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Program Concentration:

Healthcare Science

Career Pathway:

Therapeutic Services-Physical Medicine

Course Title:

Concepts of Physical Medicine

Course Description: Concepts of Physical Medicine is a course for the Therapeutic Medicine-Physical Medicine Career Pathways. It is appropriate for students wishing to pursue a career in the Sports Medicine/Rehabilitative Services Industry. The course will enable students to enhance knowledge of Therapeutic Services skills and attitudes applicable to the healthcare industry. The concepts of anatomy and physiology, assessment, and preventative care are evaluated. Fundamental healthcare skills development is initiated including medical terminology, nutrition, and basic life support. Mastery of these standards through project based learning, technical skills practice, and leadership development activities of the career and technical student organization -Health Occupations Students of America (HOSA) will provide students with a competitive edge for either entry into the healthcare global marketplace and/or the post-secondary institution of their choice to continue their education and training. This course is considered broad-based with high impact and is a prerequisite for Rehabilitation Physical Medicine and Practicum courses.

Academic Foundations

HS –CPM-1: Students will demonstrate knowledge and understanding of the academic subject matter required for proficiency within their area. Academic Standards are integrated throughout the standard statements within their discipline areas and documented immediately following the standard statement.

Injury Assessment, Evaluation, Prevention and Treatment of Head and Face Injuries

HS-CPM-2. Students will be able to analyze the anatomy, muscular structure, vascular structure, and describe the mechanisms signs and symptoms and potential complications associated with head and facial injuries.

- a. Identify and locate the bones associated with the head and face on either a human skeleton or subject.
- b. Identify and locate the muscle origins and insertions of the head and face on either a human skeleton or subject.
- c. Perform a complete examination of the cranial nerves.
- d. Identify specific type of injuries that occur to the head and face.
- e. Differentiate among signs and symptoms of concussions, skull fractures and intracranial hemorrhage.
- f. Discuss the potential consequences and delayed symptoms of head and facial trauma.
- g. Utilize proper treatment specific to head and facial injuries.
- h. Perform an on-site examination of potential head or facial injuries, including special tests for cognition, balance and coordination to include the criteria for medical referral.

Academic Standards:

SAP1: Students will analyze anatomical structures in relationship to their physiological functions.

- a. Apply correct terminology when explaining the orientation of body parts and regions.*
- b. Investigate the interdependence of the various body systems to each other and to the body as a whole.*

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SAP2: Students will analyze the interdependence of the integumentary, skeletal, and muscular systems as these relate to the protection, support and movement of the human body.

a. Relate the structure of the integumentary system to its functional role in protecting the body and maintaining homeostasis.

b. Explain how the skeletal structures provide support and protection for tissues, and function together with the muscular system to make movements possible.

Injury Assessment, Evaluation, Prevention and Treatment of Cervical Spine and Upper Thoracic Spine

HS-CPM-3. Students will analyze the anatomy, muscular structure, vascular structure, ROM, MMT and special tests, as well as prevention and treatment, of the cervical spine and upper thoracic spine.

- a. Identify and locate the bones associated with the cervical spine and upper thoracic spine on either a human skeleton or subject.
- b. Identify and locate the muscle origins and insertions of the cervical spine and upper thoracic spine on either a human skeleton or subject.
- c. Demonstrate muscle actions associated with the cervical spine and upper thoracic spine.
- d. Perform a functional assessment of myotomes, dermatomes, reflexes and vascularity of the cervical spine and upper thoracic spine.
- e. Interpret the causes of neuropathy in the upper extremity relative to cervical pathology.
- f. Administer Passive Range of Motion (PROM) and Active Range of Motion (AROM) tests special to the cervical spine and upper thoracic spine.
- g. Administer MMT specific to the cervical spine and upper thoracic spine.
- h. Identify specific type of injuries that occur to the cervical spine and upper thoracic spine.
- i. Define the proper evaluation procedures and special tests specific to injuries associated with the cervical spine and upper thoracic spine.
- j. Identify and demonstrate proper preventative techniques to the cervical spine and upper thoracic spine.
- k. Utilize proper treatment techniques specific to the cervical spine and upper thoracic spine.
- l. Participate in mock examinations and practical simulations.

Academic Standards:

SAP1: Students will analyze anatomical structures in relationship to their physiological functions.

a. Apply correct terminology when explaining the orientation of body parts and regions.

b. Investigate the interdependence of the various body systems to each other and to the body as a whole.

