Sports Medicine

Fairfax County Public Schools
Instructional Services Department
Fairfax, Virginia
2006
FAIRFAX COUNTY PUBLIC SCHOOLS
Fairfax, Virginia

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CONTENT OF COURSE

Introduction

Rational:

Sports Medicine is offered as an elective course for high school students. The course was developed to introduce students to the field of sports medicine. Sports medicine is a broad profession that requires the cooperation of many allied health and medical professionals. This course has a strong focus on human anatomy and physiology, prevention of athletic related injuries, and basic first aid.

Course Credit:

Sports Medicine is offered as a year long elective course. Students receive one elective health and physical education credit.

Course Instructor:

Sports Medicine will be taught by a licensed teacher. State of Virginia endorsement in Health and Physical Education is preferred. Experience in the field of sports medicine is recommended. Other allied health care professionals may also teach the course.

Guidelines for Teachers:

The goal of this course is to provide students with an introduction to sports medicine. It is not intended that students will learn skills and techniques that they can use on their own with the exception of CPR and first aid.

In compliance with the Code of Virginia, teachers should recognize that it is not appropriate for students to be asked to perform the following acts as a part of the sports medicine course:

- Face mask removal
- Concussion assessment
- Evaluation of an injured athlete beyond the scope of first aid
- Taping or bracing
- Practicing manipulation or mobilization
- Design and implementation of a rehabilitation program
- Recommendations of ergogenic aids or supplements

Guidelines for Students:
Students should understand that this course does not prepare them to practice sports medicine. Students may become certified in CPR and first aid but the care they may provide to others is limited to the guidelines set by the American Heart Association and/or American Red Cross for CPR and first aid.

Students must adhere to the following guidelines while involved in educational activities in sports medicine:

- Follow FCPS acceptable use policy for technology standards.
- Only use materials or equipment in the athletic training room under direct supervision of a certified athletic trainer.
- Maintain confidentiality of any personal or injury information learned while in the athletic training room or observing sport practices and/or competitions.
- Students may not use the Sports Injury Management System (SIMS) as it contains confidential information. See The Family Educational Rights and Privacy Act (FERPA) and Health Insurance Portability and Accountability Act (HIPAA).
- Show respect for other students when involved in hands-on activities such as palpation.
- Must follow directions and guidelines established by the instructor at all times.
- May not administer any medication to athletes.

Course Description:

The Sports Medicine course is designed as an introduction to the field of sports medicine. There is a strong focus on the basic principles of injury prevention, recognition, and rehabilitation. Students will learn basic human anatomy, physiology, and biomechanics.

Students will also have the opportunity to become certified in CPR and first aid.
Module 1: Introduction to Sports Medicine Course

**Objective:**
- Students will identify and demonstrate an understanding of the course objectives and appropriate behaviors in classroom, laboratory, and field trip environments.

Module 2: Introduction to Sports Medicine Related Professions

**Objective:**
- Students will identify sports medicine related professions and recognize the correlations of this course to possible future career choices.

Module 3: Legal and Ethical Issues in Sports Medicine

**Objective:**
- Students will demonstrate an understanding of the laws and legislation related to allied health and medical practices.

Module 4: Terminology

**Objective:**
- Students will define sports medicine related terminology.

Module 5: Anatomy

**Objectives:**
- Students will demonstrate an understanding of basic human anatomy including major muscles, bones, tendons, and ligaments.

Module 6: Applied Anatomy

**Objectives:**
- Students will demonstrate an understanding of the relationships between human anatomy and body movement and function.

Module 7: Preparing for Emergency Situations/Sports First Aid

**Objectives:**
- Students will identify possible emergency situations that may occur in sports and how to prepare for emergency situations.
- Students will complete the American Heart Association’s Heartsaver First Aid course to obtain certification.
- Students will complete the American Heart Association’s BLS for Healthcare Providers CPR course to obtain certification.
Module 8: Prevention of Sports Related Injuries

**Objective:**
- Students will recognize the many factors that contribute to injury prevention including physical condition, protective equipment, playing environment, and rules.

Module 9: Physiology of Injury and Pain Control

**Objective:**
- Students will demonstrate an understanding of the physiological effects of trauma to the body.

Module 10: Injuries

**Objective:**
- Students will be able to identify the common causes, signs and symptoms, and treatment of frequently occurring sports related injuries.

Module 11: Principles of Rehabilitation

**Objective:**
- Students will identify the basic principles of rehabilitation.

Module 12: Therapeutic Modalities

**Objective:**
- Students will understand how modalities affect pain and healing.

Module 13: Nutrition

**Objective:**
- Students will identify the components of proper nutrition and the relationship to athletic performance.
## Pacing Guide

<table>
<thead>
<tr>
<th>First Quarter:</th>
<th>Number of Weeks</th>
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<tbody>
<tr>
<td>• Introduction to Sports Medicine Course</td>
<td>1</td>
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<tr>
<td>• Introduction to Sports Medicine Related Professions</td>
<td>2</td>
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<tr>
<td>• Legal and Ethical Issues in Sports Medicine</td>
<td>2</td>
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<tr>
<td>• Terminology</td>
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<td>• General Anatomy</td>
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<tr>
<td>• Applied Anatomy</td>
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<td>• Preparing for Emergency Situations/Sports First Aid</td>
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<tr>
<td>• CPR</td>
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<th>Third Quarter:</th>
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<tbody>
<tr>
<td>• Prevention of Sports Related Injuries</td>
<td>2</td>
</tr>
<tr>
<td>• Pathology of Injury</td>
<td>3</td>
</tr>
<tr>
<td>• Classification of Injuries</td>
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<table>
<thead>
<tr>
<th>Fourth Quarter:</th>
<th>Number of Weeks</th>
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<tbody>
<tr>
<td>• Principles of Rehabilitation</td>
<td>3</td>
</tr>
<tr>
<td>• Therapeutic Modalities/Pain Control</td>
<td>3</td>
</tr>
<tr>
<td>• Nutrition</td>
<td>2</td>
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<td>1</td>
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Module 1

Introduction to Sports Medicine Course

Objective:
- Students will demonstrate an understanding of the course objectives and appropriate behaviors in classroom, laboratory, and field trip environments.

Essential Knowledge:
- Students will understand how they will be graded.
- Students will understand what content will be included in the course.

Materials Needed:
- projection device and/or computer with appropriate presentation software

Supplemental Materials:
- field trip possibilities (physical therapy clinics, hospitals, college athletic training facilities, professional sports athletic training facilities)
- research project ideas

Required Educational Materials:
- course syllabus
- textbook
- grading policy
- shadowing guidelines and scheduling protocols
- clinical observation worksheet

Appropriate Supplemental Content:
- none

Career Connection:
- Students will be able to apply knowledge learned in this course to future study in an allied health care field.
Assessment:
- successful completion of a selected response or constructed response quiz/test
- learning log

Key Terms:
- certification
- credentials
- licensure
- registration
- regulation
- sports medicine

Required Instructional Components:
Introduction to Sports Medicine

I. Teacher Introduction

II. Sports Medicine Profession
   A. Definition
   B. Education
   C. Credentials

III. Review Syllabus
   A. Course Outline
   B. Concept of learning “about” not learning “to do”
   C. Grading Policy
      1. Clear, concise explanation of assignments, due dates, and points awarded to each
      2. Labs, projects, classroom and home assignments and assessments

IV. Course Requirements
   A. Clinical Observations
      1. Guidelines provided
   B. Special Project (recommend in 2nd semester)
      1. Research project
      2. Periodical abstract collection
      3. Develop/produce rehabilitation equipment
   C. Tour of athletic facilities
   D. Field Trips
      1. Identify possibilities
      2. Identify fees (if any)
   E. Labs
      1. Appropriate attire during labs
      2. Lab fees (if any) to cover consumable supplies
      3. Expectations/grading
      4. Appropriate student behavior
5. Location

F. Textbooks
   1. Distribution and accountability

G. Materials
   1. Appropriate use of classroom props and teaching aids
   2. Learning log (folder or composition book, interactive notebook, glossary of terms, etc.)
   3. Standard
      a. colored pencils
      b. 3-ring binder
      c. paper for note taking
      d. writing implement
Student Course Survey

Directions: To aid in planning for this course, please answer the following questions. You do not need to put your name on this survey.

1. What do you think sports medicine means?

2. Why did you sign-up for this class?

3. What sports medicine related topics interest you the most?

4. What do you hope to learn?

5. List 5 sports medicine careers that interest you.
   A.
   B.
   C.
   D.
   E.
Athletic Training Room Worksheet

Directions: Complete the following questions during our trip to the athletic training room.

1. List 5 pieces of equipment you see in the athletic training room and their functions.

2. What type of injuries do you think are treated in the athletic training room?

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Function</th>
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<tbody>
<tr>
<td>A.</td>
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<td>C.</td>
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<td>D.</td>
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<td>E.</td>
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3. What types of learning activities (labs) could be performed in the athletic training clinic?
Sports Medicine Observation Project

During the school year, each student in the Sports Medicine class will be required to spend at least 10 hours shadowing two different sports medicine professionals (5 hours each) and observing in the appropriate environment. This project is designed to provide students with a better understanding of the Sports Medicine profession and to give students an opportunity to observe many of the topics discussed in class.

