

02. Efficiency

Content Area: **Science**
Course(s):
Time Period: **Marking Period**
Length: **Seven weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

In this semester long course, students will gain insight into the field of sports medicine and athletic training as an up and coming profession. Students will explore how physical exercise can produce many favorable changes in some anatomical structures and enhance many physiological functions. Students enrolled in this course will receive an understanding of the multidisciplinary approach to patient assessment, treatment, and care. Students will obtain an overview of the basics of exercise physiology including prevention, management, treatment and rehabilitation of athletic injuries. This course is strongly recommended for students interested in pursuing careers in medicine, sports training, kinesiology, or other health related fields.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

- Integration of mathematics as a tool for problem-solving in science, and as a means of expressing and/or modeling scientific theories
- Develop the understanding and appreciation of the limitations of the scientific analysis and research through group activities.
- Enable the student to develop skills in decision-making based on an understanding of the basic principles of laboratory research.
- Students will describe the flow of energy through living systems using examples.
- Students will describe the relationship between matter, energy, and the organization of living systems.
- All students will gain an understanding of biological diversity and evolution.
- All students will be able to explain how genetic information is encoded and transmitted in genetic material, how genetic material can be altered by natural and artificial means, and understand how current and emerging technologies impact human inherited characteristics
- Students will describe the relationship between matter, energy, and the organization of living systems.
- Students will be able to describe the relationship between matter, energy, and the organization of living systems.
- Students will utilize problem-solving techniques, decision-making and inquiry skills, reflected by formulating usable questions and hypotheses, planning experiments, conducting systematic observations, interpreting and analyzing data, drawing conclusions, and communicating results.
- Students will describe the relationship between matter, energy, and the organization of living systems.
- Integration of mathematics as a tool for problem-solving in science, and as a means of expressing and/or modeling scientific theories.

- Enable the student to extend their research skills in the area of science.

CONTENT AREA STANDARDS

9-12.HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
9-12.HS-LS1-2.2.1	Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.
9-12.HS-LS1-1.LS1.A.1	Systems of specialized cells within organisms help them perform the essential functions of life.
9-12.HS-LS1-2.LS1.A.1	Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.
VHEL.9-12.9.4.12.H.(2).2	Demonstrate knowledge of how to explain procedures and goals to patients/clients accurately and effectively, using a range of response strategies to address patient/client questions and concerns.
VHEL.9-12.9.4.12.H.2	Demonstrate mathematics knowledge and skills required to pursue the full range of postsecondary education and career opportunities.
VHEL.9-12.9.4.12.H.34	Demonstrate knowledge of employee rights and responsibilities and employers' obligations to maintain workplace safety and health.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

LA.RI.11-12.1	Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.), to support analysis of what the text says explicitly as well as inferentially, including determining where the text leaves matters uncertain.
SCI.HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
SCI.HS-ETS1-4	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

STUDENT LEARNING TARGETS

- All students will gain an understanding of the structure, characteristics, and basic needs of organisms and will investigate the diversity of life.
- All students will be able to describe the relationship between matter, energy, and the organization of living systems.

- All students will be able to describe the flow of energy through living systems using examples.
- All students will gain an understanding of biological diversity and evolution.
- All students will be able to explain how genetic information is encoded and transmitted in genetic material, how genetic material can be altered by natural and/or artificial means, and understand how current and emerging technologies impact on human inherited characteristics.
- Show understanding of how the principles of the life sciences help scientists better understand and predict the impact of changes to the environment.

Declarative Knowledge

Students will understand that:

- Medical resources must be accurately cited demonstrating strong and thorough textual evidence
- Data is gathered, displayed, summarized, examined, and interpreted to discover patterns and deviations from patterns.
- Quantitative data can be described in terms of key characteristics: measures of shape, center, and spread.
- Ways to identify medical information and design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems.
- Computer simulations can be used to help solve real world issues in the production of medical/Health Equipment

Procedural Knowledge

Students will be able to:

- Complete lab activities based on Index of Physical Fitness
- Participate and take a productive role in group exercise
- Demonstrate knowledge through video activities
- Read charts and analyze data provided
- Research information on creatine phosphate, perform lab on Glycolysis
- Formulate well thought out grammatically correct free response answers to complex sports medicine based questions
- Participate in hands-on based lab focused on muscle endurance & fast twitch/ slow twitch, energy & muscle contraction, ROM, Reflex Physiology, and Flexibility & Strength, Nutrition
- Identify various body tissues Energy & Muscle Contraction
- Identify and recall the anatomy of the bones, joints and muscles Rat dissection
- Create a healthy shake that is based on proper caloric intake and nutrition (Healthy Shake Contest)

EVIDENCE OF LEARNING

Formative Assessments

- ☐ Help students track their individual progress toward the learning target (i.e. charts, graphs, data notebooks, etc.)
- ☐ Ask students to explain their progress toward the learning target
- ☐ Ask students to provide evidence of their progress toward the learning target
- ☐ Facilitate individual conferences regarding use of data to track progress
- ☐ Use formative measures to chart individual and/or class progress towards learning targets using a performance scale
- ☐ Use formative assessment that reflects awareness of cultural differences represented in the classroom

Summative Assessments

- Benchmarks – departmental benchmark given at the end of MP1, MP2, or MP3 & MP4 b(Semester Based Course)
- Alternative Assessments
 - Lab inquiries and investigations
 - Lab Practicals
 - Exploratory activities based on phenomenon
 - Gallery walks of student work
 - Creative Extension Projects
 - Build a model of a proposed solution
 - Let students design their own flashcards to test each other
 - Keynote presentations made by students on a topic
 - Portfolio

RESOURCES (Instructional, Supplemental, Intervention Materials)

France, Robert, C. Introduction to Sports Medicine and Athletic Training: Third Edition, Delmar Cengage Learning, Clifton Park, New York, 2011.

France, Robert, C. Workbook to Accompany: Introduction to Sports Medicine and Athletic Training: Second Edition, Delmar Cengage Learning, Clifton Park, New York, 2011.

TI-83+ graphing calculators, Vernier LabPro Technology, and Vernier Graphical Analysis software.

Journal of Sports Medicine App.

INTERDISCIPLINARY CONNECTIONS

Technology/Multimedia	Video case studies
	Audio/visual media analysis
	Researching based writing
	Google
	Media Literacy
	Educational tech applications
English/Language Arts	Speech/debate
	Narrative Writing

	Information Writing
	Implementation of conventions of Standard English
	Language Acquisition
Math	Data collection/analysis
	Computations
	Statistics
	Financial/Economic/Business/Entrepreneurial Literacy
Science & Health	Integrate quantitative or technical information expressed in words in a text. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
	Experimentation
	Social Emotional Learning
	Geoscience
	Sustainability

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.

Differentiation/Accommodations/Modifications

Gifted and Talented	English Language Learners	Students with Disabilities	Students at Risk of School Failure
Extension Activities	Modifications for Classroom	(appropriate accommodations, instructional	Modifications for Classroom

<ul style="list-style-type: none">• Allow students to pursue independent projects based on their individual interests• Provide enrichment activities that include more advanced material• Allow team-teaching opportunities and collaboration• Set individual goals• Conduct research and provide a presentation of appropriate topics.• Design surveys to generate and analyze data to be used in a discussion.• Use of Higher Level Questioning Techniques• Provide	<ul style="list-style-type: none">• Pair visual prompts with verbal presentations• Repetition and practice• Model to be mastered	<p>adaptations, and/or modifications as determined by the IEP or 504 teams)</p> <p>Modifications for Classroom</p>	<ul style="list-style-type: none">• Pair visual prompts with verbal presentations• Ask students to restate information, directions, and assignments.• Repetition and practice• Model to be mastered.• Extended time to complete classwork• Provide a copy of class notes• Preferential seating to be mutually determined by the student and teacher• A student may request to use a computer to complete assignments• Establish expectations for correct spelling on assignment• Extra textbooks for home
	<p>Modifications for Homework/Assignments</p> <ul style="list-style-type: none">• Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)• Extended time for assignment completion as needed• Highlight key vocabulary• Use graphic organizers	<ul style="list-style-type: none">• Pair visual prompts with verbal presentations• Ask students to restate information, directions, and assignments.• Repetition and practice• Model skills/techniques to be mastered.• Extended time to complete classwork• Provide a copy of class notes• Preferential seating to be mutually determined by the student and teacher• A student may request to use a computer to complete assignments.• Establish expectations for	<p>Build Students' Strengths and Multiple Intelligences</p> <ul style="list-style-type: none">• Verbal Linguistic• Logical – reasoning• Musical/ Rhythmic• Intrapersonal Intelligence• Visual Spatial Intelligence• Interpersonal Intelligence• Bodily Kinesthetic accommodations/modification sent may request books on tape / CD /
	<p>Beginners:</p> <ul style="list-style-type: none">• Use graphic models and visual examples to connect important ideas• Pair graphic representations with content vocabulary – math journals, vocabulary cards, and more• Utilize		