SAP2: Students will analyze the interdependence of the integumentary, skeletal, and muscular systems as these relate to the protection, support and movement of the human body.

a. Relate the structure of the integumentary system to its functional role in protecting the body and maintaining homeostasis.

b. Explain how the skeletal structures provide support and protection for tissues, and function together with the muscular system to make movements possible.

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Injury Assessment, Evaluation, Prevention and Treatment of Lower Thoracic Spine and Lumbar Spine

HS-CPM-4. Students will analyze the anatomy, muscular structure, vascular structure, ROM, MMT and special tests, as well as prevention and treatment, of the lower thoracic spine and lumbar spine.

- a. Identify and locate the bones associated with the lower thoracic spine and lumbar spine on either a human skeleton or subject.
- b. Identify and locate the muscle origins and insertions of the lower thoracic spine and lumbar spine on either a human skeleton or subject.
- c. Demonstrate muscle actions associated with the lower thoracic spine and cervical spine.
- d. Perform a functional assessment of myotomes, dermatomes, reflexes and vascularity of the lower thoracic spine and lumbar spine.
- e. Interpret the causes of neuropathy in the upper and lower extremity relative to lumbar pathology.
- f. Administer Passive Range of Motion (PROM) and Active Range of Motion (AROM) tests special to the lower thoracic spine and lumbar spine.
- g. Administer MMT specific to the lower thoracic spine and lumbar spine.
- h. Identify specific type of injuries that occur to the lower thoracic spine and lumbar spine.
- i. Define the proper evaluation procedures and special tests specific to injuries associated with the lower thoracic spine and lumbar spine.
- j. Identify and demonstrate proper preventative techniques to the lower thoracic spine and lumbar spine.
- k. Utilize proper treatment techniques specific to the lower thoracic spine and lumbar spine.
- l. Participate in mock examinations and practical simulations.

Academic Standards:

SAP1: Students will analyze anatomical structures in relationship to their physiological functions.

- a. Apply correct terminology when explaining the orientation of body parts and regions.*
- b. Investigate the interdependence of the various body systems to each other and to the body as a whole.*

SAP2: Students will analyze the interdependence of the integumentary, skeletal, and muscular systems as these relate to the protection, support and movement of the human body.

- a. Relate the structure of the integumentary system to its functional role in protecting the body and maintaining homeostasis.*
- b. Explain how the skeletal structures provide support and protection for tissues, and function together with the muscular system to make movements possible.*

Injury Assessment, Evaluation, Prevention and Treatment of Thoracic and Abdomen

HS-CPM-5. Students will analyze the anatomy, muscular structure, vascular structure, ROM, and special tests, as well as prevention and treatment, of the thoracic and abdomen.

- a. Identify and locate the bones associated with the thoracic region on either a human skeleton or subject.
- b. Identify and locate the muscle origins and insertions of the thoracic region on either a human skeleton or subject.

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- c. Identify specific type of injuries that occur to the thoracic region and abdomen.
- d. Identify the potential consequences and signs and symptoms from direct or indirect trauma to the abdomen.
- e. Utilize proper treatment specific to thoracic and abdominal injuries.
- f. Perform an on-site examination of potential thoracic and abdominal injuries, indicating criteria for medical referral.

Academic Standards:

SAP1: Students will analyze anatomical structures in relationship to their physiological functions.

- a. Apply correct terminology when explaining the orientation of body parts and regions.
- b. Investigate the interdependence of the various body systems to each other and to the body as a whole.

SAP2: Students will analyze the interdependence of the integumentary, skeletal, and muscular systems as these relate to the protection, support and movement of the human body.

- a. Relate the structure of the integumentary system to its functional role in protecting the body and maintaining homeostasis.
- b. Explain how the skeletal structures provide support and protection for tissues, and function together with the muscular system to make movements possible.

Injury Assessment, Evaluation, Prevention and Treatment of Cardiorespiratory and Visceral Conditions

HS-CPM-6. Students will analyze the anatomy, muscular structure, vascular structure, as well as prevention and treatment, of cardiorespiratory and visceral region conditions.

- a. Identify the function and anatomy of the cardiorespiratory system and visceral region.
- b. Identify specific type of injuries that occur to the cardiorespiratory system and visceral region.
- c. Define the signs and symptoms relative to the cardiorespiratory system that may be encountered.
- d. Perform an on-site examination of potential cardiorespiratory system and visceral region injuries, for emergent or non-emergent medical referral.