**Basics**

- Total of two (2) observations: (1 each semester)
- Total hours: 10
- Required to do one OFF-CAMPUS at a medical facility approved by the instructor.
- On-CAMPUS observation hours may be completed in the Athletic Training Room with 1 hour completed during an athletic event (pending DSA approval)

**Specifics**

- Students are required to sign up in advance with the classroom teacher
- No more than two students may sign up for a given day or event
- Students must complete at least 5 observation hours before the end of the 2nd Quarter (date______________)
- Students are responsible for checking their schedules for conflicts, including their own athletic events, prior to signing up
- Students currently receiving treatment for injuries may not count those hours

**(Possible Grading Criteria)**

- Completing a 1 page summary (typed) of their experience (guidelines to be distributed during the first week of the 1st Quarter)
- Attach facility brochure from off-campus site
- Student must conduct a short interview with the sports medicine professional with pre-determined, appropriate questions approved by the instructor
Module 2

Introduction to Sports Medicine Related Professions

Objective:
• Students will identify sports medicine related professions and recognize the correlations of this course to possible future career choices

Essential Knowledge:
• Students will be familiar with sports medicine related professions including educational requirements, credentials, regulations, employment settings
• Students will explain what a professional organization is and why it is important to be a member of a professional organization

Materials Needed:
• time in career center for research
• newsprint
• markers
• Sports Medicine Related Careers worksheet
• Rubric to assess presentation

Supplemental Resources:
• Related Websites:
  ▪ American College of Sports Medicine
  ▪ American Council on Exercise  www.acefitness.org
  ▪ American Physical Therapy Association www.apta.org
  ▪ International Fitness Professionals Association www.ifpa-fitness.com
  ▪ National Athletic Trainers’ Association www.nata.org
  ▪ National Strength and Conditioning Association www.nsca.org

Recommended Educational Materials:
• Sports Medicine Related Organizations and Professions Teacher Fact Sheet

Appropriate Supplemental Content:
• guest lecture by individuals in sports medicine related professions

Career Connection:
• Students will investigate a variety of careers in allied health care
• Students will be introduced to professional organizations and the importance of these organizations
CONTENT

Assessment:
• completion of *Sports Medicine Related Careers* worksheet
• presentation of a sports medicine related career
• quiz on professions

Key Terms:
• Allergist
• Athlete
• Cardiologist
• Chiropractor
• Dentist
• Dietitian
• Gynecologist
• Neurologist
• Nurse
• Ophthalmologist
• Orthopedist
• Parent
• Pediatrician
• Physical Therapist
• Podiatrist
• Primary Care Physician
• Trainer
• Urologist

Required Instructional Components:
Introduction to Sports Medicine Related Professions

I. Associations
   A. American Medical Association (AMA)
   B. American College of Sports Medicine (ASCM)
   C. National Strength and Conditioning Association (NSCA)
   D. American Academy of Orthopedic Surgeons (AAOS)
   E. American Academy of Pediatrics (AAP)'
   F. American Physical Therapy Association (APTA)
   G. National Athletic Trainers’ Association (NATA)

II. Professions
   A. Education/Credentials/Regulations
   B. Salary Potential
   C. Job Description
   D. Potential Settings
      1. Medical Doctor
         a. Family practice
b. Pediatrician
c. General practice
d. Specialists
   • orthopaedists
   • cardiologist
   • dermatologist
   • neurologist
   • ophthalmologist
   • ears, nose, and throat (ENT)
   • allergist/immunologist
   • obstetrician/gynecologist (OB/GYN)
   • psychiatrist
   • urologist
2. Doctor of osteopathy
3. Doctor of podiatric medicine
4. Doctor of dental surgery
5. Doctor of chiropractic
6. Allied Health Specialists
   Physical therapist
   Physical therapy assistant
   Physical therapy aide
   Registered dietician
   Physician assistant
   Nurse practitioners
   Emergency medical services
   • emergency technician
   • paramedic
   Pharmacist
   Massage Therapist
   Exercise Physiologist
   Certified Personal Trainer
   Certified Athletic Trainer
**LEARNING ACTIVITIES/LABS**

**Required:**
- Sports medicine career research and presentation
  - Assign each student a different profession to research using the worksheet, “Sports Medicine Related Careers”
  - Students will present their research

**Extension Ideas:**
- Instruct students to:
  - look in the newspaper in the employment section and list possible job opportunities and describe the qualifications in the following facilities: sports medicine clinics, health clubs, high schools and colleges
  - list personal characteristics they possess that would be helpful in building a career in a sports medicine related field
  - interview three different sports related professionals and develop a presentation of information acquired
  - Invite a sports medicine professional from another setting to talk to the class about their job.
Sports Medicine Related Careers

Directions: Write the name of the sports medicine related career you have been assigned in the space provided. Using the available resources, research your assigned career and provide the following information.

Sports Medicine Related Profession: ________________________________

Job Description:

Education Requirements:

Salary Range:

Settings for Employment:

Certification/Licensure Requirements:

Regulation of Practice:

Other Interesting Facts:
Sports Medicine Careers Presentation

After researching your chosen profession, prepare a 5 minute presentation highlighting the key information you discovered.

Your **poster presentation** must include the following:

- Name of the profession
- Pertinent background information (education, certification, etc)
- Job description
- Salary range
- Employment settings
- Anything else of interest.

Your posters should be visually appealing but not distracting. Feel free to use color and to draw pictures as needed to make your poster interesting. Be Creative!

Following your presentation, you will hand in your “Sports Medicine Related Careers” worksheet (your notes from the career center), your poster, and this form.

**Grading**

<table>
<thead>
<tr>
<th>Completed, accurate research:</th>
<th>( ) points</th>
</tr>
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<tbody>
<tr>
<td>Poster:</td>
<td>( ) points</td>
</tr>
<tr>
<td>• Required info ( )</td>
<td></td>
</tr>
<tr>
<td>• Visually appropriate ( )</td>
<td></td>
</tr>
<tr>
<td>Presentation:</td>
<td>( ) points</td>
</tr>
<tr>
<td>TOTAL</td>
<td>( ) points</td>
</tr>
</tbody>
</table>

TOTAL: _______________
Sports Medicine Related Organizations and Professions

Sports Medicine Organizations

- American Academy of Orthopaedic Surgeons (AAOS)
  The American Academy of Orthopaedic Surgeons provides education and practice management services for orthopaedic surgeons and allied health professionals. ([http://www.aaos.org/wordhtml/home2.htm](http://www.aaos.org/wordhtml/home2.htm))

- American Academy of Pediatrics (AAP)
  The American Academy of Pediatrics and its member pediatricians dedicate their efforts and resources to the health, safety and well-being of all infants, children, adolescents and young adults. ([http://www.aap.org/](http://www.aap.org/))

- American College of Sports Medicine (ACSM)
  ACSM advances and integrates scientific research to provide educational and practical applications of exercise science and sports medicine. ([http://www.acsm.org/index.asp](http://www.acsm.org/index.asp))

- American Medical Association (AMA)
  AMA's work includes the development and promotion of standards in medical practice, research, and education; strong advocacy agenda on behalf of patients and physicians; and the commitment to providing timely information on matters important to the health of America. The AMA strives to serve as the voice of the American medical profession. Being that voice is our mission. ([http://www.ama-assn.org/ama/pub/category/1812.html](http://www.ama-assn.org/ama/pub/category/1812.html))

- American Physical Therapy Association (APTA)
  The mission of the American Physical Therapy Association, the principal membership organization representing and promoting the profession of physical therapy, is to further the profession’s role in the prevention, diagnosis, and treatment of movement dysfunctions and the enhancement of the physical health and functional abilities of members of the public. ([http://www.apta.org/](http://www.apta.org/))
- National Athletic Trainers’ Association (NATA)
  The mission of the NATA is to enhance the quality of health care for athletes and those engaged in physical activity and to advance the profession of athletic training through education and research in the prevention, evaluation, management and rehabilitation of injuries. ([www.nata.org](http://www.nata.org))

- National Strength and Conditioning Association (NSCA)
  As the worldwide authority on strength and conditioning, they support and disseminate research-based knowledge and its practical application, to improve athletic performance and fitness. ([http://www.nsca-lift.org](http://www.nsca-lift.org))

**Sports Medicine Related Professions**

**Medical Doctor:**

Job Description: highly trained in the art and science of the diagnosis and treatment of disease and the maintenance of health

Education: undergraduate degree
4 years of medical school
3-8 year internship and residency
1-2 year fellowship
Exam- American Board of Medical Specialists (ABMS)

Potential Settings: clinic, hospitals, private practice, researcher, teacher

Salary Potential: Average depending on specialty- $202,000

**Doctor of Osteopathy:**

Job Description: emphasis on the body’s musculoskeletal system, preventable medicine and holistic patient care

Education: undergraduate degree
4 years of osteopathic medical school
3-8 year residency and internship
1-2 year fellowship
Exam- American Osteopathic Association (AOA)

Potential Settings: clinic, hospitals, private practice, researcher, teacher

Salary Potential: Average salary- $202,000
**Doctor of Podiatric Medicine:**

Job Description: diagnose and treat disorders, diseases and injuries of the foot and lower leg

Education: at least 90 semester hours of undergraduate study
4 year podiatric medical college
1-3 year residency program
Exam - National Board of Podiatric Medical Examiners (NBPME)

Potential Settings: clinic, hospitals, own practice, nursing home, researcher, teacher

Salary Potential: Average salary - $106,230

**Doctor of Dental Surgery or Doctor of Dental Medicine:**

Job Description: diagnose, prevent and treat tooth and tissue problems

Education: at least 2-3 years of undergraduate education or undergraduate degree
4 year dental school approved by the American Dental Association
Exam - National Board Dental Exam (NBDE)

Potential Settings: group practice, private practice, researcher, teacher

Salary Potential: Average salary - $123,210

**Doctor of Chiropractic:**

Job Description: diagnose and treat patients whose health problems are associated with the body’s muscular, nervous and skeletal systems.

Education: 2 - 4 years of undergraduate education, some programs require a 4 year undergraduate degree
4 year chiropractic college
Exam - National Board of Chiropractic Examiners

Potential Settings: group practice, private practice, researcher, teacher

Salary Potential: Average salary - $102,400
Physician Assistant:
Job Description: provide diagnostic, therapeutic, and preventative healthcare services under the supervision of physicians.

