

Small group learning activity: As a team, students complete a K-W-L chart in which they brainstorm everything they Know (K) for certain about Kinesiology: Applied Human Anatomy and Physiology and everything they Wonder (W) or are curious about regarding Kinesiology: Applied Human Anatomy and Physiology; and determine how the class might Learn (L) what they need to know to turn the things they wonder about kinesiology into kinesiology knowledge. (See Assessment section)

Small group Discussion Questions: Students will discuss: What kinds of supports from family, friends, and the community are needed to adopt a healthy life style? * How does culture influence views on what it means to be healthy and to take care of one's health? What does living a healthy lifestyle enable you to do?

TEXT: *Kinesiology: Movement in the Context of Activity*, Volume 1, Greene & Roberts, Chapters 1 and 2. pp. 3 -34

TEXT: *Foundations of Kinesiology: Studying Human Movement and Health*, Peter Klavora, pp. 1-12
Each student is expected to do a close reading of the text and to complete a concept map for each chapter/unit. In addition, students will answer select chapter/unit questions and be prepared to participate in text-based discussions and other unit-related learning activities.

UNIT II: **Historical and Social Context for Kinesiology**
History of science, with emphasis on medicine and kinesiology and their impact on

society * Early & different attempts to understand the natural world. * Science and technology in ancient world, e.g., China, Greece, Egypt, etc. * Pre-scientific & early-scientific revolution (medical practitioners and scientists systematically ask what works & why; work of da Vinci & others.) * Foundations for modern medical science * Development of modern medical science and kinesiology in the 19th, 20th, & early 21st centuries (Industrial revolution, 2nd industrial revolution, information revolution) * Key figures, discoveries, & inventions in past four centuries. * Major theories that changed humans' view of their place in the world, e.g., Copernican revolution and Darwin's Theory of Evolution. * Social, religious, and economic conditions that supported or inhibited development of science and technology in various countries over the centuries. * Current events and challenges related to medicine, health science, and kinesiology and their impact on society.

TEXT:

Assignment: Student-Researched & Facilitated Presentations Student teams prepare and make power point presentations on selected fields of kinesiology, on historical medical practitioners/scientists and/ practitioners of kinesiology, and/or on a form of kinesiology technology. Emphasis is on relevance of the field, medical professional/biomedical scientist/kinesiologist, or form of technology; needed technology that preceded inventions/ forms of technology; and an analysis of impact on society. Students take Cornell notes on presentations by their peers. Student-generated quiz questions on essential knowledge shared.

Interactive Lecture: Teacher PowerPoint Presentation on Nature of Science, with emphasis on kinesiology and health science: * Sources of motivation to understand the natural world and, in particular, the human body * Basis in rational inquiry of observable or hypothesized entities. * Development of theories to guide scientific exploration. * Major changes in scientific knowledge stemming from new discoveries, new evidence, or theories that better account for anomalies or discrepancies. * Need to test theories, elimination of alternative explanations of a phenomenon, & multiple replications of results. * Tentativeness of scientific knowledge (Theories are the best we know from the available evidence until contradictory evidence is found.)

Career Building: Students will research career opportunities related to a background or degree in kinesiology. Each student will write up her/his Kinesiology College and Career Search on a particular Kinesiology-related career. A list of some possible careers will be provided in class; however, these include: kinesiologist, cardiopulmonary rehabilitation specialist, clinical exercise physiologist, physical therapist, occupational therapist, personal trainer, health and fitness counselor, strength and conditioning specialist, coach, Kinesiology teacher/professor, exercise psychologist, sports psychologist, sports medicine doctor, ergonomist, nutritionist, chiropractor, rehabilitation counselor, respiratory therapist, public health educator, orthopedist. Resources: National Occupational Classification Website, Job Futures (www.jobfutures.ca), Career Cruising website.

Professional Associations include: American College of Sports Medicine, American

Heart Association, National Athletic Trainers Association, National Strength and Conditioning Association, Special Olympics (www.specialolympics.gov)

Opportunities to Enhance Knowledge and Skills in Kinesiology: Health Careers Club and/or HOSA Chapter, Job Shadows, Internships, Kinesiology Practicum, Professional Mentors/Kinesiology Project Consultants, Informational Interviews

UNIT III: THE BIOLOGICAL BASIS OF HUMAN MOVEMENT; REVIEW OF HUMAN ANATOMY

Topics include:

- Structure and Function of the Human Body:
- Basic Anatomy of the human body
    - Hierarchical organization of the body
    - Homeostasis
    - Terms used in anatomical descriptions,
    - Self-assessment of body anatomy and physiology knowledge)

Students will:
* demonstrate an understanding of anatomical description and analysis;
* use correct anatomical terminology when describing the human body and its performance;
* describe the various parts of the skeletal and muscular systems and the ways in which they relate to human body movement and performance;
* demonstrate an understanding of the organization and complexity of human anatomy

Small Group work questions:
* Describe the anatomical position and discuss its relationship to the directional terms of the body.
* Describe the four major planes that bisect the body. Provide an example of a movement that occurs in each plane.
* Define 3 types of movement and provide an example of each for a specific joint in the human body.
* Describe the major types of synovial joints. Which allow the greatest amount of movement? The least?
* What are the components and roles of the axial and appendicular skeletons.
* Describe the five regions of the vertebral column from the most superior to the most inferior. In what region are the atlas and axis located?
* What type of joint is the knee? What structures present at the knee provide additional support to this joint? What muscles are primarily responsible for maintaining an upright posture?
* What three muscles combine to form the hamstrings and what role do they play?
* What four major muscles make up the abdomen? What layer is most superficial? Most deep? What actions do these muscles enable you to do?

TEXT: *Foundations of Kinesiology: Studying Human Movement and Health,* Klavora, pp. 13 -57

UNIT IV: MUSCLE STRUCTURE AND COORDINATION

Topics include:

- Muscles at Work/Muscle Forces in Human Motion
  - Basic Muscle Mechanics
  - Factors Affecting Muscle Movement
  - Types of Muscles (skeletal/voluntary; smooth/involuntary; cardiac muscle
  - Skeletal muscle: properties, muscle teamwork, structure
  - Muscle Fiber Types (fast twitch: FT or type II) and Slow Twitch (ST or Type I); Type IIa and IIb
  - Nerve-Muscle Interaction
  - Intramuscle Coordination; Intermuscle Coordination
  - Sports Specific Training
  - Muscle Adaptation to Strength Training
  - Muscles surrounding the shoulder girdle
  - Muscles surrounding the elbow and radiouluar joints
  - Muscles surrounding the wrist, joint and hand
  - Kinesiological muscle analyses of upper extremity movements and exercises
  - Muscles surrounding the hip joint and pelvic girdle
  - Muscles surrounding the knew joint
  - Muscles surrounding the ankle joint and foot
  - Muscles surrounding the trunk and spinal columns
  - Kinesiological muscle analyses of lower extremity, trunk, and whole body movements and exercises.
- Energy for Muscular Activity
- The Science of Biomechanics: How Do I Move?
- Overview of Muscle-related Sports Injuries

Text: *Foundations of Kinesiology: Studying Human Movement and Health*, Klavora, pp. 58-73 plus 40-57 Each student will complete a close reading of the assigned text and will develop a concept map for each chapter/unit. He/she will also answer chapter/unit questions and be prepared to engage in individual, pair, small group, and/or whole class discussions, scientific labs, and learning activities related to textual content.

Small Group Questions: What are 3 types of muscles found in the human body? * Describe the structure of a muscle from the largest structural unit to the smallest. * Explain how the sarcomere contracts, resulting in muscle shortening.. * Describe the three types of muscle fibers and give two characteristics of each type of fiber. * Explain nerve-muscle interaction. * Discuss the differences between inter- and intra-

muscle coordination.

UNIT V: MUSCLES AT WORK

Topics include;

- Types of Muscle Contractions: Static and Dynamic
- Static Contraction: Isometric – Concentric- Eccentric
- Dynamic Contraction: Isotonic, Auxotonic, Isokinetic, Plyocentric -- Concentric (overcoming accommodating), Eccentric (resistive)
- Factors Influencing Muscle Contraction: state of health and training status
- Joint Angle
- Muscle Cross-Section Area – Maximal or Absolute Strength, Relative Strength
- Speed of Movement: Maximal Strength, Power, Muscular Endurance, Relationship between Maximal Strength and Power, Relationship between Maximal Strength and Muscular Endurance, Issues Related to the Relationship Between Strength and Endurance (Muscle Fiber Type, Age, Sex, Strength to Weight Ratio, Muscle Cross-sectional Area, Variation in Testosterone Level)

Small Group Discussion Questions: Identify major types of muscle contraction and give two examples of each. * Discuss major differences between static and dynamic muscle contractions. * Muscle cross-section influences the amount of force a muscle can generate. Explain. * Describe factors that influence muscle contraction. Provide an example of each. * Discuss differences between strength, power, and endurance sporting activities. * Briefly discuss the relationship between maximal strength and power. Provide examples. * Briefly discuss the relationship between maximal strength and muscular endurance. Present two examples. * What happens to muscular strength as one ages? Why?

TEXT: *Foundations of Kinesiology*, p. 74-91 Each student will complete a close reading of the assigned text and will develop a concept map for each chapter/unit. He/she will also answer chapter/unit questions and be prepared to engage in individual, pair, small group, and/or whole class discussions, scientific labs, and learning activities related to textual content.