Academic standards:

SAP 1: Students will analyze anatomical structures in relationship to their physiological functions.

- a. Apply correct terminology when explaining the orientation of body parts and regions.
- b. Investigate the interdependence of the various body systems to each other and to the body as a whole.

SAP 2: Students will analyze the interdependence of the integumentary, skeletal, and muscular systems as these relate to the protection, support, and movement of the human body.

- a. Relate the structure of the integumentary system to its functional role in protecting the body and maintaining homeostasis.
- b. Explain how the skeletal structures provide support and protection for tissues, and function together with the muscular system to make movements possible.

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SAP 3: Students will assess the integration and coordination of body functions and their dependence on the endocrine and nervous systems to regulate physiological activities.

- a. Interpret interactions among hormones, senses, and nerves which make possible the coordination of functions of the body.*
- b. Investigate the physiology of electrochemical impulses and neural integration and trace the pathway of an impulse, relating biochemical changes involved in the conduction of the impulse.*
- c. Describe how the body perceives internal and external stimuli and responds to maintain a stable internal environment, as it relates to biofeedback.*

SAP 4: Students will analyze the physical, chemical, and biological properties of process systems as these relate to transportation, absorption, and excretion, including the cardiovascular, respiratory, digestive, excretory and immune systems.

- b. Analyze, and explain the relationships between the respiratory and cardiovascular systems as they obtain oxygen needed for the oxidation of nutrients and removal of carbon dioxide.*
- d. Examine various conditions that change normal body functions (e.g. tissue rejection, allergies, injury, diseases and disorders) and how the body responds.*

Infection Control in Physical Medicine

HS-CPM-7. Students will identify and describe pathogens commonly encountered in physical medicine and will demonstrate knowledge of infection control principles.

- a. Describe the components of the chain of infection and methods for interrupting the chain
- b. Explain and demonstrate the use of standard precautions as described in the rules and regulations set forth by the Occupational Safety and Health Administration (OSHA)
- c. Practice aseptic techniques in the physical medicine setting
- d. Compare the different levels of aseptic control and their uses in physical medicine
- e. Demonstrate proper disposal of hazardous waste
- f. Utilize appropriate PPE whenever there is a risk for contact with bodily fluids
- g. Evaluate the role of the immune system in physical medicine.

Academic standards:

SCSh2: Students will use standard safety practices for all classroom, laboratory, and field investigations.

- c. Follow correct protocol for identifying and reporting safety problems and violations.*

SAP 4: Students will analyze the physical, chemical, and biological properties of process systems as these relate to transportation, absorption, and excretion, including the cardiovascular, respiratory, digestive, excretory and immune systems.

- d. Examine various conditions that change normal body functions (e.g. tissue rejection, allergies, injury, diseases and disorders) and how the body responds.*

Career Planning in Physical Medicine

HS-CPM-8. Students will participate in research and self-assessment to identify their choice of careers in the area of physical medicine.

- a. Plan and evaluate a variety of careers in physical medicine and explain the educational requirements for each

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- b. Identify a variety of employment settings within physical medicine
- c. Identify the personal characteristics for a career in physical medicine
- d. Explain certification, accreditation, registration and licensure as it applies to disciplines within physical medicine
- e. Identify primary and secondary members of the physical medicine team and evaluate the roles and responsibilities of each member
- f. Identify and discuss the professional organizations and associations related to physical medicine and evaluate the benefits of membership in these organizations
- g. Develop a career plan and set long and short term goals that will enable them to be successful members of the physical medicine team.

Academic standards:

ELA11C1: Students will demonstrate understanding and control of the rules of the English language, realizing that usage involves the appropriate application of conventions and grammar in both written and spoken formats. The student

a. Demonstrates an understanding of proper English usage and control of grammar, sentence, and paragraph structure, diction, and syntax.

ELA11LSV2 Students will formulate reasoned judgments about written and oral communication in various media genres. The student delivers focused, coherent, and polished presentations that convey a clear and distinct perspective, demonstrate solid reasoning, and combine traditional rhetorical strategies of narration, exposition, persuasion, and description.

c. Responds to questions with appropriate information.

g. Gives reasons in support of opinions expressed

Role of Nutrition in Physical Medicine

HS-CPM-9. Students will evaluate the importance of nutrition in physical medicine.