Education: at least two years of college before entering a physician assistant program
2 years of physician assistant school

Potential Settings: clinic, hospital, physician’s office

Salary Potential: Average salary - $76,350

Physical Therapist:
Job Description: using various physical modalities and exercise to help people recover from injuries or diseases of the muscles, joints, nerves or bones.

Education: 3 - 4 years of undergraduate education, some programs require a master degree
national exam

Potential Settings: hospital, clinic, nursing home, school health, researcher, teacher

Salary Potential: Average salary - $57,050

Physical Therapist Assistant:
Job Description: work under direction and supervision of physical therapist; may assist patients with exercises and modalities; record treatment and report to physical therapist

Education: associate degree including hands-on clinical experience
CPR and first aid certification

Potential Settings: hospitals, nursing care facilities, physician’s office, home healthcare services, outpatient care centers

Salary Potential: Average salary - $28,530
Physical Therapist Aide:

Job Description: under direct supervision of physical therapist keep treatment area clean and prepared for therapy sessions; may perform clerical tasks and patient transport

Education: high school diploma
Trained on-the-job
CPR and first aid certification may be required

Potential Settings: hospitals, nursing care facilities, physician’s office, home healthcare services, outpatient care centers

Salary Potential: Average salary - $20,690

Registered Dietician:

Job Description: study dietary patterns in order to maximize performance and prevent disease and improve health

Education: undergraduate degree in dietetics
Complete a 9-month American Dieticians Association (ADA) approved internship
ADA Exam

Potential Settings: hospitals, clinics, nursing homes, sports complexes, school systems, public health facilities, fitness centers, researcher, teacher

Salary Potential: Average salary - $58,070

Nurse Practitioner:

Job Description: Nurse practitioners are registered nurses who have advanced education and clinical training in a health care specialty. They deliver basic care for infants, children, adults, and families in a wide range of settings, both outpatient and inpatient.

Education: undergraduate degree (Associate’s or Bachelor’s)
Graduate approved nursing program
National Exam

Potential Settings: clinic, hospital, nursing homes

Salary Potential: Average salary - $68,360
**Emergency Medical Technician:**

**Job Description:** provide vital attention as they care for and transport the sick or injured to a medical facility.

**Education:** certification requirements vary by state
4 levels of training
paramedic program (highest level) up to 2 years

**Potential Settings:** local government (fire, police)
independent third rescue squad departments
private ambulance service

**Salary Potential:** Average salary - $41,980

**Pharmacist:**

**Job Description:** with a physician’s or other healthcare provider’s prescription, dispense medications to patients; advise healthcare provider of selection and dosage of medications; and monitor patient use of medication

**Education:** 2-3 years of undergraduate study
graduate of an accredited college of pharmacy
state Exam

**Potential Settings:** community pharmacies, hospitals, clinics, mail-order pharmacies, federal government, home healthcare agencies

**Salary Potential:** Average salary - $74,110

**Massage Therapist:**

**Job Description:** administer specialized techniques which are designed to enhance the physical well being of their clients

**Education:** Training requirements vary from state to state, although more and more schools and states recommend massage therapy programs of at least 500 hours training.

**Potential Settings:** self-employed, fitness facility, spa, clinic, hospital

**Salary Potential:** Average salary - $45,000
**Exercise Physiologist:**

Job Description: study the acute and chronic physiological responses and adaptations resulting from physical activity to improve or maintain health, fitness or performance.

Education: Master degree minimum – PhD preferred
Graduate degree and recognized certification

Potential Settings: commercial, clinical, cardiopulmonary rehab specialist, researcher, teacher

Salary Potential: Average salary - $78,366

**Personal Trainer:**

Job Description: Personal trainers design exercise programs for clients based on each person's health history, capabilities and fitness objectives.

Education: undergraduate degree
Certification by such organization as the ASCM

Potential Settings: client's home, trainer's place of employment or business or 3rd party fitness facility

Salary Potential: Average salary - $45,800

**Certified Athletic Trainer:**

Job Description: care and prevention of illness and injuries related to sport and exercise

Education: undergraduate or graduate degree from a program accredited by the Commission of Accreditation of Allied Health Education Programs (CAAHEP)
Exam – national

Potential Settings: clinic, high school, college, professional level, industrial

Salary Potential: Average salary - $31,839

**2006 Salaries:** UPDATE ANNUALLY
Module 3

Legal and Ethical Issues in Sports Medicine

Objective:
• Students will demonstrate an understanding of the laws and legislation related to allied health and medical practices.

Essential Knowledge:
• Students will recognize the importance of confidentiality related to allied health and medical practices.
• Students will identify the importance of maintaining accountability through record keeping and identify various types of record keeping used in medical professions.
• Students will develop an understanding of the Good Samaritan Law.
• Students will agree to the confidentiality agreement for shadowing and understand the importance of the agreement.
• Students will understand Virginia’s Athletic Training law and how it applies to them when assisting in the athletic training room.

Materials Needed:
• computer lab with internet access
• projection device and/or computer with appropriate presentation software

Supplemental Materials:
• Code of Ethics from a variety of professions

Recommended Educational Materials:
• sample of SOAP note format
• sample of information captured in a computer based record keeping system
• student confidentiality agreement
• Good Samaritan Law

Inappropriate Content and Student Practices:
• Entry into any area of the SIMS computer program other than the one designated by the certified athletic trainer (ATC).
• ANY outside communication of an individual’s personal health information (PHI).

Appropriate Supplemental Content:
• Comparison of practice laws from other states.
• Review the school’s participation policy or code of conduct for athletes.
• Ethical codes by sports medicine associations
• American Medical Association’s (AMA) Hippocratic oath

Career Connection:
• Students will develop an understanding of how laws and legislation impact health care professions.
Assessment:
- Define terms (Health Insurance Portability and Accountability Act (HIPAA), Family Educational Rights and Privacy Act (FERPA), etc)
- Selected response or constructed response quiz/test

Key Terms:
- assessment
- confidentiality
- diagnosis
- ethics
- FERPA
- HIPAA
- History
- inspection
- liability
- medical malpractice
- objective
- observation
- palpation
- personal health information (PHI)
- SIMS
- SOAP note
- subjective

Required Instructional Components:
Introduction to Legal and Ethical Issues in Sports Medicine

I. Legal and Ethical Issues in Sports Medicine
   A. Record Keeping
      1. Types (software, paper)
      2. SOAP notes
      3. Storage
      4. Accountability
   B. Privacy Issues/Confidentiality
      1. Family Educational Rights and Privacy Act (FERPA)
      2. Health Insurance Portability and Accountability Act (HIPAA)
         http://www.hhs.gov/ocr/hipaa/
      3. Ethics of confidentiality
      4. Legal aspects
      5. Students confidentiality agreement for shadowing
   C. Good Samaritan Law:
   D. Practice Laws from various Boards of Medicine
   E. Risk Management
LEARNING ACTIVITIES/LABS

**Required:**
- Review the following:
  - Practice Laws
  - Good Samaritan Law
  - Privacy Act within HIPAA and FERPA regulations
- Have students write about and discuss how the regulations and laws apply to them.

**Extension Ideas:**
- Provide a fictional case and have students change it to SOAP note format.
- Research the history of regulations or laws, or a court case related to one of the laws.

**SOAP Notes**

**S**: (Subjective)
What the athlete can tell you about their condition. This may include:

- History (what happened, when, where, how, past related conditions)
- Symptoms (what can be perceived and reported by the athlete – pain, sounds, odd feeling, lack of sensation, etc)
- What their self-limitations have been
- What they have done for initial treatment of the injury so far

**O**: (Objective)
What the evaluator can perceive about the conditions. This may include:

- General condition of the athlete (consciousness, perceived pain, etc)
- Signs (what can be seen, felt, or measured by the evaluator – swelling, discoloration, bleeding, deformity, guarding, limping, etc)

**A**: (Assessment)
The possible conditions are based on the subjective and objective findings.

**P**: (Plan of Action)
The course of treatment decided upon by the health care professional. This may include:

- Immediate first aid
- Further referral to another health care professional
- Therapeutic modalities
- Therapeutic exercise
- Home care instructions
Module 4

Terminology

Objective:
• Students will define sports medicine related terminology.

Essential Knowledge:
• Students will define the anatomical planes and axes.
• Students will define spatial and movement anatomy.
• Students will define injury terminology.