UNIT VI: ENERGY FOR MUSCULAR ACTIVITY

Topics include:

- The Chemistry of Energy Production
- Three Energy Systems: Immediate Energy:
- The High Energy Phosphate System;
- Short Term Energy: The Lactic Acid System;
- Long Term Energy: The Oxygen System

Small Group Discussion Questions/Working on Mastery: What are the differences between the three energy systems? * Describe one advantage and one disadvantage of each of the three energy systems. * Give an example of three activities or sports that use each of the high energy phosphate system; the anaerobic glycolytic system;

and the aerobic glycolytic system as its primary source of energy (one sport for each energy system.) * What is the most important source of fuel in the body for all types of energy production, a substance also known as the energy currency of the body? * Distinguish ATP turnover from ATP re-synthesis. * Describe how each of the three energy systems could be trained most efficiently.

TEXT: *Foundations of Kinesiology*, pp. 92-105 Each student will complete a close reading of the assigned text and will develop a concept map for each chapter/unit. He/she will also answer chapter/unit questions and be prepared to engage in individual, pair, small group, and/or whole class discussions, scientific labs, and learning activities related to textual content.

UNIT VII: THE HEART AND LUNGS AT WORK

Learning Outcomes:

- Students will increase their knowledge and understanding of the function and control of the cardiovascular and respiratory systems
- Students will describe the relationship between the cardiorespiratory system and energy production.
- Students will explain the measures that are used to evaluate and describe the various components of the cardiovascular and respiratory systems.
- Students will describe the acute and chronic effects of physical activity on the body
- Students will analyze the effects of different environmental conditions on the body during physical activity

Topics include:

- Cardiovascular Anatomy: Heart (structure, function), Blood Pressure
- Cardiac Output (Stroke Volume, Heart Rate, Intensity of Work)
- Peripheral Circulatory System (Arteries, Veins, Red Blood Cells, Hemoglobin
- Cardiovascular Physiology (transport of carbon dioxide, oxygen uptake)
- Respiratory Anatomy and Physiology (Structure, Function (Ventilation, Gas Exchange in Lungs))
- Exercise Effects on the Cardiovascular and Respiratory Systems (Cardiac Output, Capillary Supply, Blood Volume, Ventilation, The Bohr Effect)
- Exercise and Environments Altitude (hyperventilation), Temperature (hyperthermia/heat stroke)

Respiratory System Essay (See Assignment Section)
Cardiovascular and Respiratory Labs and Project (See Assignment Section)

Learning log entries: Students will define and provide units for blood pressure, heart rate, cardiac output, stroke volume, and arterial-venous oxygen difference. * Students will describe the ways in which training and exercise improve the effectiveness of the cardiovascular and respiratory systems.

TEXT: *Foundations of Kinesiology*, pp. 106-125 Each student will complete a close

reading of the assigned text and will develop a concept map for each chapter/unit. He/she will also answer chapter/unit questions and be prepared to engage in individual, pair, small group, and/or whole class discussions, scientific labs, and learning activities related to textual content.

UNIT VIII: THE SCIENCE OF BIOMECHANICS

Topics include:

- Types of Study: Quantitative versus Qualitative Analysis; Kinematics versus Kinetics
- Biomechanical Models of Human Motion: the Particle Model, the Stick Figure Model, the Rigid Segment Body Model, Steps of Analysis
- Types of Motion: Linear Motion, Angular Motion, General Motion
- Causes of Motion: Calculating Moment of Force
- Forces Represented by Vectors: New Force
- Mass and Inertia Concepts: Newton's First Law of Motion; Inertia
- Force and Acceleration Concepts: Newton's Second Law of Motion: Acceleration
- Impulse, Impact, and Momentum Concepts
- Action-Reaction Concept: Newton's Third Law of Motion: Reaction
- Projectile Motion: Maximizing Height and Range; Taking Off and Landing at Different Heights, Air Resistance, Optimizing Range
- Fluid Dynamics: Fluid Drag Forces: the Dynamics of Air; Skin-friction Drag; Profile Drag; Fluid Lift Forces; Angle of Attack; the Magnus Effect
- Body Balance and Stability Control: Equilibrium, Balance, Stability, Factors affecting Balance
- Angular Kinetics: Off-center External Forces
- Conservation of Momentum Within the Body: Rotations While Airborne
- Qualitative Analysis of Human Motion: Skill Objective, Analyzing a Skill, Observation of a Performance, Error Detection and Correction

Learning Activities and Essays (see Lab Activities and Key Assignment Sections)

TEXT: *Foundations of Kinesiology*, pp. 128-164 Each student will complete a close reading of the assigned text and will develop a concept map for each chapter/unit. He/she will also answer chapter/unit questions and be prepared to engage in individual, pair, small group, and/or whole class discussions, scientific labs, and learning activities related to textual content.

UNIT VIII: SPORTS INJURIES: KINESIOLOGY

Learning Objectives: Students will:

- Identify factors associated with injury prevention
- Describe common musculoskeletal injuries
- Demonstrate an understanding of the implications of various chronic and acute injuries and how to treat them

Topics include:

- What are sports injuries? Acute and chronic injuries
- Biomechanical Principles of Injury
- How are sports injuries treated? Injury Treatment and Rehabilitation; healing phases
- How to prevent sports injuries? Nature's warning system; protective equipment; warming up and cooling down; keeping fit and flexible; eating and resting to avoid injury
- Soft Tissue Injuries: contusions, strains and sprains
- Dislocations: Dislocation of the Shoulder
- Fractures
- Concussions
- Overuse Injuries: tendonitis, bursitis, shoulder impingement, stress fractures
- Recent advances in treating sports injuries, future advances

Essay: Role of Kinesiology in Preventing Body Injuries (see Key Assignments)
Discussion/Short essay responses: In an exercise regimen, what are the benefits of warming up and cooling down? What is the difference between a sprain and a strain? * What should you do immediately after an injury? * Compare and contrast a dislocation and fracture. * Identify, describe, and suggest treatment for three overuse injuries. * Describe the difference between bursitis and tendonitis. * Distinguish between a stress fracture and shin splints.
TEXT: *Foundations of Kinesiology*, pp. 167-190 Each student will complete a close reading of the assigned text and will develop a concept map for each chapter/unit. He/she will also answer chapter/unit questions and be prepared to engage in individual, pair, small group, and/or whole class discussions, scientific labs, and learning activities related to textual content.

UNIT IX: HUMAN PERFORMANCE AND PHYSICAL FITNESS THROUGH THE KINESIOLOGY LENS

Topics Include:

- Components of Physical Fitness:
- Muscular Strength
- Muscular Endurance\
- Cardiorespiratory Endurance
- Maximal Oxygen Uptake (VO2max)
- Prediction of VO2max
- Relative VO2max
- Flexibility (Active & Passive Flexibility)
- Stretching Methods (Static & Dynamic Stretching, Pre-stretching, active stretching phase, strength training and flexibility)
- Body Composition
- Psychomotor Ability
- Components and Principles of Fitness Programs
- Training Components – time, frequency volume, intensity (distance, resistance to overcome, frequency of movement, work-to-rest ratio, type of

exercise, warm-up and cool-down
- Other Components of Training – exercise speed, number of repetitions variety of exercise
- Principles of Fitness Training – Progressive resistance or overload principle, gradual load increase, explosive load increase, reversibility principles, specificity of exercise principle, periodization of training principle (preparation, competitive, transition)
- Designing Fitness Training Programs: Guidelines for Designing an Exercise Program
    - ✓ Resistance Training: Station Training, Circuit Training, Circuit Training Variables (Number of Stations, Exercise Sequence, Number of Laps, Number of Repetitions and Level of Resistance, Recovery Between Exercises, Types of Exercises)
    - ✓ Popular Circuits
    - ✓ Cardiorespiratory Training (Endurance Training, Fartiek Training, Interval Training (Extensive Interval, Intensive Interval), Repetition Training)
    - ✓ Combination Training: Combo Circuit Training, Cross Training (aerobic cross training, muscular endurance cross training

Other Web Resources:
American Heart Association *http://www.heart.org/HEARTORG/*
NOVA Online – Companion Website for the "Cut to the Heart" NOVA television program includes resources on Pioneers of Heart Surgery, Treating a Sick Heart, Troubled Hearts (diseased hearts), Map of the Human Heart (Hot Science)
http://www.pbs.org/wgbh/nova/heart
The Heart: An Online Exploration
Animation of Route of Blood in Heart, in conjunction with Wiggers Diagram
http://library.med.utah.edu/kw/pharm/hyper_heart1.html
Virtual Heart – Interactive site with basic heart tutorials
http://thevirtualheart.org/anatomyindex.html

Small Group Discussion Questions/Working on Mastery: Describe the major components of physical fitness and how each dimension relates to physical fitness. * Describe antagonist training and why it is important to incorporate antagonist training into a strength training program. * Describe various methods used to promote muscular strength, muscular endurance, and cardiorespiratory endurance. * Distinguish between VO2max, absolute VO2max, and relative VO2max. Describe appropriate units of measurement for each. * What is flexibility work important for one's health? What are some of the established flexibility methods and which flexibility method is most effective? * Discuss the relevance of psychomotor abilities as a component of fitness. * Identify the principles of exercise training and explain how each dimension affects the planning of a fitness program. * Identify five components of an effective cardiorespiratory and muscular fitness program. Briefly explain the important characteristic of each component. * Describe elements of a

circuit exercise-training program and describe how you incorporate circuit training into your overall fitness regimen. * How can people improve their muscular and cardiorespiratory endurance in one workout?

TEXT*: Foundations of Kinesiology*, pp. 191-225 Each student will complete a close reading of the assigned text and will develop a concept map for each chapter/unit. He/she will also answer chapter/unit questions and be prepared to engage in individual, pair, small group, and/or whole class discussions, scientific labs, and learning activities related to textual content.