- a. Identify the six classes of nutrients and describe the functions of each
- b. Identify the five food groups and list several food sources for each group
- c. Assess the nutritional status of patients in physical medicine
- d. Define calorie and explain the role of calories in weight maintenance, weight loss, and weight gain
- e. Distinguish between the signs, symptoms, and treatment of various eating disorders
- f. Analyze the importance of water and describe signs of dehydration
- g. Compare and contrast different methods of fluid replacement for the physically active person
- h. Describe the components of a pre-event meal.

Academic standards:

SAP 4: Students will analyze the physical, chemical, and biological properties of process systems as these relate to transportation, absorption, and excretion, including the cardiovascular, respiratory, digestive, excretory and immune systems.

a. Describe the chemical and physical mechanisms of digestion, elimination, transportation, and absorption within the body to change food and derive energy.

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c. Relate the role of the urinary system to regulation of body wastes (i.e. water-electrolyte balance, volume of body fluids).

Monitoring and Evaluating Client/Patient Status

HS-CPM-10: Students will demonstrate the process for basic assessment (i.e. vital signs, height, weight, etc...), monitoring, reporting/recording patient/client's health status.

- a. Perform all "beginning and ending" procedures utilized in a clinical setting (i.e. wash your hands, gather equipment, provide for privacy, etc...)
- b. Evaluate factors that may affect temperature, pulse, respirations, blood pressure, height and weight including normal and abnormal values.
- c. Demonstrate the ability to utilize and accurately read manual and electronic equipment to measure vital signs, height and weight using aseptic technique as well as use other assessment instruments and equipment according to manufacturer's guidelines and accepted safety practices.
- d. Utilize manual and electronic equipment to measure vital signs, height and weight.
- e. Report and record temperature, pulse, respirations, blood pressure, height and weight manually on graphic/flow sheets and/or electronically on mobile charts (when available) within designated time frame.
- f. Apply mathematical concepts and perform mathematical calculations appropriate to clinical expectations and/or work-based learning site.

Academic standards:

MM2P4: Students will make connections among mathematical ideas and to other disciplines.

c. Recognize and apply mathematics in context outside of mathematics.

ELA10LSV1: Students will participate in student-to-teacher, student-to-student, and group verbal interactions.

- a. Initiates new topics in addition to responding to adult-initiated topics.*
- b. Asks relevant questions.*
- c. Responds to questions with appropriate information.*
- d. Actively solicits another person's comments or opinion.*
- e. Offers own opinion forcefully without domineering.*
- f. Contributes voluntarily and responds directly when solicited by teacher or discussion leader.*
- g. Gives reasons in support of opinions expressed.*
- h. Clarifies, illustrates, or expands on a response when asked to do so; asks classmates for similar expansions.*
- i. Employs group decision-making techniques such as brainstorming or a problem-solving sequence (e.g., recognizes problem, defines problem, identifies possible solutions, selects optimal solution, implements solution, evaluates solution).*
- j. Divides labor so as to achieve the overall group goal efficiently.*

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Environmental Issues

HS-CPM-11. Students will demonstrate knowledge and understanding of the environmental conditions such as heat, humidity, moisture, and cold that can impair the body's ability to function properly.

- A. Define and correctly spell each of the key terms associated with environmental issues
- B. Identify the signs and symptoms of conditions caused by exposure to extreme environments
- C. Describe methods to prevent or minimize the effects of environmental conditions
- D. Describe methods of handling emergencies associated with extreme environmental conditions
- E. Identify the stresses of exercise in the heat and cold conditions in both the trained and untrained state
- F. Identify the adaptations that occur as a result of acclimatization to heat and cold conditions
- G. Describe precautions that should be taken in a lightning storm
- H. List the problems that air pollution presents and how they can be avoided

Emergency Action Planning

Completion of this standard will enable students to obtain certifications in American Heart Association (AHA) Basic Life Support and/or American Red Cross (ARC) CPR.

HS-CPM-12. Students will demonstrate the steps of Basic Life Support (BLS).

- a. Demonstrate cardiopulmonary resuscitation on an infant; child and an adult (simulate using manikins).
- b. Utilize personal protection devices and the use of standard precautions for disease prevention.
- c. Identify when cardiopulmonary resuscitation may be discontinued once it has been initiated.
- d. Demonstrate the application, operation, and maintenance of an automated external defibrillator trainer.

Academic standards:

SAP 4: Students will analyze the physical, chemical, and biological properties of process systems as these relate to transportation, absorption, and excretion, including the cardiovascular, respiratory, digestive, and excretory and immune systems.

b. Analyze, and explain the relationships between the respiratory and cardiovascular systems as they obtain oxygen needed for the oxidation of nutrients and removal of carbon dioxide.