Materials Needed:
• 3-D skeleton
• anatomical poster of human body
• television
• computer
• DVD Player
• projection device and/or computer with appropriate presentation software
• index cards

Textbook Reference:
• Glossary 335-345; CD provided with text

Supplemental Materials:
• ISBN: 0679778497
• Websites:
  Discovery School.com
  http://puzzlemaker.school.discovery.com/
  http://www.sohp.soton.ac.uk/biosci/anatomy1.htm (illustrates anatomical planes and axes)

Recommended Educational Materials:
• vocabulary crossword puzzle

Appropriate Supplemental Content:
• medical abbreviations
• Latin linguistics

Career Connection:
• Students will develop knowledge of common medical terminology used in medical professions.
CONTENT

Assessment:
- Quiz on terminology
- Crossword puzzle for definitions
- Re-write a paragraph describing an injury by changing lay terminology to proper medical terminology

Key Terms:
- (see required instructional components)

Required Instructional Components:
Introduction to Terminology

I. Terminology
   A. Spatial
      1. Anatomical Position
      2. Anterior
      3. Posterior
      4. Superior
      5. Inferior
      6. Medial
      7. Lateral
      8. Oblique
      9. Proximal
     10. Distal
     11. Superficial
     12. Deep
     13. Prone
     14. Supine
     15. Vertical
     16. Horizontal
   B. Planes and Axes
      1. Frontal/coronal plane
      2. Transverse/horizontal plane
      3. Sagittal/median plane
      4. Transverse/horizontal axis
      5. Longitudinal/vertical axis
      6. Sagittal/anteroposterior axis
   C. Movement
      1. Flexion
      2. Extension
      3. Abduction
      4. Adduction
      5. Internal rotation
      6. External rotation
      7. Pronation
      8. Supination
9. Horizontal abduction
10. Horizontal adduction
11. Circumduction
12. Elevation
13. Depression
14. Protraction
15. Retraction
16. Plantar flexion
17. Dorsiflexion
18. Inversion
19. Eversion
20. Hyperextension
21. Lateral flexion
22. Cervical
23. Scapular
24. Scapular
25. Opposition
26. Ulnar deviation
27. Radial deviation

D. Injury Terminology
1. Abrasion
2. Acute
3. Amputation
4. Atrophy
5. Avulsion
6. Blister
7. Chronic
8. Contusion
9. Dislocation
10. Ecchymosis
11. Edema
12. Fracture
13. Hematoma
14. Hemorrhage
15. Hypertrophy
16. Inflammation (“itis”)
17. Laceration
18. Paralysis
19. Parathesia
20. Puncture
21. Spasm
22. Sprain
23. Strain
24. Subluxation
LEARNING ACTIVITIES/LABS

**Required:**
- Crossword puzzle
- Vocabulary word sort
  - Give ½ of the class an index card with a term and the other ½ and index card with a category
  - Students must find the person with the appropriate category the corresponds with their term
  - Can do similarities and differences as well
- Matching game
  - Give ½ of the class an index card with a term and the other ½ and index card with a definition
  - Students must find their partner
  - Working with their partner, students will prepare a drawing or demonstration of the word to share with the class
- Visit the website www.sohp.soton.ac.uk/biosci/anatomy1.htm to view anatomical planes and axes

**Extension Ideas:**
- create a chart comparing the Latin root to the medical term
- create a chart identifying common medical abbreviations
- create a glossary of terms
- Simon Says
  - Ask all students to stand at their desks. Instructor acts as “Simon” to produce instructions for students to move their body parts based on anatomical movements. If a student moves his or her body incorrectly according to the instructions given by “Simon” or moves without waiting for the “Simon says” cue, that student is out of the game. Last student(s) standing wins the game. Give students a chance to be “Simon”
  - This can also be done in small groups with winners facing off for the title of class champion
- Around the World
  - Students create index cards using injury terminology. On one side of the card is an illustration of the term. On the other side of the card is the written term. Then the instructor reviews the cards with the class. Begin at one end of the room with two students standing next to each other. The instructor shows the first illustration to the students. The first of the two students to properly identify the term for the illustration moves on to the next student’s desk. The other student remains at his or her seat. As long as a student continues to correctly identify the term, that student will go “around the world”. At the end of a designated time period, the student who has moved the most desk positions from his or her original seat is the winner of the game
Module 5

Anatomy

Objectives:
• Students will demonstrate an understanding of basic human anatomy including major muscles, bones, tendons, and ligaments.

Essential Knowledge:
• Students will identify the components of the axial skeleton.
• Students will identify the components of the appendicular skeleton.
• Students will identify the bones comprising the skull.
• Students will identify the different types of joints.
• Students will identify the function of cartilage.
• Students will identify the function of bursa.
• Students will identify the major muscles of the body.
• Students will identify the role of the central and peripheral nervous systems.

Materials Needed:
• skeleton
• illustrations of the skeletal and muscular systems
• 3-D joint models or illustrations
• muscle models or illustrations

Textbook Reference:
• Chapter 3, CD provided with text

Supplemental Materials:
• muscular models
• anatomy related website: http://www.gwc.maricopa.edu/class/bio201/index.htm

Required Educational Materials:
• Videos:

Inappropriate Content and Student Practices:
• reproductive system
• inappropriate palpation

Appropriate Supplemental Content:
• field trip to cadaver lab (Northern Virginia Community College)
Career Connection:
- Students will be introduced to human anatomy. This knowledge will be essential for continued study in any allied health care field.
Assessment:
• Skeletal and muscular anatomy labeling worksheets
• Identify bones on skeleton
• Match movements of the body with muscle(s) that cause the motion
• University of Minnesota, WebAnatomy
  http://www.gen.umn.edu/faculty_staff/jensen/1135/webanatomy/

Key Terms:
• appendicular skeleton • insertion
• articular cartilage • origin
• axial skeleton • Peripheral nervous system (PNS)
• biaxial • slow oxidative
• bursa • synovial
• central nervous system (CNS) • triaxial
• fast glycolytic • uniaxial
• fast oxidative

Required Instructional Components:
Introduction to Anatomy and Physiology

I. Bones
   A. Skull
   B. Axial Skeleton
   C. Appendicular Skeleton
      1. Soft tissue
      2. Joints and related structures
         a. Joint classification
         b. Articular cartilage
         c. Bursa
         d. Synovial tissue

II. Muscles (primary gross movers)
   A. Types
      1. Slow oxidative (Type I)
         a. Slow contraction time
         b. High resistance to fatigue
         c. Used for endurance activities
      2. Fast oxidative (Type IIa)
         a. Faster contraction time
         b. Moderate resistance to fatigue
         c. Used for prolonged anaerobic activities with a relatively high force output, such as racing 400 meters.
      3. Fast glycolytic (Type IIb)
         a. quick contraction time
b. low resistance to fatigue
c. used for short anaerobic, high force production activities, such as sprinting, hurdling, jumping, etc.

B. Origin
C. Insertion
D. Movement
   1. Deltoids
   2. Rotator cuff
   3. Biceps
   4. Triceps
   5. Wrist flexors
   6. Wrist extensors
   7. Finger extensors
   8. Finger flexors
   9. Abdominals
  10. Back extensors
  11. Trapezius
  12. Latissimus dorsi
  13. Rhomboids
  14. Hip flexors
  15. Hip extensors
  16. Quadriceps
  17. Hamstrings
  18. Dorsiflexors
  19. Plantarflexors
  20. Peroneals
  21. Ankle inverters
  22. Toe extensors
  23. Toe flexors

III. Nervous System
   A. Central nervous system (CNS)
   B. Peripheral nervous system (PNS)
LEARNING ACTIVITIES/LABS

Required:

- Videos:
- Skeleton and bone exploration:
  - Identify bones and bony landmarks on full and/or disarticulated skeleton
- Lower Extremity Bony Anatomy lab
- Skeleton and muscle labeling worksheets
- Joint classification chart
- Identify motions of the body and the muscle(s) that cause the motion

Extension Ideas:

- Cadaver lab – arrange for class to visit a cadaver lab (NVCC)
- Illustrate the skeletal system on an outline of the human body
Lower Extremity Bony Anatomy Lab

Materials: Non-toxic markers
Masking tape or athletic tape
Rubbing alcohol

Safety: Use non-toxic markers **only**
Screen students for allergies to ink, tape, or rubbing alcohol

Task: Write the following bony landmarks on tape with markers
Place the tape on the landmark on your lab partner

1. 1\textsuperscript{st} distal phalanx
2. 3\textsuperscript{rd} Middle phalanx
3. 4\textsuperscript{th} Proximal Phalanx
4. Base of the 5\textsuperscript{th} Metatarsal
5. First Metatarsal
6. Medial Malleolus
7. Lateral Malleolus
8. Calcaneus
9. Anterior Ridge of the Tibia
10. Lateral Fibular shaft (Distal)
11. Tibial Tuberosity
12. Medial Femoral Condyle
13. Head of the Fibula
14. Patella
Module 6
Applied Anatomy

Objectives:
• Students will demonstrate an understanding of the relationships between human anatomy and body movement and function.

Essential Knowledge:
• Students will identify muscle origin, insertion and action.
• Students will identify movements allowed by different types of joints.
• Students will identify the body’s response to exercise.

Materials Needed:
• Skeleton
• Blood pressure cuff/stethoscope
• Muscle models or illustrations

Supplemental Materials:
• Levers Worksheet
• CD provided with text
• Clover, J. Sports Medicine Essentials.

Recommended Educational Materials:
• Pulse / blood pressure worksheet
• Muscle / motion matching worksheet
• Gait analysis worksheet

Appropriate Supplemental Content:
• Biomechanics of throwing
• Biomechanics of sprinting

Career Connection:
• Students will be introduced to the basic principles of physiology, biomechanics, and kinesiology. This knowledge will provide a foundation for more extensive study in allied health care professions.
**Assessment:**
- Gait analysis
- Muscle / motion matching
- Vital signs lab

**Key Terms:**
- Biomechanics
- blood pressure
- closed kinetic chain
- concentric
- eccentric
- gait
- heart rate
- isokinetic machine
- isometric
- isotonic
- kinesiology
- lever
- open kinetic chain
- physiology
- respiratory rate
- vasoconstriction
- vasodilation
- VO₂ max

**Required Instructional Components:**
Introduction to Applied Anatomy

I. **Physiology**
   A. Cardiovascular system
      1. anatomy
      2. blood pressure/ heart rate
      3. vasoconstriction and vasodilation
   B. Respiratory System
      1. Anatomy
      2. Respiratory Rate
   C. Cellular Respiration
   D. Exercise Physiology
      1. Effect of exercise on heart rate, blood pressure, respiratory rate
      2. VO₂ max
      3. Oxygen debt
      4. Types of muscle fibers

II. **Biomechanics**
    A. Levers
       1. Class 1
       2. Class 2
       3. Class 3
    B. Types of Muscle Contractions
       1. Isometric
       2. Isotonic (concentric/eccentric)
    C. Gait (walking, running)
       1. Dynamics of gait
2. Analysis of gait

III. Kinesiology
A. Muscle movement
   1. Proximal attachment
   2. Distal attachment
   3. Action
LEARNING ACTIVITIES/LABS

**Required:**
- Blood pressure and pulse Lab
- Exercise physiology lab
- Gait analysis lab

**Extension Ideas:**
- Throwing analysis
- Isokinetic muscle testing
- Manual muscle testing
- VO₂ max testing
Blood Pressure and Pulse Lab

Directions: Follow the steps below to assess pulse and blood pressure on three individuals. Record results in the table at the bottom of the page.