UNIT X: THE ROLE OF EVALUATION IN KINESIOLOGY

Student learning outcomes: Students will:

- Apply kinesiology concepts and principles in testing, measurement, and evaluation of one's own physical fitness (and/or that of the class, Academy, school, community, etc.)
- Understand the science involved in various assessments and tests related to physical fitness
- Know how to use a variety of tests to measure human body performance and strength
- Differentiate between the concepts of reliability and validity.

Topics include:

- The Science involved in Assessing Physical Fitness
- The Science involved in Measuring Aerobic Capacity
- The Science involved in Measuring Body Composition
- The Science involved in Measuring Muscular Strength
- The Science involved in Measuring Muscular Endurance
- The Science involved in Measuring Flexibility

TEXT: Foundations of Kinesiology, pp. 226-253 Each student will complete a close reading of the assigned text and will develop a concept map for each chapter/unit. He/she will also answer chapter/unit questions and be prepared to engage in individual, pair, small group, and/or whole class discussions, scientific labs, and learning activities related to textual content.

UNIT XII: THE NUTRITION CONNECTION: THE INFLUENCE OF NUTRITION ON HUMAN BODY PERFORMANCE

Learning Outcomes: Students will:

- Increase their knowledge and understanding of the anatomy and physiology of the digestive system
- Identify nutritional requirements and components of a healthy diet
- Describe the effects of nutrition on human body performance, including athletic performance

Topics include:

- The Digestive System & Digestive Processes
- Functional Overview of the Gastrointestinal Organs

- Nutritional Requirements: Types and Sources of Nutrients (Proteins, Fats/lipids, Carbohydrates, Fiber, Vitamins, Minerals, Water, etc.)
- Nutritional Guidelines and Recommendations
- MyPyramid and other nutritional guides
- Issues related to Nutrition: How safe is the food supply? Is vegetarianism a healthy alternative? Do I need supplemental vitamins and minerals? What is the scoop on sugar? How do our nutritional needs change as we age? Can diet improve athletic performance? Looking through the lens of kinesiology, what influence does diet have on human body performance?

TEXT: *Foundations of Kinesiology*, pp. 254 – 287 Each student will complete a close reading of the assigned text and will develop a concept map for each chapter/unit. He/she will also answer chapter/unit questions and be prepared to engage in individual, pair, small group, and/or whole class discussions, scientific labs, and learning activities related to textual content.

UNIT XIII: MOTOR DEVELOPMENT AND MOTOR LEARNING IN PRACTICE

Learning Outcomes:

- Deepen knowledge and understanding of human growth and development
- Understand factors affecting optimal growth and development across the life cycle
- Understand the necessity of physical activity for optimal growth and development
- Demonstrate an understanding of the differences between the sexes across the life cycle
- Demonstrate an understanding of individual differences in performance, growth, and development
- Explain the skill acquisition processes (stages of learning a skill)
- Practice types of feedback and understand their roles in skill learning
- Apply of motor learning principles in teaching and learning a body movement skill
- Understand types of transfer and apply transfer principles to learning a skill
- Use effective practice methods when designing a movement skill learning environment

Topics include:

- Review of Stages of Growth and Development as well as Factors Affecting Growth and Development
- Perceptual Motor Development Across the Growth and Development Cycle
- Gender Body Structure and Fitness Differences Across the Growth and Development Cycle
- Social and Psychological Factors Across the Growth and Development Cycle
- Youth Sports and the role of Kinesiology
- Skill Acquisition Process
- Stages of Learning a Skill
- Information Feedback for Skill Learning

- Transfer in Motor Learning
- Designing Effective Practice

Learning Activities:
Short Essay Responses for Student's Learning Log/Blog: * Define what is meant by critical periods and readiness. Why do you think it is best to learn a skill when these two concepts are present? * Briefly describe the characteristics that are associated with each of the following stages of growth and development: infancy, childhood, and adolescence. * Describe how you would convince a non-active friend or parent why participation in physical activity benefits wellness, health, and body movement. * Write an "expanded" definition of "movement intelligence." How does this concept differ from motor programs and skills?* What roles to movement intelligence and motor abilities play in determining an individual's skill level and performance? * Describe the continuum of open and closed skills. * Describe the factors that influence the acquisition of movement intelligence. * Identify the stages of learning a skill and describe the important features of each. * Describe the essential differences between extrinsic feedback and intrinsic feedback? Provide examples of each. * What considerations must be made when designing effective practice? When is part practice most effective? How can mental practice (visualization) offer benefits to performance?

TEXT: *Kinesiology: Scientific Basis of Human Motion*, (2011), Nancy Hamilton, Wendi Weimar and Kathryn Luttgens, (Unit III, pp. 372-552 (Jig-saw Reading; Each small group of students is responsible for reading and teaching one chapter to the class as a whole. Students are encouraged to read more and will for certain assignments; however, each student group is primarily responsible for 20-25 pages.

Unit XIV: THE FUTURE OF KINESIOLOGY AND EXHIBIITIONS OF STUDENT WORK

- Kinesiology Forum (including a focus on Emerging Trends and the Future of Kinesiology) The Forum involves a Panel of Health, Medicine, and Science Speakers. Students prepare interview questions, take notes, write reflective blog/journal entry on ideas shared by speakers.

Learning Activities

- ESSAY ASSIGNMENTS: Students write TWO Kinesiology essays of approximately 3-5 pages each. (At least one of these essays should be included in the student's Kinesiology: Applied Anatomy and Physiology Portfolio of Work.) (See Key Assignments Section.
- Work to Finalize Student Portfolio (including samples of exemplary lab/project reports, one or more research papers, one or more essays, pictures of student projects with summary pieces that describe standards met; one or more entries from the bioscience notebook/learning log/blog; other evidence of Kinesiology learning/accomplishments. Students might also include a resume, letters of recommendation, etc.)
- Review for Final Exam and preparation for Kinesiology Student Portfolio Presentations

FINAL EXAM AND PORTFOLIO EXHIBITION:
BENCHMARK EXAM: Exam includes multiple choice & short essay questions on students must score 90% or higher on benchmark exams which test mastery of essential knowledge. There are opportunities to relearn & retest to benchmark mastery.
Review for First Semester Exam
FINAL EXAM: Exam includes key concepts from the entire course with greater emphasis on second semester units. Includes multiple choice, short answer, and essay questions. There will be at least two extended (blue book) essay questions.

Public Exhibition of Student Work * Determining Exhibition criteria and options * Designing and Implementing a Public Exhibition of Student Kinesiology work * Students analyze own work & determine what pieces best represent their growth and accomplishments. Students create a portfolio (DVD, Web site or other media). Students defend & explain choices. Students work with faculty, Kinesiology professionals, and members of the Health Academy Advisory Board to determine criteria, exhibition and judging.

KEY LABORATORY ACTIVITIES

LAB ACTIVITY: KINESIOLOGY BASICS –K101

- Students complete pre-lab activities and worksheet
- Students review basic kinesiology vocabulary and are introduced to new kinesiology terminology
- In a group students perform the following active motions:
  - ✓ Shoulder: Flexion, Abduction, Horizontal Abduction, Lateral rotation, Extension, Horizontal Adduction, Medial Rotation
  - ✓ Elbow: Flexion, Extension
  - ✓ Hips: Flexion, Abduction, Extension, Adduction, Lateral rotation, Medical Rotation
  - ✓ Flexion, Extension
- In small groups, students will participate in a series of learning activities related to the speed and distance traveled by pivots.
- Students will practice the correct way to engage in palpation of muscles. As
- they follow the lab instructions, they will palpitate muscles on the lateral aspect of the forearm, the dorsal aspect of the elbow (a boney area), etc. carefully describe what they feel. They will experiment with palpating using the finger pads of their right index and middle fingers as well as palpating with fingertips. They will compare and contrast sensations.
- Working with a series of partners, students will practice observation and palpation skills on the patellae tendon, the medial and lateral epicondyles of the humerus; pulse at the radial artery; the ulnar nerve on the posterior medial aspect of the elbow, etc.
- Students will complete a detailed examination of posture and compare a person's posture to the normal or ideal posture. Students will note aspects of

symmetry and deviation from normal posture. Following the lab directions, each student will observe her/his partner in a variety of Specified standing position and will describe any major differences.

- Students will practice visual observation and auditory observations.
- Extended learning: taking blood pressure (technique) and observation
- Using a stethoscope, students will listen to one another's heart and lungs and carefully describe the sounds heard.
- Students will practice performing, observing, and identifying movements included in the lab. Students will perform as many of the motions prescribed in the lab as possible while standing, sitting, lying supine, and side-lying. (list of motions provided for shoulder girdle, shoulder, elbow, forearm, wrist, finger, thumb, hip, knee, ankle, toes.)
- Students will complete post-lab questions and lab report.