SCSh2: Students will use standard safety practices for all classroom, laboratory, and field investigations.

a. Follow correct procedures for use of scientific apparatus.

b. Demonstrate appropriate techniques in all laboratory situations.

c. Follow correct protocol for identifying and reporting safety problems and violations.

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Reading Across the Curriculum

Reading Standard Comment

After the elementary years, students engage in reading for learning. This process sweeps across all disciplinary domains, extending even to the area of personal they experience text in all genres and modes of discourse. In the study of various disciplines of learning (language arts, mathematics, science, social studies), students must learn through reading the communities of discourse of each of those disciplines. Each subject has its own specific vocabulary, and for students to excel in all subjects, they must learn the specific vocabulary of those subject areas in context.

Beginning with the middle grades years, students begin to self-select reading materials based on personal interests established through classroom learning. Students become curious about science, mathematics, history, and literature as they form contexts for those subjects related to their personal and classroom experiences. As students explore academic areas through reading, they develop favorite subjects and become confident in their verbal discourse about those subjects.

Reading across curriculum content develops both academic and personal interests in students. As students read, they develop both content and contextual vocabulary. They also build good habits for reading, researching, and learning. The Reading Across the Curriculum standard focuses on the academic and personal skills students acquire as they read in all areas of learning.

Students will enhance reading in all curriculum areas by:

- a. Reading in all curriculum areas
 - Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas.
 - Read both informational and fictional texts in a variety of genres and modes of discourse.
 - Read technical texts related to various subject areas.
- b. Discussing books
 - Discuss messages and themes from books in all subject areas.
 - Respond to a variety of texts in multiple modes of discourse.
 - Relate messages and themes from one subject area to messages and themes in another area.
 - Evaluate the merit of texts in every subject discipline.
 - Examine author's purpose in writing.
 - Recognize the features of disciplinary texts.
- c. Building vocabulary knowledge
 - Demonstrate an understanding of contextual vocabulary in various subjects.

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- Use content vocabulary in writing and speaking.
 - Explore understanding of new words found in subject area texts.
- d. Establishing context
- Explore life experiences related to subject area content.
 - Discuss in both writing and speaking how certain words are subject area related.
 - Determine strategies for finding content and contextual meaning for unknown words.

CTAE Foundation Skills

The Foundation Skills for Career, Technical and Agricultural Education (CTAE) are critical competencies that students pursuing any career pathway should exhibit to be successful. As core standards for all career pathways in all program concentrations, these skills link career, technical and agricultural education to the state's academic performance standards.

The CTAE Foundation Skills are aligned to the foundation of the U. S. Department of Education's 16 Career Clusters. Endorsed by the National Career Technical Education Foundation (NCTEF) and the National Association of State Directors of Career Technical Education Consortium (NASDCTEC), the foundation skills were developed from an analysis of all pathways in the sixteen occupational areas. These standards were identified and validated by a national advisory group of employers, secondary and postsecondary educators, labor associations, and other stakeholders. The Knowledge and Skills provide learners a broad foundation for managing lifelong learning and career transitions in a rapidly changing economy.

CTAE-FS-1 Technical Skills: Learners achieve technical content skills necessary to pursue the full range of careers for all pathways in the program concentration.

CTAE-FS-2 Academic Foundations: Learners achieve state academic standards at or above grade level.

CTAE-FS-3 Communications: Learners use various communication skills in expressing and interpreting information.

CTAE-FS-4 Problem Solving and Critical Thinking: Learners define and solve problems, and use problem-solving and improvement methods and tools.

CTAE-FS-5 Information Technology Applications: Learners use multiple information technology devices to access,

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organize, process, transmit, and communicate information.

CTAE-FS-6 Systems: Learners understand a variety of organizational structures and functions.

CTAE-FS-7 Safety, Health and Environment: Learners employ safety, health and environmental management systems in corporations and comprehend their importance to organizational performance and regulatory compliance.

CTAE-FS-8 Leadership and Teamwork: Learners apply leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.

CTAE-FS-9 Ethics and Legal Responsibilities: Learners commit to work ethics, behavior, and legal responsibilities in the workplace.

CTAE-FS-10 Career Development: Learners plan and manage academic-career plans and employment relations.

CTAE-FS-11 Entrepreneurship: Learners demonstrate understanding of concepts, processes, and behaviors associated with successful entrepreneurial performance.