Pulse
1. Find Carotid artery with index and middle finger
2. Palpate pulse (gently)
3. Count number of beats in 10 seconds
4. Multiply number by 6
5. Record results

Blood Pressure
1. Subject should be relaxed and seated for at least 5 minutes prior to measurement
2. Place cuff over upper arm (check direction of arrow, if present)
3. Place stethoscope over brachial artery
4. Inflate cuff to approx 180 mm Hg
5. Release air slowly
6. LISTEN for first Korotkoff sound (note the number on the gauge)
7. LISTEN for sounds to STOP (note reading on the dial)
8. Record results

<table>
<thead>
<tr>
<th>Subject #1</th>
<th>Subject #2</th>
<th>Subject #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Exercise Physiology Lab

Directions: Work with a partner to record blood pressure, heart rate, and respiratory rate before, during, and after exercise.

Before Exercise

Sit quietly for 5 minutes then have your partner take your pulse, blood pressure, and respiration rate. Record your results.

Pulse:
Blood pressure:
Respiratory rate:

During Exercise

Walk briskly or jog on the track. Partner will take your pulse, blood pressure, and respiration rates at the intervals below. Perform QUICKLY. Record your results.

<table>
<thead>
<tr>
<th></th>
<th>Pulse *</th>
<th>Blood pressure</th>
<th>Respiration rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 minute</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Polar heart rate monitors are recommended for this activity
After Exercise

Sit quietly. Have your partner take your pulse, blood pressure, and respiration rates at the intervals below. Record your results.

<table>
<thead>
<tr>
<th>Time</th>
<th>Pulse *</th>
<th>Blood pressure</th>
<th>Respiration rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 minute</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Polar heart rate monitors are recommended for this activity

Discussion Questions

1. Describe what happened to your pulse, blood pressure and respiration rate as you began to exercise and compare it to your results at 5, 10, and 15 minutes.

2. Describe how you felt during the first 1-2 minutes of exercise and compare it to after 10 minutes.

3. What happened to your pulse, blood pressure, and respiratory rate in the first minute immediately following exercise?

4. Did you return to your before exercise pulse, blood pressure, and respiratory rate? If no, why not? If yes, how long did it take?
**Muscle Motion Matching Worksheet**

**Directions:** Identify which joint is moved by the muscle groups listed below. Use the word bank to complete the Action classification in column 2. Using the numbered anatomical chart, indicate the muscle location in column 3.

<table>
<thead>
<tr>
<th>Word Bank:</th>
<th>Flexion</th>
<th>Abduction</th>
<th>Horizontal</th>
<th>Adduction</th>
<th>Protraction</th>
<th>Extension</th>
<th>Adduction</th>
<th>Horizontal</th>
<th>Abduction</th>
<th>Retraction</th>
<th>Lateral</th>
<th>Flexion</th>
<th>Internal</th>
<th>Rotation</th>
<th>External</th>
<th>Rotation</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Muscle Groups</th>
<th>Joint Moved</th>
<th>Action (Could be Multiple)</th>
<th>Muscle location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plantar Flexors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dorsi Flexors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hamstrings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quadriceps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hip Flexors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hip Extensors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hip Adductors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hip Abductors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hip Rotators</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trunk Extensors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muscle Group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>-------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>Trunk Flexors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deltoids</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pectorals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhomboids (upper Back)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lats (Mid Back)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biceps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triceps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wrist Flexors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wrist Extensors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotator Cuff</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neck</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Terms:**  
Flexion  
Abduction  
Extension  
Adduction  
Horizontal Adduction  
Protraction  
Retraction  
Lateral Flexion  
Internal Rotation  
External Rotation

<table>
<thead>
<tr>
<th>Muscle Groups</th>
<th>Joint</th>
<th>Moved</th>
<th>Action</th>
<th>muscle location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plantar Flexors</td>
<td>Ankle</td>
<td>Extension (Push the foot down)</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Dorsi Flexors</td>
<td>Ankle</td>
<td>Flexion (Pull the foot up)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Hamstrings</td>
<td>Knee</td>
<td>Flexion (Bend the knee)</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Quadriceps</td>
<td>Knee</td>
<td>Extension (Straighten the knee)</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Hip Flexors</td>
<td>Hip</td>
<td>Flexion (lift leg up/forward)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Hip Extensors</td>
<td>Hip</td>
<td>Extension (Push leg down/back)</td>
<td>17 &amp; 18</td>
<td></td>
</tr>
<tr>
<td>Hip Adductors</td>
<td>Hip</td>
<td>Adduction (Move leg toward body)</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Hip Abductors</td>
<td>Hip</td>
<td>Abduction (Move leg from body)</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Hip Rotators</td>
<td>Hip</td>
<td>Int &amp; Ext Rotation (turn leg in/out)</td>
<td>Not Shown</td>
<td></td>
</tr>
<tr>
<td>Trunk Extensors</td>
<td>Spine</td>
<td>Extension (straighten back)</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Trunk Flexors</td>
<td>Spine</td>
<td>Flexion (Curl the back)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Deltoids</td>
<td>Shoulder</td>
<td>Flexion (Raise Arm)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Pectorals</td>
<td>Shoulder</td>
<td>Horizontal Adduction (Cross Chest)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Rhomboids (upper Back)</td>
<td>Shoulder</td>
<td>Retraction (Pull back)</td>
<td>12</td>
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<tr>
<td>Lats (Mid Back)</td>
<td>Shoulder</td>
<td>Extension (Pull Down)</td>
<td>16</td>
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<tr>
<td>Biceps</td>
<td>Elbow</td>
<td>Flexion (Bend Elbow)</td>
<td>4</td>
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<tr>
<td>Triceps</td>
<td>Elbow</td>
<td>Extension (Straighten Elbow)</td>
<td>13</td>
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<tr>
<td>Wrist Flexors</td>
<td>Wrist / Fingers</td>
<td>Flexion (Bend Wrist / Fingers)</td>
<td>7</td>
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<tr>
<td>Wrist Extensors</td>
<td>Wrist/ Fingers</td>
<td>Extension (Straighten Wrist/Fingers)</td>
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<tr>
<td>Rotator Cuff</td>
<td>Shoulder</td>
<td>Internal &amp; External Rotation</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Neck</td>
<td>Cervical Spine</td>
<td>All Neck Motions</td>
<td>1</td>
<td></td>
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</tbody>
</table>
The Normal Gait Cycle

<table>
<thead>
<tr>
<th>HS</th>
<th>FF</th>
<th>HL</th>
<th>TO</th>
<th>NWB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact</td>
<td>Midstance</td>
<td>Propulsion</td>
<td>Swing Phase</td>
<td></td>
</tr>
</tbody>
</table>

Stance Phase = 62%  Swing Phase = 38%

**Heel Strike:** Joints Become Loose Adapter to the Ground

**Foot Flat:** Subtalar Joint Rolls to Pronation

**Foot Flat:**
- Transfer Weight from Heel to Toe
- Discontinue Pronation (Medial Lower Leg Muscles begin to Fire)
- Single Leg Stance – Full Body Weight

**Heel Lift:** Midfoot Locks for propulsion
- Begin Supination (Medial Lower Leg Muscles Max Contraction)

**Toe-Off:** Foot Fully Locked
- Ankle Plantarflexors and Toe Flexors Fire
- Great toe needs at least 30 Degrees of Extension or else heel whips

**NWB:** Ankle Dorsiflexion at least 10 Degrees to Clear Floor
- Subtalar Pronates then Slight Supination for Heel Strike

**Heel Strike:** Joints Become Loose Adapter to the Ground
Gait Lab Activity

Name_________________________  Period ____

Material Needed:
Damp towels
Dark Paper

1. Place damp towels on floor with 5-6 feet of dark paper beyond
2. Student walks onto damp towel with bare feet, then walks onto the paper
3. Water mark on paper reveals the amount of pronation that is occurring
4. Determine which type of running shoe would be better for the student using the criteria below.

<table>
<thead>
<tr>
<th>Cushion Shoe</th>
<th>Cushion / Stability Shoe</th>
<th>Motion Control Shoe</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Arch</td>
<td>Moderate to Low Arch Height</td>
<td>Low Arch Height</td>
</tr>
<tr>
<td>Small Lateral Impression</td>
<td>Medium to Large Medial Impression</td>
<td>Large Medial Impression</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Smudged Mark Under</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hallux (From Rotation)</td>
</tr>
</tbody>
</table>
Module 7
Preparing for Emergency Situations/Sports First Aid

Objectives:
• Students will identify possible emergency situations that may occur in sports and how to prepare for emergency situations.
• Students will complete the American Heart Association’s Heartsaver First Aid course to obtain certification.
• Students will complete the American Heart Association’s BLS for Healthcare Providers CPR/AED course to obtain certification.

Essential Knowledge:
• Students will identify emergency situations.
• Students will develop emergency plans.
• Students will recognize the impact of environmental situations on injury.
• Students will define PRICE and how it is used in initial treatment of injury.
• Students will identify universal precautions to prevent the spread of blood borne pathogens.