(Source of lab concept: *Laboratory Manual for Clinical Kinesiology and Anatomy*)

SKELETAL SYSTEM LABORATORY

- This lab involves students in activities related to the human skeletal system. Students complete lab exercises related to the patella, sesamoid bones, flexor tendons.
- Students palpate a variety of markings, including crest, epicondyle, and tuberosity as well as landmarks on skeletons and models, such as trochanter, foramen, fossa, groove, meatus, sinus, condyle, eminence, facet, head, crest, epicondyle, line spine, tubercle, tuberosity, trochanter.
- Students identify bones and bone groups that make up the axial skeleton and the appendicular skeleton.
- Using bones in the bone box, students arrange the bones of the upper extremity and the bones of the lower extremity in proper anatomical orientation to one another to create the appendicular skeleton.
- Students examine a mid-shaft cross section of a long bone and describe the type and appearance of the bone. In addition, students examine and describe a cross section of the epiphysis of a long bone.
- Students use disarticulated bones and identify bone structures such as epiphysis, endosteum, epiphycal plate, metaphysis, diaphysis, and periosteum.
- Using the skeleton and models, students identify short, flat, long, irregular, and sesamoid bones and provide examples of each.
- Students complete pre- and post-lab questions as well as a lab report. The post-lab questions focus on the function of the axial skeleton, appendicular skeleton, various parts of a bone, etc.

LAB INVESTIGATION: CIRCULATORY SYSTEM: SHEEP HEART DISSECTION:

Students describe appearance of external and internal structures of a sheep's heart. Students identify structures and functions of a sheep's heart. Students trace flow of blood through the heart. Students follow the lab Sheep Heart Lab Dissection protocol and complete a series of observations and dissection procedures. Students also complete related lab drawings and write a formal

laboratory report that includes their observations, methods, findings, conclusions, discussion, and reflection. Students practice demonstrating their knowledge of the sheep heart and of heart circulation in several on line sheep heart learning exercises.

Students take a mastery quiz on sheep heart anatomy and heart circulation. Students locate, label & identify functions of: superior vena cava, inferior vena cava, right atrium, opening of coronary sinus, tricuspid, chordae tendinae, pulmonary semilunar value, pulmonary artery (trunk), right coronary artery, interventricular coronary artery, coronary sinus, left atrium, pulmonary veins, bicuspid or mitral value, left ventricle, semilunar valve of the aorta, aorta, brachiocephalic artery, carotid artery, subclavian artery.

Students are given a detailed diagram of the human hear and are asked to label the superior vena cava, inferior vena cava, aorta, pulmonary arteries, pulmonary veins, right atrium, right ventricle, left atrium, left ventricle, semi-lunar valves, nitral valve, tricuspid valve. In addition, each student will label where blood enters the heart from the body and lungs AND label where blood leaves the heart to go to the body and lungs.

Students research and write a brief essay in which they compare and contrast the structures and functions of the human heart with a sheep heart.

Resources include:
http://www.biologyjuntion.com/sheep_heart_dissection_lab_report.htm
Sheep Heart Dissection with pictures including observation of external and internal anatomy:
http://www.hometrainingtools.com/heart-dissection-project/a/1318/
http://www.nku.edu/~dempseyd/HEART_1.htm (includes many sheep heart resources plus an animation of blood through the heart, a blood pressure measurement video, interactive heart labels, etc.)
http://www.morgancc.edu/faculty/Smith,L/AnatomyReview/Labs/Heart%20Dissection.pdf (note: This is an advanced lab on the heart dissection with some excellent heart dissection directions and pictures. This lab also explores blood vessels and value action. It also includes a heart proficiency quiz.
http://fsweb.bainbridge.edu/acunningham/BIOL2012/BIOL2112-HeartDissection.htm (includes human heart models/pictures as well as sheep heart dissection.
The Human Heart http://www.fl.edu/learn/heart/index.html (topics: development, structure, vessels, blood, systems, monitoring, health, history, heart headlines, etc.)

LAB INVESTIGATION: BREATHING RATE: WHAT IS THE EFFECT OF EXERCISE ON BREATHING RATE?
Working with a partner, students form a hypothesis about the effect of exercise on breathing rate and write this as an If, Then statement. Each student takes turns

assuming the role of the participant or investigator. The participant sits very sill for 1 minute, walks in place for one minute, and jogs in place for one minute. After each 1-minute "exercise" breathing rates are recorded on a spreadsheet. After switching roles and again recording breathing rates, students use Excel to make a bar graph (column graph) of the data and analysis the data. Using their data as a reference, students describe the relationship between breathing rate and exercise. Each student writes a paragraph or two describing the ways in which the data supported or did not support the original hypothesis and discussing the lab results and implications.

LAB INVESTIGATION: LUNG CAPACITY

Working with a partner, students complete a series of lab activities designed to measure lung capacity. Students will measure volume of air, experimental lung capacity, vital lung capacity, etc. and analyze the data that results. Each student will complete a lab report.

Extended learning: Each student will design an investigation to test one of the following:

- Do you think the air temperature will have an effect on the lung capacity of an individual?
- Will a person's height and/or size have an effect on her/his lung capacity?
- How does smoker versus non-smoker compare for lung capacity?

Each student writes a step-by-step procedure for the investigation and creates a chart to record the type of data that would be gathered in the investigation

LAB INVESTIGATION: RESPIRATORY SYSTEM LAB

Students describe and note similarities and differences between: quiet inspiration, deep inspiration, forced inspiration, quiet expiration, and forced expiration.

- Students describe in detail the phases of respiration.
- Students understand the function of the ribs and the upper trapezius during respiration.
- Students identify, describe, and explain the functions and interactions of the larynx, alveoli, nasopharynx, laryngopharynx, trachea, nasal cavity, oral pharynx, mediastrimum, bronchioles, oral cavity, diaphragm, bronchi
- Students work with a partner to obverse different types of respiration and the motions of body during respiration.

SKELETAL MUSCLES LAB (also includes explorations of the "elbow")

Activities: Chicken Wings and Muscle Structure; Muscles and Movement: Learning Major Muscles and Their Actions

Learning Outcomes: Students will be able to: compare bird and human forelimb structure and relate structure to function; identify skeletal muscle, fat, and connective tissues; describe and demonstrate specific joint movements; locate and name major muscles of the human body; and discuss the actions of major muscles

during specific activities.

Chicken Wings and Muscle Structure: Students will examine the chicken skeleton and human skeleton and identify humerus, ulna, radius, and wrist (carpal), hand (metacarpal) and finger bones (phalanges) on each. Following a prescribed lab procedure, students will dissect and experiment with elements of the chicken wings, including tendons, ligaments, epimysium, skeletal muscle tissue, etc. Students will carefully examine the major muscles and locate the flexors and extensors of the elbow joint. Students will be able to explain the ways in which the structures of the chicken wing and human upper limb are homologous, describe five specific tissues that they examined in the chicken wing, and explain the role of blood vessels and nerves in skeletal muscle function.

In addition, students will be able to explain what muscles flex and extend the elbow joint and the function of the action in chickens and in humans. Students will explain how differences in muscle and bone anatomy relate to the way of life of chickens/birds and humans. (NOTE: There are many versions of the chicken wing lab available on line and in print. One version can be found at CTE Online:
http://www.cteonline.org/portal/defalut/Curriculum/Viewer/Curriculum?action=2&view=viewer&cmobjid=177526
Another can be found at: http://www.anndannenberg.com/bio2/BioLabs/Chickenwinglab.pdf)

Activity: Muscles and Movement. Muscles produce movement by crossing joints. Each student will define and demonstrate the following movements with reference to the human skeleton: flexion, extension, abduction, circumduction, pronation, supination, plantarflexion, dorsification.

Activity: Learning Major Muscles and Their Actions: Using a diagram of the human body, students will locate the following major muscle groups: abdominals, gluteala, hamstrings, quadriceps femorta. Using an experimental approach, students will identify the major muscles involved in walking; crunches/ sit-ups and push-ups.

NERVOUS SYSTEM LAB Pre-Lab Activity: Prior to beginning the lab, students take a tour of the brain at http://www.alz.org/alzheimers_disease_4719.asp Students identify functions of each main brain part: cerebrum, cerebellum, and brain stem. Students also explore: supply lines, the cortex, left brain/right brain, the neurons, cell signaling, and signal coding.

Station One: Neuroanatomy and Function Activities: Cerebellum: function=balance and coordination. Each student completes a series of exercises related to knee flexion and hip extension, writes up findings, and answers questions such as, during the knee flexion activity, why do you think that closing your eyes made the task more difficult?

Pariental Lobe (part of cerebral cortex) Function = sensory processes (touch). Each

student works with a partner to map cutaneous (skin) sensations on the mid forearm, tip of pointer finger, tip of little finger, palm of hand, back of hand, back of neck, cheeks, and forehead.

Temporal Lobe (part of cerebral cortex) Function = auditory perception and speech activities
Occipital lobe: Function = Vision Depth Perception activities; Why do you need two eyes? How does closing one eye affect the ability to judge distances?
Frontal Lobe: Function = decision making, problem solving, and planning activities
Brain Stem: Function = vital center (respiration, regulation of heart rhythms, etc.)

Station Two: Testing your Cranial Nerves: olfactory nerve activities; optic nerve activities; oculomotor nerve, trochlear nerve, and abducens nerve activities; trigeminal nerve activities; facial nerve activities; vestibulocochlear nerve tests; glossopharyngeal nerve and vagus applications; spinal accessory nerve tests; and hypoglossal nerve activity.

See also Science Geek Nervous System Lab involving reaction time of arm and shoulder; reaction time of thumb and index finger; and mapping nerve endings on the pad of right index finger, back of upper arm, and back of the neck.
http://www.sciencegeek.net/Biology/biopdfs/Lab_NervousSystem.pdf

NECK AND TRUNK LAB: Palpation of bones, landmarks, ligaments, and other structures. Locating structures, most of which cannot be palpated:

- Skull (occipital bone, occipital protuberance, basilar area, foramen magnum, occipital condytes, temporal bone, mastoid process
- Vertebra: Body, neural arch or vertebral arch, vertebral foramen, pedicle, lamina, transverse process, vertebral notches, intervertebral foramen, articular process, spinous process
- Intervertebral disk: annulus fibrosus, nucleus pulposus
- Atlas (atlas C1, Anterior Arch)
- Axis (Axis C2, Dens or odontoid process)
- Other structures
  Working with a partner, students will perform prescribed motions of the neck and trunk and observe partners flex, extend, laterally bend, and rotate. Students will carefully describe the movements in writing and indicate the amount of motion available in specific regions of the spinal column (cervical, thoracic, lumbar); Students will complete a series of neck and trunk exercises while the partner determines specific muscles involved, amount of extension, amount of motion, types of contractions, etc.