assessments
at a higher
level of
thinking

manipulatives –
pattern blocks, paper
money, tangrams,
etc. Use
manipulatives to
help students make
connections between
concrete and abstract
concepts

- Use pictures or
visuals wherever
possible
- Cue students before
asking a questions
during class
discussions
- Help students with
background
vocabulary
- Use graphic
organizer
- Modify the length of
reading passages,
with extended time
to complete them
- Minimize homework
to essential content
and learning
- Assign simplified
homework with
extended time to
complete it
- Simplify
assessments:
 - true/false
 - Multiple
choice (only
two choices)
 - Matching
 - decreased

correct spelling
on assignments.

- Extra textbooks
for home.
A student may
request books
on tape / CD /
digital media, as
available and
appropriate.
- Assign a peer
helper in the
class setting
- Provide oral
reminders and
check student
work during
independent
work time
- Assist student
with long and
short term
planning of
assignments
- Encourage
student to
proofread
assignments and
tests
- Provide regular
parent/ school
communication
- Teachers will
check/sign
student agenda
daily
- Student requires
use of other
assistive
technology
device

digital media, as available
and appropriate.

- Assign a peer helper in the
class setting
- Provide oral reminders
and check student work
during independent work
time
- Assist student with long
and short term planning of
assignments
- Encourage student to
proofread assignments and
tests
- Provide regular parent/
school communication
- Teachers will check/sign
student agenda daily
- Student requires use of
other assistive technology
device

Modifications for Homework and Assignments

- Extended time to complete
assignments
Student requires more
complex assignments to
be broken up and
explained in smaller units,
with work to be submitted
in phases
- Provide the student with
clearly stated (written)
expectations and grading
criteria for assignments

Modifications for Assessments

- Extended time on
classroom tests and

Modifications for

	number of questions	Homework and Assignments	quizzes Student may take/complete tests in an alternate setting as needed
Intermediate:	<ul style="list-style-type: none"> • Use of a bilingual dictionary • Focus on recognition work (listening, reading), rather than productive work (speaking and writing) 	<ul style="list-style-type: none"> • Extended time to complete assignments • Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases 	<ul style="list-style-type: none"> • Restate, reread, and clarify directions/questions • Distribute study guide for classroom tests • Establish procedures for accommodations / modifications for assessments
	<ul style="list-style-type: none"> • Use pictures or visuals wherever possible • Cue students before asking a questions during class discussions • Oral and written production expanded • Focus on main/core vocabulary only • Help students understand contextual terms • Extended time for assessments 	<ul style="list-style-type: none"> • Provide the student with clearly stated (written) expectations and grading criteria for assignments • Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, topic). 	
	<ul style="list-style-type: none"> • Provide an outline of class notes so that students can focus on class discussion • Ask students to rephrase key ideas in their own words • Check comprehension of directions by asking students to restate 	<p>Modifications for Assessments</p> <ul style="list-style-type: none"> • Extended time on classroom tests and quizzes Student may take/complete tests in an alternate setting as needed • Restate, reread, and clarify directions/questi 	

the information

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- Distribute study guide for classroom tests
- Establish procedures for accommodations / modifications for assessments