Materials Needed:
• sling or digital psychrometer
• adjustable crutches
• triangle bandages
• elastic bandages
• SAM splints
• Those designated for American Heart Association courses (Appendix E)

Textbook Reference:
• Chapters 19, 20, 21, 22
• American Heart Association Heartsaver First Aid
• American Heart Association Fundamentals of BLS for Healthcare Providers

Supplemental Materials:
• Clover, J. Sports Medicine Essentials.
• Hillman, S. Introduction to Athletic Training.

Recommended Educational Materials:
Review all 61 of the Fairfax County Public Schools Fact Sheets:
www.fcps.edu/fts/safety-security/factsheets/index.htm
• Lightning Protocol (SEH-20, 20a)
• Heat Illness Guidelines (SEH-15)
• Cold Weather Safety (SEH-23)
• vital signs worksheet
• worksheet on emergency action plan
• vital lab worksheet
• splint, sling and swath lab
• PRICES fact sheet
Appropriate Supplemental Content:
• primary survey lab
• investigate how a health club or physical therapy clinic plans for emergencies

Career Connection:
• Students will gain an understanding of preparing for emergency situations and will learn first aid and CPR skills.
CONTENT

Assessment:
- develop an emergency action plan for a specific location
- accuracy of weather measurements
- sling/swath
- first aid practical and written test from the American Heart Association
- Healthcare Provider CPR/AED practical and written test from the American Heart Association

Key Terms:
- ambient temperature
- anaphylaxis
- catastrophic
- core body temperature
- emergency action plan
- emergency medical services
- humidity
- psychrometer
- relative humidity
- wet bulb temperature

Required Instructional Components:
Introduction to Emergency Situations and First Aid

I. Emergency Situations
   A. Possible Scenarios
      1. Catastrophic
      2. Anaphylaxis
      3. Emergency Medical Services related referral
   B. Emergency Action Plan
      1. Concept of an emergency action plan
      2. Why an emergency action plan is needed
         a. Review National Athletic Trainers’ Association position statement
      2. Components of an emergency action plan

II. Vital Signs
   A. Heart Rate
   B. Respirations
   C. Blood Pressure

III. Respiratory Concerns and Management
   A. Asthma (general)
      1. Basic etiology
      2. Triggers
      3. Management
         a. Avoid triggers
         b. Medications
      2. Asthma attack management
         a. Coached breathing
         b. Rescue inhaler
   B. Exercise Induced Asthma (EIA)
      1. Triggers
      2. Prevalence
3. Management

C. Exercise Induced Bronchiole Spasm (EIB)
   1. Triggers
   2. Prevalence
   3. Management

D. Allergic Reactions Causing Respiratory Distress
   1. Anaphylaxis
   2. Treatment

IV. Environmental Concerns and Preventions
   A. Sun
      1. Use of sunscreen to prevent sunburn/cancer
      2. Impact on body heat
   B. Heat
      1. Establishment of heat guidelines
      2. Methods of measuring heat stress
         a. wet bulb temperature
         b. wet bulb globe temperature
         c. Humiture charts
         d. Heat stress charts
         e. Temperature and humidity
      1. Exertional heat illness
         a. Signs and symptoms
         b. First aid treatment
            • heat cramps
            • heat exhaustion
            • heat stroke
   C. Air Quality
      1. Council of Governments (COG)
      2. Ozone levels
   D. Cold
      1. Establishment of cold guidelines
      2. Wind chill
   E. Lightning
      1. Dangers of
         a. Death
         b. Catastrophic injury (permanent disability)
      2. Methods of detection
         a. Flash to bang
         b. Lightning detectors
         c. Lightning predictor
   F. Allergies
      1. Anaphylaxis
      2. Triggers
         a. air quality
         b. temperature
         c. Insects
         d. Plants
         e. Food
         f. Latex
3. Treatment
   a. Epi pen
   b. Inhalers
   c. Antihistamines
      • over the counter (OTC) medications
      • prescription medications

G. Unforeseen Events
   1. In school versus out of school
   2. Environmental
      a. Tornado
      b. Hurricane
      c. Flood

V. Protection, Rest, Ice, Compression, Elevation (PRICE)
VI. Immobilization
   A. Ambulation
      1. 1-man assist
      2. 2-man carry
   B. Splinting/Bandaging
      1. Sling and swath
      2. Crutch use
      3. Splints
         a. Air
         b. Vacuum
         c. SAM
         d. Other

VII. Referral
   A. When to Refer
      1. Emergency medical services (EMS)
      2. Medical doctor (MD)
      3. Specialist
      4. Parent

VIII. Heartsaver First Aid course
IX. Basic Life Support for Healthcare Providers CPR/AED course
LEARNING ACTIVITIES/LABS

**Required:**
- splint, sling, and swath lab
- vital signs worksheets
- work in groups to list supplies of a basic first aid kit and then have groups share and create and create a master list
- American Heart Association BLS for Healthcare Providers CPR course
- American Heart Association Heartsaver First Aid course

**Extension Ideas:**
- lookup/measure current weather readings
- visit emergency medical services (EMS) facility, write observation report
- interview with emergency medical services/emergency room personnel
- assemble a first aid kit
  - List additional supplies needed for a specific sport and provide the rational
- have a doctor or emergency medical technician bring a kit to class, show and discuss contents
- arrange for the local emergency medical service to bring an ambulance and give students a tour
- demonstrate for students how to stock an emergency medical kit and explain how the supplies are used
**TEACHER FACT SHEET**

**Signs and Symptoms of Heat Problems:**
The following are common signs and symptoms related to heat illness, but are not intended to represent a complete list. In the event an athlete is suffering from one or more of the following, the athlete should be referred to appropriate allied health care or medical professional for full evaluation.

- Muscle spasms/cramps
- Heavy or profuse sweating
- Skin is flushed or cool and pale
- Headache
- Dizziness
- Rapid pulse, nausea, weakness
- Disoriented, confusion
- Elevated body core temperature
- Cessation of sweating
- Red, dry skin
- Shallow breathing and rapid pulse
- Loss of consciousness

**Heat Illness/Injury Facts:**
- Adolescents take longer to acclimatize to the heat than adults
- Weight loss of water greater than 3% of body weight significantly increases the risk of heat related illness
- 1.5 times the amount of water lost must be consumed to replace lost weight
- Unrelated illnesses causing vomiting and/or diarrhea will increase risk of heat related illnesses. These conditions should be brought to the attention of the ATC and/or coaching staff prior to participation and close monitoring of these individuals should take place during practice sessions and competition
- Athletes taking certain medications including diuretics, antihistamines, beta blockers and anti-cholinergics are at higher risk for heat illnesses
- Light colored breathable clothing can assist the body in cooling
- Athletes who are overweight, poorly conditioned, recovering from illness, lacking in sleep, or taking medications are at added risk for heat illnesses and should be monitored closely and/or have their participation level modified

**Recommendations for Fluid Replacement:**
- All schools should establish a Fluid Replacement Protocol for their facility
- All athletes should inform their coaches and/or athletic training staff of any pre-existing heat illness, gastrointestinal condition and/or medical complication prior to exercising in the heat
- Weigh athletes before and after each practice during hot weather. Athletes should conform to a restricted activity schedule if not within 1% of the previous days PRE-EXERCISE weight
- Replace fluids at a rate of 24 fluid ounces for every pound of body weight lost after exercise

- Athletes should be educated in the process of hydrating themselves as a 24 hour a
day process
• Athletes should begin every athletic activity well hydrated
• During exercise, the average person should drink 8 – 12 oz of fluid every 20 to 30 minutes
• Urine color is an easy method to determine hydration status. Light yellow to clear urine indicates a well-hydrated athlete
• Water should be available to athletes at all times and never be withheld from exercising individuals

Acclimatization to Heat:
Another way to help prevent heat stress is to become acclimatized to the weather. Acclimatization means becoming adapted to the weather or climate. The process takes 7 to 12 days. Studies have shown adolescents take longer to acclimatize to heat than adults. As a result of acclimatization, the sweating mechanism of a person is enhanced:
• onset of perspiration occurs earlier
• perspiration increases
• increase in blood volume with the more training an individual does
• improves supply of oxygen to the muscles
• heart rate decreases
• core body temperature does not rise as high during exercise

Other facts about heat illnesses and exercising in the heat:
• Dehydration of 1% to 2% of body weight begins to impact athletic performance
• Dehydration greater than 3% of body weight may increase an athlete’s risk of heat illness
• Sports drinks should contain less than 8% carbohydrate. Carbohydrate content greater than 8% compromises the rate of gastric emptying and should be avoided
• Wear light weight and light colored clothing
• Early morning commonly produces a humid environment and lower temperatures. Usually, as the sun rises, the temperature will increase and the humidity decreases. As the evening hours approach, the temperature decreases and the humidity will rise. Often, the most critical times to monitor athletes ability to exercise in hot weather occurs when the temperature rises quickly during the early morning prior to the sun burning off the humidity or during storms when the humidity remains high due to cloud cover
• A mild breeze can reduce the humidity on a particular field, as well as improve the evaporative process
• Field watering after practice sessions can help reduce the ambient humidity on or near an athletic field, thus reducing the heat stress on athletes
**Wet-bulb temperature** is measured using a standard mercury-in-glass thermometer, with the thermometer bulb wrapped in muslin, which is kept wet. The evaporation of water from the thermometer has a cooling effect, so the temperature indicated by the wet bulb thermometer is less than the temperature indicated by a dry-bulb (normal, unmodified) thermometer. The rate of evaporation from the wet-bulb thermometer depends on the humidity of the air - evaporation is slower when the air is already full of water vapor. For this reason, the difference in the temperatures indicated by the two thermometers gives a measure of atmospheric humidity.

**Fluid replacement should be at a rate of 24 oz for every pound of body weight lost after exercise.** The Heat Policy also applies to indoor activities.