PELVIC GIRDLE LAB

- Students locate, identify, and determine/describe the functions of the structures of the sacrum, ilium, ischium, and pubis.

- Students work with a partner to perform prescribed pelvic motions and the partner observes and documents the motions and describes the effects of various motions on the lumbar spine and hips.

APPLIED KINESIOLOGY LAB: SHOULDER GIRDLE-JOINT

Students will identify on a skeleton or human subject the structures of the shoulder; draw on a skeleton diagram and label the shoulder joint movements; determine the possible movements of the shoulder and identify the agonists and their antagonists. In addition, students will identify the boy landmarks and muscles around the shoulder; measure and identify normal and abnormal shoulder range of motion; perform tests to identify normal and abnormal strength and length of the muscles crossing the shoulder; identify the location and function of the supporting structures of the shoulder; and identify the relationship of the shoulder and shoulder girdle

Equipment: goniometer, marking pencil, tape measure

Textbook – chapters/sections on upper extremity and shoulder girdle

Procedures: While subject is in a standing position, each student finds and marks: medial border and inferior angle of the scapula; Humerus (head, greater tubercle, lesser tubercle, bicipital groove, biceps brachil tendon, surgical neck, anatomical neck); olecranon process; styloiad process of ulna.

Students identify the location of the following: caracebrachialis, biceps, triceps, pectoralis major (upper, lower), latissimus dorsi, tores major

Students identify the supportive structures of the shoulder and girdle on a bone model: caracohumeral ligament, glenohumeral ligament, caracoacromial ligament, subacromious bursa.

With the subject in a standing position, students observe the posture of the shoulder, humerus, and scapula from the posterior view or anterior view and lateral view. Using a chart that describes indicators of normal and abnormal posture, students determine whether the posture of the shoulder – posterior view and lateral view – is normal or abnormal. Similarly using a chart that describes indicators of normal and abnormal posture, students examine the posture of the scapula and humerus. (Posture of shoulder, scapula, and humerus chart is available at http://www.usc.edu/dept/LAS/kinesiology/exsc301/LabManual/Lab5_Shoulder.pdf)

Following given lab procedures and using a goniometer, students measure and record the range of motion of the shoulder complex. Students examine flexion/extension, abduction, and internal/external rotation.

Following given lab procedures, students test the length of the glenohumeral and scapular muscles. Pectoralis major, sternal part; latissimus dorsi, teres major and

rhomboids.

Students examine the range of joint motion and range of muscle length for both the right and left arms. Flexion (normal range 180 degrees); Extension (normal range 45 degrees), Abduction (normal range: 180 degrees); Adduction (normal: 0 degrees); internal rotation (normal: 70 degrees); external rotation (normal: 90 degrees); sternal part of pectoralis major (normal rnage 0 degrees); clavicular part of pectoralis major (normal= 0degrees; pectoralis minor (normal = 1 inch); latissimus dorsi and teres major (normal=180 degrees)

Students perform and record muscle testing of the following muscles according to given instructions: coracobrachialis; supraspinatus and middle deltoid; anterior and posterior deltoid; pectoralis major, upper; pectoralis major, lower; shoulder lateral rotators; shoulder medial rotators; teres major; latissimus dorsi

Movement Analysis: Observe and record/chart movement of the scapula and glenohumeral joint during the following series of movements. Standing position (start); 90 degrees shoulder flexion with elbow fully extended; 90 degrees horizontal abduction with elbow 90 degrees flexed; 90 degrees external rotation with elbow 90 degrees flexed, 180 degrees abduction with elbow fully extended, 90 degrees external rotation with elbow 90 degrees flexed; 90 degrees horizontal abduction with elbow 90 degrees flexed; 90 degrees shoulder flexion with elbow fully extended; standing position (end)

In pairs or small groups, students respond in writing to the following: Using the language of kinesiology: applied anatomy and physiology, describe the shoulder and scapular posture of your subject. * What are rotator cuff muscles and how would you strengthen rotator cuff muscles? * What are the functions of the infrspinatus and teres minor as compared to the subscapularis? * What is the scapula-humeral rhythm? What is the normal ratio of scapula-humeral rhythm? What are the scapular movements associated with arm elevation during shoulder flexion and abduction? * During a postural evaluation of the shoulder, you found that 1/3 of the humeral head of your subject protrudes beyond the humeral head. What supportive structure(s) might be too tight or two short? * If your subject has limited shoulder internal rotation, which muscle(s) might be too short? How would you stretch them? * During a ROM evaluation, you found that your subject has an excessive range of external rotation. What supportive structure(s) is/are susceptible to injury during an excessive external rotation? * Shoulder islocation is a common injury in contact sports. Which is the most common direction of shoulder dislocation? Why? * What are the functional differences between the sternal and clavicular portion of pectoralis major? * Assume your subject has tightness of the pectoralis major and the pectoralis minor, describe the posture of the scapula and shoulder of your subject. * What are the functional differences between the anterior, middle, and posterior deltoid? * What are the functions of the supraspinalua muscle?

Resources: Shoulder Lab http://old.hkin.educ.ubc.ca/361/pages/sh_mus.htm Students will locate and commit to memory: scapula, clavicle, sterum and manubrium, skull and spine humerus, pelvis and sacrum * Students will locate and commit to membory the: Sternoclavicular joint, acromioclavicular joint, coracoclavicular joint, glenohumeral joint, coracoacromial joint * Students will use their text to locate on the models the following shoulder joint features and commit to memory: joint capsule, ligaments (acromioclavicular, coracoclavicular, coracolhumeral, glenohumeral (superior, middle, inferior), transverse humeral, and coracoacromial ligaments), coracoacrominal arch. * Students will locate the following skeletal muscles that intersect with the function of the human shoulder: trapezius, levalor scapulae, pectoralis minor, cornacobrachialis, subscapularis subclavius, suprapinatus, teres major, rhomboid major and minor, deltoid (anterior, middle, posterior), infraspinatus, latissimus dorsi, serratus anterior, teres minor, pectoralis major

ANATOMY AND PHYSIOLOGY OF THE HUMAN KNEE JOINT; THE KNEE AND HUMAN MOTION

Students will:

- Deepen their understanding of the skeletal system with emphasis on the lower extremity
- Be able to explain the chemical make-up of bone and the process of ossification (histology of bone, other tissues related to bones)
- Differentiate between the types of joints in the human body
- Become knowledgeable about the muscle groups in the leg
- Better understand why the knee is the most commonly injured joint (complex structure, weight-bearing)
- Be able to describe other structures that are essential for normal movement of the knee (diarthrodial joint), including ligaments, tendons, cartilage, and bursa
- Explain, demonstrate and illustrate the coordination of the different systems involved in knew movement and each of their specializations
- Describe common knee injuries, the pathologies, and treatments

Students participate in an in-depth examination of the human knee joint, a very complex part of the human anatomy. The knee joint is classified as a diarthrodial or synovial joint and contains numerous structures.

FOOT AND ANKLE LAB: Students will: Identify bony landmarks and muscles around the ankle and foot, measure and identify normal and abnormal ankle range of motion; identify normal and abnormal strength and length of the ankle muscles; identify the relationship of the foot and ankle motion during both open and closed kinematic chains; identify the location and function of the support structures of the ankle and foot complex. Equipment: marking pencil and goniometer

Overview of Procedure: 1) While their subject is in a sitting position, students will

find and mark the following: anterior-medial surface of the tibia, fibular head, medial and lateral maileoli, calcaneus, talus, navicular head, cuboid. 2) Review subject's standing posture, focusing attention foot segment, ankle, and knee joint. Note any deviation observed and hypothesize consequences of the devisation on subject's muscle length, strength, and stress placed on the supporting structures. 3) Identify the following soft tissue structures: anterior tsiofibular, calcaneofibular and posterior tsiofibular ligaments; deltoid ligament, 4) Using a goniometer, measure the range of motion of the ankle and chart the results for both the right and left foot. (ankle dorsiflexion with knee fully extended; ankle dorsiflexion with knee flexed; ankle plantar flexion (45%) 5) Using instructions provided, students perform muscle testing on the following: tibialis anterior, tibialis posterior, peroneus longus and brevis, peroneus tertius, soleus, gastrocnemius, exterior halluces longus and brevis; extensor digitorum longus and Brevis; flexor halluces longus; flexor digitorum longus

In addition to writing individual lab reports and labeling aspects of the foot and ankle structure on an anatomical diagram of the foot and ankle, students work in pairs or small groups to respond to the following questions: * Does your subject have a limited or excessive ankle dorsiflexion? If yes, what is the range? • What structure (s) could potentially limit ankle dorsiflexion range of motion? • Could weakness of the ankle dorsiflexors influence the ankle dorsiflexion range? • Assume that your subject has limited ankle dorsiflexion, please design a stretching exercise program specific to your subject. • Does your subject have a limited or excessive ankle plantar flexion? If yes, what is the range? • What structure (s) could potentially limit ankle plantar flexion range of motion? •Could weakness of the ankle plantar flexors influence the ankle plantar flexion range, and how? • Assume that your subject has limited ankle plantar flexion, please design a stretching exercise program specific to your subject. • When performing a standing calf stretch with knee fully extended, which muscles are stretched? • When performing a standing calf stretch with knee slightly flexed, which muscle (s) is stretched? • What are the functional differences of the tibialis anterior and tibialis posterior? • What are the functions of the tibialis posterior during stance? • Design an exercise to strengthen the tibialis posterior muscle. • Deltoid ligament is very strong. During an eversion sprain, the ligament might not be severly injured; however, the abduction force may cause an avulsion fracture of the attachment of the deltoid ligament instead. Which attachment of the deltoid ligament is susceptible to injury during an eversion ankle sprain?