- Light colored, loose clothing is suggested during activity in hot weather.
- Athletes are encouraged to wear sunscreen on exposed skin during hot, sunny conditions.
- Adequate fluid supply should be readily available at all times during activity in hot weather.
- Individuals poorly acclimatized, or poorly conditioned are at increased risk for heat related illness/injury and should be monitored closely or placed on a modified participation schedule.
- Athletes having a pre-existing dehydrated state (recent fever or gastro-intestinal illness) or pre-existing heat injury are at a much higher risk for heat related illness/injury and should be monitored closely or placed on a modified participation schedule.
- Medications including diuretics, antihistamines, beta blockers and anti-cholinergics increase the risk of heat illness/injury.
- Overweight athletes are at increased risk for heat illness/injury and should be monitored closely.
- Energy, ergogenic, and dietary supplements such as Creatine may cause an increase in dehydration and heat related illness and/or injury.
Teacher Fact Sheet

AMERICAN COLLEGE OF SPORTS MEDICINE CLARIFIES
INDICATORS FOR FLUID REPLACEMENT
Experts: Avoid Relying on Thirst Alone to Gauge Body’s Fluid Replacement

INDIANAPOLIS – The American College of Sports Medicine (ACSM) is pleased the recent Institute of Medicine (IOM) report, which set dietary intake levels for water, salt, and potassium for the maintenance of health and well-being, also indicates athletes and other active people have higher fluid replacement needs. While much of the report focuses on daily fluid requirements for the public, ACSM’s experts note that thirst is not the best indicator of how much these individuals should replace in terms of fluid and sodium losses following prolonged physical activity and/or heat exposure. Fluids before, during and after exercise are an important part of regulating body temperature and replacing body fluids lost through sweat.

"This report is important because it debunks some common misconceptions about fluid and electrolyte intake. However, it is important to clarify the report’s use of the phrase ‘on a daily basis.’ Daily fluid intake is governed mostly by behavioral factors, such as eating meals or even walking past a water fountain. Thirst is important during and after physical activity, especially in hot environmental conditions,” said ACSM President W. Larry Kenney, Ph.D. “However, the clear and important health message should be that thirst alone is not the best indicator of dehydration or the body’s fluid needs.”

Dehydration resulting from the failure to adequately replace fluids during exercise can lead to impaired heat dissipation, which can elevate body core temperature and increase strain on the cardiovascular system. Dehydration is a potential threat to all athletes, especially those who are not acclimatized for strenuous activity in hot environments.

To minimize the potential for heat exhaustion and other forms of heat illness, Kenney and other ACSM experts recommend water losses due to sweating during exercise be replaced at a rate close to or equal to the sweating rate. This can be accomplished by athletes weighing themselves before and after the exercise bout. This recommendation is based on sound scientific data and clinical experience dealing with athletes suffering from heat-related illness.

The report also makes mention of active people avoiding excessive fluid consumption which may, in the extreme, result in hyponatremia. While hyponatremia is a rare occurrence, it is a dangerous condition that may arise when athletes drink too much water, diluting the body’s sodium levels. It is most often seen in prolonged endurance athletes, such as those participating in marathons and triathlons. ACSM’s current hydration guidelines address this threat in addition to the more commonly occurring dehydration problem, and provide recommendations that can help prevent both health hazards for the athlete. Generally, persons participating in prolonged or strenuous physical activity (including both exercise and occupational settings) should continue to heed current hydration guidelines. Water and sports drinks are not dangerous to athletes when consumed as recommended – in volumes approximating sweat losses. Water in particular quenches the sensation of thirst before body fluid replacement is
achieved, so thirst should not be the only determinant of how much fluid is consumed under such conditions.

"Relying on thirst to determine an active individual’s fluid replacement needs is inadequate, especially so in older exercisers. As we age, thirst becomes an even poorer indicator of the body’s fluid needs," said Kenney.

In a similar vein, the IOM report’s guidance on chronic sodium intake should not be confused with recommendations that athletes liberally salt their food and consume sports drinks when acclimatizing to, or exercising in, hot conditions. While cutting back on overall sodium in the diet is sound advice for the majority of the public, athletes have a special need to replenish lost sodium stores in the short-term.


The American College of Sports Medicine is the largest sports medicine and exercise science organization in the world. More than 20,000 International, National, and Regional members are dedicated to advancing and integrating scientific research to provide educational and practical applications of exercise science and sports medicine.
Emergency Action Plan

Directions: Your group will be developing an emergency action plan for an assigned area. Circle the location from the list below and then create your plan by providing the following information.

Location: Main gym
Wrestling room
Field Hockey field
Baseball field
Tennis courts
Weight room
Cafeteria
Auditorium
Stadium

<table>
<thead>
<tr>
<th>List essential personnel in the order of response to an emergency</th>
<th>Describe the role or responsibilities of the person in an emergency situation</th>
</tr>
</thead>
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</table>

What equipment is necessary? List each item and where it is located.

Where will EMS enter the building or athletic field?
Injury First Aid Lab

Directions: With a partner, get the following materials:
1 Roll of pre-wrap
1 Triangle Bandage
1 SAMS splint, plank, or magazine

Assume that your partner has a possible fracture of the wrist

Splint the wrist and apply a sling.

Check off the steps as you provide first aid.

PARTNER 1                     PARTNER 2
1._____ Stabilize by not allowing to 1._____ Stabilize by not allowing to
    move (athlete can help with this) move (athlete can help with this)
2._____ Check for bleeding, deformity 2._____ Check for bleeding, deformity
3._____ Check for Pulse 3._____ Check for Pulse
4._____ Check for Sensation 4._____ Check for Sensation
5._____ Splint for injured structure 5._____ Splint for injured structure
6._____ Apply Sling/ triangle bandage 6._____ Apply Sling/ triangle bandage
7._____ Check Circulation 7._____ Check Circulation
8._____ Refer to Physician 8._____ Refer to Physician
Name:_____________________

PRICES Lab

**Directions:**
Work in a group of three to respond to the following situation. You will need one 4” elastic bandage and 1 bag of ice. Each person in your group should have the opportunity to be the primary caregiver.

**Situation:**
An athlete steps on another’s foot during a basketball game and falls to the floor. He/she is in significant pain and tells you that they “rolled their right ankle and felt a POP”. You see that it is swelling slightly, but there is no obvious deformity. He/she is tell you that they have sprained that same ankle twice before and it feels the same. They do not feel as though they can put any pressure on it, as just pressing on the floor causes significant pain.

**Task:**
Carry the athlete from the court using a two person carry. Apply the PRICES principle and care for this injury. Check off steps as your partner completes them.

**Checklist:**

**P**revent further harm

- Carry from the court (2-person carry)

**R**est

- Do not allow them to walk or put the leg down
- Sit or lay the athlete in a comfortable position that facilitates elevation.

**I**ce

- Ask if the athlete has ever had ice on before / Check for allergic reaction
- Explain why ice is applied
- Make proper size ice bag & press air out of the bag
- Spread ice evenly & apply over lateral ankle
- Set timer for 20 minutes
**Compression**

1. Explain why the compression wrap will be applied
2. Begin wrapping just proximal to the toes
3. Wrap should be snug
4. Continue wrapping in a spiral or figure 8’s until mid-calf
5. Be sure the wrap is comfortable
6. Check toes for proper circulation

**Elevation**

1. Explain why elevation is used
2. Lie athlete down. Position athlete so he/she can raise leg above heart
3. Raise leg above heart
4. Support at an angle that is comfortable and effective

**Splinting**

1. Explain how you would apply a splint that will immobilize the ankle
Primary Survey Lab

Name________________________

Situation:
You arrive on the scene and an athlete is face down, not moving. You are to get help and begin a primary Survey.

_____ Call 911
_____ A    _____ Bleeding
_____ B    _____ Heart Rate: _____ bpm
_____ C    _____ Respirations _____ rpm

_____ Assume possibility of neck injury

Primary Survey

1. What are the Objectives?

1. _________ To Survey Scene
2. _________ To Remove risk of further harm
3. _________ To Control bleeding
4. _________ To Immobilize
5. _________ To Check and record vital signs

2. If there is a significant injury to the brain and/or spine, what should you do? Why would you do that?

3. What are the criteria that you use to answer question #2

4. What are the necessary actions to take if there are no signs of life?
Module 8

Prevention of Sports Related Injuries

Objective:
- Students will recognize many factors that contribute to injury prevention including physical condition, protective equipment, playing environment, and rules.