HAND KINESIOLOGY: The variety of movements available to the human hand and wrist are the result of its unique bone and joint structure, ligament structure, muscle arrangement, and nerve distribution. Using a University of Kansas interactive lab, students explore hand kinesiology.
http://classes.kumc.edu/sah/resources/handkines/kines2.html

WRIST JOINT LAB ACTIVITY: On a skeleton and on at least two of their classmates, each student will locate , palpate and observe the following structures of the human wrist:(NOTE: not all structures are palpable.) Radius – styloid process, ulna – styloid process; proximal row of carpals (scaphoid, triquetrum, and pisiform); and gistal row (trapezium, capitate, hamate, and hook of the hamate.

On a skeleton and a partner, each student locates the following muscles of the wrist:
Sitting position: flexor carpi ulnaris, flexor carpi radilalis, palmaris longus
Extensor carpi radialis longus: extensor carpi radialis brevis, extensor carpi ulnaris

Students complete a series of activities involving opening and closing a jar with a screw-on lid. Students monitor and record ways in which the wrist functions during the process. Students respond to a series of questions about the structure and function of the wrist and wrist muscles and nerves. In addition, students are able to start on the anterior medial side and proceeding laterally around the wrist, name the wrist muscles in the order encountered. Students complete a lab report that includes diagrams and charts to record the results of their activities.

HIP JOINT LAB
Students will view an interactive online presentation on the Anatomy of the Hip at http://www.wisc-online.com/objects/OTA2204/OTA2204.swf They will examine basic structures and functions of the hip as a ball and socket joint, muscles and tissues attached to the hip, and the supply of blood to the femoral head. They will view and complete activities related to the femur and left hip bone. They will complete a quiz in which they identify highlighted parts of the femur and hip bone.

CLINICAL KINESIOLOGY AND ANATOMY OF THE BODY Students will complete a series of lab exercises related to posture and gait and will write up their findings. One resource for definitions of posture and gait is a short article on posture and gait analysis at http://www.livestrong.com/artilce/183065-posture-gait-analysis Another useful, short article on Gait and Balance Assessment can be found at http://www.enotes.com/gait-balance-assessment-eference/gait-balance-assessment

Gauge Your Gait Lab: Students work in groups of four and each member of the group is assigned a role. In the course of the lab activities, students observe their normal gait and calculate cadence, stride length, and velocity. They then compare their results to those of the rest of the class.

LAB: MOVEMENT DESCRIPTION In order for descriptions of body segments to be meaningful, movement specialists must be able to communicate with one another using a standard set of nomenclature. In general, plan and axes of motion are used to describe the orientation of the body segments while joint action nomenclature is used to describe the actual movement at a particular joint. Using the anatomical position as a reference and the figure and table provided in the lab handout, each student will complete a chart that displays the cardinal planes and axes of motion; selected directional terms; and definitions of fundamental joint actions.

Purpose: to review terminology used to describe human movements and utilize this terminology in the analysis of joint movements for the following motions: 1) biceps curl; 2) shoulder press (wide grip); 3) bench press (wide grip);

4) push up (narrow hand placement); and 5) sit-up with a twist.

Sample chart for Biceps Curl

Joint/movement	Start position	Joint action(s)	Plane
Elbow/raise (starting with dumb bells in a lowered position			
Elbow/lower (starting with dumbbells in an elevated position)			

Sample chart for Shoulder Press (wide grip)

Joint/movement	Start position	Joint action(s)	Plane
Elbow/push up (starting with dumb bells in a lowered position)			
Shoulder/push up			
Elbow/return (starting with dumbbells in an elevated position)			
Shoulder/ return			

NOTE: Lab involves similar charts/documentation for Sit up with a twist (upward movement only) involves: elbows (starting with torso in a lowered position); shoulders; torso; hips; knees; ankles

LAB INVESTIGATION: MUSCLE MECHANICS When a muscle pulls, it creates a torque about a joint. The torque determines the tendency to turn about the joint center. The larger the torque, the greater the tendency to turn about the joint center. There are two primary methods to calculate the torque created by a muscle pulling about a joint. One involves Multiplying the moment arm of the whole muscle force by the size of the whole muscle force. (When a force (Fm, the muscle force) creates a toque, it does so by acting at a distance from the joint center. That distance is the moment arm, defined as the perpendicular distance from the joint center to the line of action of the force. The torque created by the muscle force is equal to the product of the moment arm and the force.) A second method of calculating the torque involves using the turning component of the muscle force. (See in class handout for diagrams and details of the methods.) Using your knowledge of muscle mechanics, solve the following problems. * Determine which method of doing a sit-up exercise involves the smallest amount of muscular torque. * If the insertion of the deltoid on the humerus is at a point located at a distance r = 0.09 m from the joint center, what is the value of the torque created by the deltoid muscle about the shoulder joint?

LAB INVESTIGATION INTO ACUTE PHYSIOLOGICAL RESPONSES TO EXERCISE

The body functions best when body fluids, temperatures, and the chemical constitution of blood are at specific levels. A change in the internal environment of the body usually prompts an immediate response in an attempt to restore homeostasis (stable internal environment.) The internal regulatory systems cause

the changes that we experience before, during, and after exercise. Short term, or acute physiological responses occur as a result of increased stress on the normal resting functions of the body, such as heart rate, breathing, and blood pressure. In this lab investigation, students assess the consequences of exercise on oxygen uptake and heart rate of a specific human subject and learn more about how the homeostasis of the human body is affected by such changes. After performing pre-exercise tests, monitoring the subject during a series of exercises, and performing post-exercise tests, students graph: the relationship between exercise intensity and heart rate; the average mass of the subjects used in the lab investigations; volume of air expired, volume of Oxygen uptake, and volume of Carbon Dioxide output as well as the calculated expiratory exchange ratio.

KEY ASSIGNMENTS

KINESIOLOGY AND APPLIED PHYSIOLOGY ARTICLE REVIEWS

The instructor will provide a number of articles from Exercise and Sport Sciences Reviews, Applied Physiology Reviews as well as other sources that must be reviewed (see class syllabus for list of articles and due dates). Reviews need only be a single page, single spaced, word-processed, 12-point font. The review should answer the questions: What is the article about? What is the salient point? What are the implications? What was most interesting about the article? In your opinion, what further research needs to be done.? What questions do you have after reading the article?

PERSONAL FITNESS PLAN

Each student will assess her/his own personal fitness. Working in pairs, students will design personal fitness plans for one another. Students will then implement and monitor their progress and evaluate the effectiveness of their plans.

EXPANDED DEFINITION OF BIOMECHANICS Each student will write a one page "expanded" definition of Biomechanics in which he/she also discusses the influence of Biomechanics on the study of Kinesiology.

BIOMECHANCIS ESSAYS – Choice of Any Two of the Following Essay Choices

- Each student will write an essay in which he/she applies each of Newton's three laws of motion to a skill, or portion thereof, relevant to the sport of her/his choice. Be specific in identifying forces, masses, accelerations and so on. (2-3 pages)
- Each student will assume the role of a coach and write an essay describing how he/she would advise an athlete in a particular sport to make effective use of the principles of kinesiology and biomechanics and to maximize impulse and minimize the harmful effects of impact. (2 pages)

- Each student describes the ways in which athletes decrease drag forces against their bodies. (2 pages)
- In a sport of the student's choosing, the student describes how an athlete maintains and/or loses her/his balance during the execution of a skill specific to that sport. (2 pages) (See Chapter 3 in *Biomechanics: A Qualitative Approach for Studying Human Movement*)
- Each student identifies four aspects of qualitative analysis and applies them to a sports skill or body movement of her/his choice. Each student writes an essay describing her/his analysis. (2 pages)

BIOMECHANICS OF SPORT

Having completed a study of the body's major organ systems and how they function and influence one another, students will choose a particular sport and then, using their growing expertize in kinesiology, research skills, experimentation, and documentation, write a description of the particular bio-movements involved in this particular sport.

DEVELOPING A MOTOR SKILL

Students will choose a particular motor skill or body movement skill, he/she would like to master. The student will research the kinesiology of the particular motor skill or movement, develop a plan to increase her/his own mastery of this skill and movement. Then implement and monitor their progress for a two-week period and evaluate the effectiveness of her/his plan.

In addition to various texts, a few notes on acquiring new skills to inform the motor skill development plan:

Kolb (1984) developed a theory of experiential learning that involved four stages:

- Concrete Experience - doing or having an experience
- Reflective Observation – reviewing and reflecting on the experience
- Abstract Conceptualization – concluding and learning from the experience
- Active Experimentation – planning and trying out what you have learned

Whitmore Learning Cycle. Whitmore (1984) identified that our learning cycle includes:

- Unconscious incompetence
- Conscious incompetence
- Conscious competence
- Unconscious competence

Transfer of Learning can take place in the following ways: skill to skill, theory to practice, training to competition

DESCRIBING A COMMON SPORTS MOVEMENT USING THE LANGUAGE OF

BIOMECHANICS AND KINESIOLOGY
Students will read detailed descriptions of the movements involved in specific sports actions: the Karate Roundhouse kick, the vertical jump, jump roping, and the long snap.
Example/excerpt : The description of jump roping involves the principles of motion, force, balance and stability, and the principle of projection. Jump roping also involves a combination of rotary and translator motion, the successful integration of turning the rope (rotary motion) and vertical jumping (translator motion)… See http://www.eric.edu.ogv/80/PDFS/ED409268.pdf The student will then choose another common body motion in a particular sport, such as the backstroke in swimming, a serve in tennis, a swing in golf, etc. and carefully write a detailed biomechanics description of this movement.

COMPARE AND CONTRAST ACUTE AND CHRONIC INJURIES
COMPARE AND CONTRAST ACUTE INJURIES WITH CHRONIC INJURIES: RESEARCH AND ESSAY: Each student researches and then writes an essay of 2-3 pages in which he/she compares and contrasts acute injuries and chronic injuries. Students provide examples of each, describe signs of each, and describe treatments of each.

THE ACL AND ACL INJURIES (Research and Essay)
If you talk with any athlete, one of the injuries they dread most is the possibility of a torn ACL. It generally means the end of the season, surgery, and months of rehabilitation. Students will research the ACL and ACL injuries. They will write up their findings in a 3-5 page Study of the ACL paper Students should describe ACL Injury Treatment, reconstruction, ACL Prevention, ACL Surgery, etc.

ROLE OF KINESIOLOGY: APPLIED ANATOMY AND PHSYIOLOGY IN PREVENTING BODY INJURY ESSAY: Write a 2-3 page essay on the role of kinesiology and training with regard to body injury prevention.

CAREERS IN KINESIOLOGY/APPLIED PHYSIOLOGY
Students will review an extensive list of careers in kinesiology at https://www.k-state.edu/kines/careers (Kansas State) and chose one career of interest to research. Using guidelines provided by the instructor, students will write up their findings, including the education and training needed for this career, the type of work involved, and how the career relates to kinesiology, biomechanics, and/or applied physiology.

Some possible kinesiology-related careers include: kinesiologist, cardiopulmonary rehabilitation specialist, clinical exercise physiologist, physical therapist, occupational therapist, personal trainer, health and fitness counselor, strength and conditioning specialist, coach, Kinesiology teacher/professor, exercise psychologist, sports psychologist, sports medicine doctor, ergonomist, nutritionist, chiropractor, rehabilitation counselor, respiratory therapist, public health educator, orthopedist.

Resources: National Occupational Classification Website, Job Futures (www.jobfutures.ca), Career Cruising website.

Professional Associations include: American College of Sports Medicine, American Heart Association, National Athletic Trainers Association, National Strength and Conditioning Association, Special Olympics (www.specialolympics.gov)

Opportunities to Enhance Knowledge and Skills in Kinesiology: Kinesiology Club, Job Shadows, Internships, Kinesiology Practicum, work with Professional Mentors/Kinesiology Project Consultants, Informational Interviews

KINESIOLOGY MOVEMENT ANALYSIS FILM /DIGITAL MEDIA PROJECT
This project is a video-based movement analysis of physical motion (i.e., soccer kick, baseball throw). Students choose a 10-second motion to analyze (e.gl, throw a baseball or step off a stairs), film the motion, and then edit the film or otherwise prepare it in a format to share in a presentation. NOTE: Students are expected to shot from multiple angles and include both full speed film clips and slow motion clips of the motion and provide a three to five page report analyzing the motion of the muscles and joints.

KINESIOLOGYS POSTER TALK: EVERYONE TEACHES, EVERYONE LEARNS*:*
Individual Students or Pairs of Students will be assigned/chose one key Bioscience concept and assume responsibility for teaching the concept to others. Presentations should include a poster/graphic representation of the concept and/or other multimedia. All presentations will involve a demonstration of the concept. Cornell Note-taking. Student-generated quizzes on essential concepts
Interactive Presentation Facilitated by Teacher to review and reinforce all essential kinesiology Concepts.

RESPIRATORY SYSTEM ESSAY: In an essay of two-three pages, describe in detail the path that a molecule of oxygen would take from the air in the atmosphere to the air in the lungs and from the air in the lungs to a muscle cell. Include a brief description of the path and all the related steps that a molecule of carbon dioxide could take from a muscle cell to the air in the lungs to the air in the atmosphere.

BREATH OF LIFE: DOES EXERCISE INCREASE LUNG CAPACITY? PROJECT
Essential Questions: How much air do you breathe in when you tae a deep breath? Can you increase your lung capacity if you exercise regularly? Do Athletes have greater lung capacity than non-athletes?
Students in the class will work with their teacher to develop both an experimental (athlete) group and a control (non-athlete) group, based on the amount and intensity of regular exercise. Each group will involve 50-100 subjects. They will follow official procedures for projects involving human subjects and obtain informed consent for every participant who is questioned or observed. Students will develop and utilize surveys; test tidal lung capacity and vital lung capacity (using

either the balloon method OR the water displacement method) of each participant; measure the height and weight of each participant. Using a spreadsheet program or data table, students will enter all data. Students will calculate the average and standard deviation of the ratio for each group. Students will determine whether or not there is a consistent relationship between tidal capacity and vital capacity within each of the groups? Learning extension: Students use Student's t-test to determine whether or not any differences between the two groups are statistically significant.
Resources include: Perry, T., 2006, "The Magnificent Lungs"
http://www.emphysemafoundation.org: 9001/nefusa/pulmonaryhealth.jsp
Staff, 2006 "Human Respiratory System," American Lung Association
http://www.lungusa.org/site/pp.asp?c=dvLU900E&b=22576
Body Surface Area Calculator http://www.halls.md/body-surface-area/bsa.htm
Use of Spreadsheet Program: http://www.usd.edu/trio/tut/excel/
Student's T-Tests http://www.physics.csbsju.edu/stats/t-test.htm

ALTERNATE OR EXTENDED LEARNING ACTIVITY: HUMAN BODY TESTING: After completing Unit X on the role of evaluation in kinesiology, each student will select one component of human body testing and develop a plan for evaluating this component, using field tests, etc. This assignment does not involve the actual human subjects testing, but does involve designing an evaluation plan that includes human subjects testing related to kinesiology: applied anatomy and physiology.

WRITING PROFESSIONAL LAB REPORTS & PROJECT REPORTS: Student understanding of kinesiology & her/his ability to design, conduct, & communicate results of an experiment or design project is demonstrated in lab/project reports. For every major lab activity & project, each student will write a formal lab/project report.

The lab/project report should encompass all the customary sections. Such sections include: * Title Page * Purpose * Research and Theoretical Background * Procedure (and/or observation) * Data and Calculation * Graphs * Discussion of Results * Self-Assessment Reflection on New Learning (as appropriate) * Bibliography (as appropriate)
NOTE: Lab reports are evaluated using the Kinesiology Lab Report Scoring Rubric included in the course syllabus.

MAINTAINING A KINESIOLOGY SCIENCE NOTEBOOK: Each student maintains a personal Kinesiology Notebook for most major projects. Notebooks follow *Guidelines for the Engineer-Physicist Notebook* included in class syllabus. The Kinesiology Notebook documents in written form efforts of student-author on one or more projects in a time-sequential form. It is the equivalent of a technical diary that also includes analysis and reflections on learning. The Kinesiology Science Notebook contains: ideas of its author, alternatives considered, decisions reached, interactions with other people & with organizations, changes made along the way, &

implementation flow of projects, labs, etc.
KINESIOLOGY LEARNING BLOG/LOG/JOURNAL: Students write frequently, including forms of analytical, expository, & reflective writing. Students are regularly asked to respond articles and/or to writing prompts, to record their learning and thinking about kinesiology concepts, and to describe in writing their progress in achieving mastery of essential standards and habits of mind (Costa & Kallick)/ habits of a scientist. (included in course syllabus)
KINESIOLOGY/MEDICAL FIELD RESEARCH PAPER – Each student will be assigned a topic dealing with a specific medical field. The student will research this field and analyze how this health/biomedical field uses knowledge of kinesiology and, in particular, the science of the human body to improve human life. Students will synthesize and evaluate these concepts to make a projection of where this health/biomedical field will gravitate to in the future. Each student will complete a research paper of 3 to 5 pages. Students will also provide a visual aid or power point presentation that will be used in an oral Case Study presentation.
KINESIOLOGY RESEARCH /PHYSICAL CONDITION OR INJURY PAPER – Each student will be assigned a topic dealing with a specific physical condition or injury that affects the human body. The student will research this condition or injury and analyze the effect/s on the body and how the body reacts and adjusts to the condition or injury Each student will also research any treatments the medical field has developed to fight the assigned disease. Each student will complete a research paper of 3 to 5 pages. Students will also provide a visual aid or power point presentation that will be used in an oral presentation.
RESEARCH PAPER: ROLE OF TECHNOLOGY IN THE STUDY AND PRACTICE OF KINESIOLOGY - Research and write a 4 to 6-page paper on the role of technology in the study and practice of kinesiology. Include a bibliography of resources. If possible, include at least one primary resource.
KINESIOLOGY IN THE MEDIA - In the course of the year each student will choose 10 articles on a kinesiology related issue or issues and complete a reading assessment that will include a summary and a personal reflection regarding the article. The assessment should include the title, publication date, and source of the article. There is an expectation that a minimum of five article assessments will be completed each semester.
KINESIOLOGY IN THE HEALTH/BIOMEDICAL CAREER FIELDS Students investigate how the knowledge, skills and concepts learning in Kinesiology apply in at least one other non-kinesiology health/biomedical career of interest and write up their findings.
MOVIES TO SEE, DO, AND LEARN KINESIOLOGIC CONCEPTS

Students explore a variety of physics concepts in kinesiology. They then choose a particular body movement/s in a particular activity/activities or sport/s and research, storyboard, film, and edit iMovies (or similar film media) that include graphics, demonstration video and narration to explain abstract kinesiology concepts

OXYGEN CONSUMPTION AND ADJUSTMENTS TO PROGRESSIVE EXERCISE Based on findings in an experiment related to a subject's oxygen consumption and adjustments to progressive exercise, each student will a) describe the findings for the "patient" in layperson terms and b) develop an age-appropriate, scientifically-based exercise prescription to develop cardiovascular fitness.
NOTE: equipment involved includes bicycle ergometer or treadmill, heart rate monitor, gas analysis and volume measurement equipment.

EXERCISE IN SPECIFIC POPULATIONS Using research and her/his knowledge of both chronic conditions and/or the impact of exercise, each student or student team will design an exercise regimen for adults with one of the following conditions:

- Asthma (bronchospasm)
- COPD – Chronic Obstructive Pulmonary Disease (decreased expiratory airflow resulting from airway resistance; combination of chronic bronchitis and emphysema)
- Diabetes (distinguish between Type One Diabetes and Type Two Diabetes.)
- Hypertension (distinguish between Prehypertension, 1 Hypertension (essential) and II Hypertension (secondary)
- Older Adults

EXTENDED LEARNING: MINDING YOUR BODY Students explore the benefits of yoga by studying baseball players who incorporate yoga into their physical and conditioning training. They investigate a variety of mind-body techniques and create a presentation for the class.

MYOSTATIN AND MUSCLE DEVELOPMENT In the article "Gene Doping," Lee Sweeney discusses several different ways in which athletes of the future may use genetic technology to improve sports performance. Specifically, he proposes genetic manipulation involving a protein called myostatin. After reading the article carefully and participating in a class discussion related to the article, each student completes additional research related to myostatin and then writes a 2-3 page essay that deals with the following questions: What is the role of myostatin in normal muscle development? What happens in breeds of cattle (such as Belgian Blue) as a result of myostatin genetic mutation? Are there other examples of domestic animals that show similar patterns from myostatin mutations? * Myostatin-blocking therapies have obvious appeal to "healthy athletes seeking rapid growth." Why? Gene transfer to enhance muscle development would be virtually impossible to detect. Would you regard this as a form of cheating? Why or why not? * What is the

current status of myostatin-blocking drugs? How might such drugs help in the fight against muscular dystrophy or other muscle-related medical conditions?

RESEARCH PAPER: ROLE OF TECHNOLOGY IN THE STUDY AND PRACTICE OF KINESIOLOGY - Research and write a 4 to 6-page paper on the role of technology in the study and practice of kinesiology. Include a bibliography of resources. If possible, include at least one primary resource.

NEW DIRECTIONS IN KINESIOLOGY ESSAYS: Write TWO Kinesiology essays of approximately 3-5 pages each. (At least one of these essays should be included in your Kinesiology Portfolio of Work.) Choices include:

◊ Essay on a kinesiology problem: Describe how kinesiology approaches and methods of discovery, measurement, analysis, or modeling have played on important role in either understanding the workings of the human body and of disease or of a human biological process or in the development of a particular kinesiology technology

◊ Essay on the future of Kinesiology. Respond to the following: Wayne Clough, an engineering educator wrote: "It is always dangerous to talk about the future of anything. When computers were first created, T.J. Watson, the founder of IBM, predicted we might need about six of them. As recently as 1977, Ken Olsen, the founder of Digital Equipment Corp., believed that none of us would ever have a computer in our homes. These men were leaders and experts in their fields, and they still got it wrong." Now that you know much more about Kinesiology, what are your predictions for the future of Kinesiology? For example, what will be happening in the field of Kinesiology 25 years from now? Provide a rationale (evidence, etc.) to support each of your predictions.

◊ Identify an important societal need, determine the magnitude of the problem and quantify the specifications for a Kinesiology solution that includes technical, ethnical, medical, legal and other requirements. Write an essay describing your problem and solution. Include the specific ways in which principles and practices of kinesiology: applied anatomy and physiology help you meet a particular societal need.

◊ Choose a Kinesiology concept that especially intrigues you. Explore this concept, including doing a telephone or email "interview" with an expert on this concept. Then write an I-search essay in which you describe the concept, the significance of this concept, and its importance in current and future society.

KINESIOLOGY STUDENT PORTFOLIO & PUBLIC EXHIBITION OF STUDENT WORK

- Determining Exhibition criteria and options
- Designing and Implementing a Public Exhibition of Student Kinesiology work

Students analyze their own work and determine what pieces best represent their ability and growth. Students create a portfolio (DVD, Web site or other media). Students must defend and explain their choices.

Students work with faculty and health/medical/science professionals to determine criteria, exhibition and judging. Students design entry form, choose judges and prepare venue for a public exhibition of work.

Instructional Methods and/or Strategies

A variety of instructional strategies will be utilized to accommodate all learning styles and to reinforce language, math and scientific skills while learning kinesiology: applied anatomy and physiology concepts.

- ☐ Inquiry-based Laboratory explorations and projects
- ☐ Direct Instruction (lectures, multimedia presentations, demonstrations of kinesiology principles and procedures, small and large group discussions, seminars, student interactive presentations)
- ☐ Team teaching with medical and/or science professional partners
- ☐ Reading and use of a variety of instructional materials and resources (professional journals, reference materials, textbooks, electronic media, scientific literature)
- ☐ Use of technology-based resources (scientific instrumentation, simulations, internet, computer-based instruction)
- ☐ Qualitative and quantitative analysis
- ☐ Recording methods, including digital recording
- ☐ Self-directed, cooperative, and collaborative learning projects (project-based learning, problem-based learning, inquiry learning)
- ☐ Investigative research (both library and internet) and analytic and expository writing
- ☐ Use of medical professionals/kinesiology research scientists and other community partners as guest speakers, student project consultants, review panels for student exhibitions of work
- ☐ Practicum, field trips and other industry/community-based-learning and/or service-learning experiences
- ☐ Out-of-class work for projects, research & report assignments, & demonstration and presentation preparation.
- ☐ Student portfolios, Kinesiology notebooks, reflective learning journals, writing in science
- ☐ Student exhibitions and competitions

F. Assessment Methods and/or Tools

Assessment of each student's learning and mastery will include, but are not limited to:

- ☐ Long-term cumulative and competitive projects
- ☐ Laboratory work, practicum, and reports

- ☐ Rubric assessment of Kinesiology Notebook, essays, and other written assignments
- ☐ Qualitative and quantitative assessments of project performances
- ☐ Portfolio presentations of student work which demonstrate achievement of standards
- ☐ Classroom participation, individual and team effort, demonstrations of mastery, and quality of work
- ☐ Authentic Assessments; Professional and community evaluation of exhibitions of individual/group project work, including formative and summative assessments
- ☐ Exams and quizzes, including essay exams

- ☐ For most units there are Benchmark Exams that include multiple choice and short essay questions. Students must achieve at 90% or above mastery on essential course benchmarks. Students must demonstrate mastery of essential standards, including demonstrating knowledge and understanding of key science concepts and applications. NOTE: There will be opportunities for relearning and retesting.

NOTE: SELF-ASSESSMENT OF KINESIOLOGY KNOWLEDGE; SELF-ASSESSMENT OF COLLEGE AND CAREER READINESS; DOCUMENTATION OF GROWTH AND MASTERY At the beginning of the course, each student self-assesses regarding her/his knowledge of kinesiology: applied human anatomy and physiology as well as 21st century knowledge and skill development. *Using an assessment tool provided by the instructor, each student will self-assess with regard to her/his own knowledge and skills and college and career readiness related to the study of Kinesiology: Applied Anatomy and Physiology. Each student will develop and monitor a Personal Growth in Kinesiology: Applied Anatomy and Physiology Knowledge and Skills Plan. Each student's evidence of growth and mastery will be included in her/his Kinesiology Portfolios and will be part of a summative assessment.*

Knowledge and skills to be assessed include: knowledge of the human body, especially muscle, skeletal, cardiovascular, and respiratory systems; the language (professional medical terminology) of kinesiology; interest in physical activity and understanding the science of kinesiology and applied anatomy and physiology; interest and knowledge in the mechanics and general health of the human body; knowledge of human health and nutrition; motor skills; motivational skills; discussion skills, written communication skills; oral and listening communication skills; visual communication skills, use of technology skills; demonstration skills, planning skills, teamwork skills; patience, precision; and persistence.

K-W-L Chart: Also, at the beginning of the course, in small groups, students complete a K-W-L chart in which they brainstorm everything they Know (K) for certain about Kinesiology: Applied Human Anatomy and Physiology and everything they Wonder (W) or are curious about regarding Kinesiology: Applied Human Anatomy and Physiology. Then, using their textbooks, the internet, the classroom library, expert-consultants, etc., students will suggest ways the class can Learn (L) what students need to know to turn the things they wonder about kinesiology into knowledge of kinesiology. At the end of the course, the teacher and students will use the K-W-L Chart as a means to assess how well they did as a community of learners. Were questions and issues essential to students addressed in the course content? Were the students successful in learning what they needed to know?