Essential Knowledge:
- Students will recognize importance of flexibility and how to increase flexibility including techniques of static and ballistic stretching and proprioceptive neuromuscular facilitation (PNF)
- Students will recognize the importance of strength and explain strengthening principles of periodization, SAID principle and DAPRE technique
- Students will recognize importance of proprioception
- Students will recognize effect of field conditions on the prevention of injury
- Students will identify types and importance of protective equipment for sports

Materials Needed:
- sit-n-reach box
- pull-up bar
- balance training equipment (BOSU, wobble board)
- examples of protective equipment

Textbook Reference:
- Chapter 24

Supplemental Materials:
- flexibility
- websites:
  - Fitness Advantage
  - American College of Sports Medicine

Appropriate Supplemental Content:
- aerobic fitness testing
- VO2 max
- exercise physiology

Career Connection:
- One of the main roles of a sports medicine practitioner is the prevention of injury. Many of the principles and exercises used in injury prevention can be applied to injury rehabilitation.
CONTENT

Assessment:
- performance of fitness tests and compare to norms; identify areas of strength and weakness
- develop a personal fitness program containing all the components of fitness
- construct prevention of injury posters to display in school

Key Terms:
- cardiovascular fitness
- flexibility
- muscular endurance
- muscular strength
- proprioception
- percent body fat

Required Instructional Components:
Introduction to Prevention of Sports Related Injuries

I. Conditioning
   A. Somatotypes
      1. Ectomorph
      2. Mesomorph
      3. Endomorph
   B. Flexibility
      1. Importance
         a. Range of motion and relationship to injury
         b. Range of motion and relationship to strength
      2. How to develop
         a. Static
         b. Ballistic
         c. Proprioceptive neuromuscular facilitation (PNF)
   C. Muscular Strength and Endurance
      1. Definitions
      2. Importance
         a. Strength to overcome forces
         b. Endurance to prevent injury
      3. How to develop
         a. Periodization
         b. SAID principle
         c. DAPRE technique
   D. Cardio-Vascular Fitness
      1. Importance
      2. How to develop
   E. Balance and Agility
      1. Importance
         a. Balance and correlation to the risk of injury
      2. Developing strategy
         a. Proprioception
II. Equipment
   A. Standard
   B. Protective

III. Facility/Field Conditions
   A. Survey Field for Dangerous Conditions
      1. Foreign objects
      2. Sprinklers
      3. Holes/ruts

IV. Rules/Policies/Guidelines
   A. How rules help to prevent injury
   B. Changes in rules to prevent injury
      1. Spearing
      2. Goggles for girls lacrosse
      3. Mouth guards
      4. High stick
      5. Pitchers having required rest period
LEARNING ACTIVITIES/LABS

**Required:**
- With a partner, test balance during a one minute stork stand; count the number of times the elevated foot touches the ground during the one minute.
- Balance Error Scoring System (BESS) testing.
- Stretching lab – students demonstrate proper stretching techniques and learn why some stretches can be potentially harmful.

**Extension Ideas:**
- Evaluate an aerobic fitness testing protocol.
- Fitness testing – flexed-arm hang, push-ups, or pull-ups, PACER test, sit-and-reach, one mile run/walk, V-sit reach, sit & reach, back-saver, curl-ups, partial curl-ups.
- Tri-Fit assessment.
Module 9
Physiology of Injury and Pain Control

Objective:
• Students will demonstrate an understanding of the physiological effects of trauma to the body.

Essential Knowledge:
• Students will be able to explain the inflammatory response.
• Students will be able to explain the pain-spasm-pain cycle.
• Students will be able to explain the basic concept of the Gate Control theory of pain management.

Materials Needed:
• projection device and/or computer with appropriate presentation software

Supplemental Materials:
• Clover, J. Sports Medicine Essentials

Recommended Educational Materials:
• worksheets on pain-spasm-pain cycle
• pain control fact sheet

Inappropriate Content and Student Practices:
• causing or inflicting pain on others or themselves

Appropriate Supplemental Content:
• How different modalities can be used to control pain

Career Connection:
• Students will develop a basic understanding of how the body responds to trauma which can be applied to many health care professions.
CONTENT

Assessment:
- Diagram pain-spasm-pain cycle
- Outline the progressive stages of the inflammatory response
- Matching of pain control theories to basic modalities
- Selected or constructed response quiz/test

Key Terms:
- contusion
- ecchymosis
- edema
- effusion
- hematoma
- hypoxia
- inflammation
- spasm
- trauma
- vasoconstriction
- vasodilation
- hypoxia

Required Instructional Components:
Introduction to Physiology of Injury and Pain Control

I. Physiology of Injury
   A. Trauma and Cell Death
      1. Types of trauma
      2. Impact on tissue
   B. Pain Spasm
      1. Auto reaction to injury
      2. Guarding response
   C. Pain Cycle
   D. Secondary Hypoxic Response

II. Pain Control
   A. Theories of Pain Control
      1. Gate control
      2. Endogenous opiate
LEARNING ACTIVITIES/LABS

**Required:**
- Guided completion worksheet of pain-spasm-pain cycle

**Enrichment Activities:**
- Build abstract model of gate control theory
Pain-Spasm-Pain Cycle

**Word Bank:**
- Trauma
- Spasm
- Cell Death
- Pain

Diagram:

A. ↓
   
B. ↓
   
C. →
   
D. ↓
   
E. ↑

F. →

H. ↑
**Pain-Spasms-Pain Cycle (KEY)**

**Word Bank:**
- Trauma
- Spasm
- Cell Death
- Pain

A. Trauma

B. Pain

C. Spasm

D. Cell Death

E. Pain

F. Spasm

G. Cell Death

H. Pain

**Key:**
- a) Trauma
- b) Cell Death
- c) Pain
- d) Spasm
- e) Cell Death
- f) Pain
- g) Spasm
- h) Cell Death
Module 10

Injuries

Objective:
- Students will be able to identify the common causes, signs and symptoms, and treatment of frequently occurring sports related injuries.

Essential Knowledge:
- Students will demonstrate knowledge of sprains and strains
- Students will demonstrate knowledge of fractures and dislocations
- Students will demonstrate knowledge of mild traumatic brain injury (MTBI)
- Students will demonstrate knowledge of neck and spine injuries
- Students will demonstrate knowledge of dermatological conditions
- Students will demonstrate knowledge of environmental illnesses

Materials Needed:
- 3-D skeleton, anatomical poster of human body
- projection device and/or computer with appropriate presentation software

Textbook Reference:
- Cartwright LA, Pitney WA., Fundamentals of Athletic Training, Chapters 4, 9-15, 21

Supplemental Materials:
- Clover, J. Sports Medicine Essentials,
- The Anatomy Coloring Book

Inappropriate Content and Student Practices:
- Student performance of diagnostic special tests
- Student application of a protective and/or support device to an injury that would allow an athlete to return to participation
- Evaluation and initial treatment of any injury

Appropriate Supplemental Content:
- Teacher demonstration of special tests for injuries
- Guest speakers (American Cancer Society to speak about sun safety, dermatologist to speak about skin diseases)
- Goniometric measurements

Career Connection:
- Students will develop an understanding of common injuries that occur to active individuals. This knowledge can be applied in many different health care professions.
Assessment:
- Reaction Time Lab
- Selected or constructed response quiz/test
- Classify pictures of covered skin conditions as bacterial, viral, or fungal
- Mini research project – have students create a brochure about sun safety. Brochure should include at least five ways to safely enjoy the sun or outdoor activities.

Key Terms:
- Anaphylaxis
- Blister
- Concussion
- Dislocation
- Environmental conditions
- Fracture
- Frostbite
- Heat cramps
- Heat exhaustion
- Heat stress
- Heat stroke
- Hypothermia
- Impetigo
- Ligament
- Mild traumatic brain injury (MTBI)
- Ring worm
- Sprain
- Staph infection
- Strain
- Subluxation
- Tendon

Required Instructional Components:
Introduction to Injuries

I. Sprains
   A. Causes
   B. Signs/symptoms
   C. Treatment
   D. Examples
      1. Anterior talofibular ligament (ATF)
      2. Anterior cruciate ligament (ACL)
      3. Acromioclavicular ligament (AC)
      4. Sternoclavicular ligament (SC)
II. Strains
   A. Causes
   B. Signs/symptoms
   C. Treatment
   D. Examples
      1. Quadriceps
      2. Gastrocnemius
      3. Hamstring
      4. Trapezius

III. Fractures
   A. Causes
   B. Signs/symptoms
   C. Treatment
   D. Examples
      1. Stress
         -foot
         -tibia/fibula
      2. Greenstick
      3. Avulsion
      4. Spiral
      5. Comminuted
      6. Blowout
      7. Epiphyseal
      8. Compression
      9. Oblique
     10. Transverse

IV. Dislocations
   A. Causes
   B. Signs/symptoms
   C. Treatment
   D. Examples
      1. Glenohumeral joint
      2. Elbow
      3. Finger

V. Mild traumatic brain injury (MTBI)
   A. Causes
   B. Signs/symptoms
   C. Treatment

VI. Neck/spine injury
   A. Causes
   B. Signs/symptoms
   C. Treatment

VII. Dermatology
   A. Causes
B. Signs/symptoms
C. Treatment
D. Examples
  1. Ring worm
  2. Impetigo
  3. Staph infection
  4. Sun burn
  5. Blisters

VIII. Environmental
A. Causes
B. Signs/symptoms
C. Treatment
D. Examples
  1. Allergies/anaphylaxis
  2. Heat illness
  3. Cold related injury
LEARNING ACTIVITIES/LABS

**Required:**
- Poster activity: students will research one specific injury using various sources (i.e. Internet, books, and medical journals) and create a poster to illustrate their findings. Poster should include: picture or diagram, name of injury, injury mechanism, signs and symptoms, immediate management of injury, and one rehabilitation technique.
- Lab: Reaction Time
- Instructor demonstration of injury evaluation
- Palpation of bony and soft tissue anatomy for specific injury examples
Lab: Reaction Time

The purpose of this lab is to assess simple reaction time.

Examiner: ________________________________

Subject: ________________________________

Trial #1
- The subject will be seated at a table with dominant arm resting on table, hand extended over the edge.
- The examiner will hold the ruler just above the subject’s hand.
- The examiner will drop the ruler (vertically) and the subject must grab the ruler as quickly as possible.
- The examiner will record the point at which the subject grabbed the ruler (distance in centimeters)
- Subject may have 2 practice trials.
- Record three separate measurements and average.

<table>
<thead>
<tr>
<th>Trial #1</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance</td>
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</table>

Trial #2
- The subject shall safely spin 5 times in a counter-clockwise direction (spotter)
- Repeat the process above, recording three addition measurements

<table>
<thead>
<tr>
<th>Trial #2</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance</td>
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</tbody>
</table>

1. Compare the average distance between Trials #1 & #2. Which condition (dizzy/not dizzy) resulted in the greatest average distance?

2. What conclusion can you draw regarding the effects of head injury on reaction time?

3. Why is this important?
Module 11

Principles of Rehabilitation

Objective:
• Students will identify basic principles of rehabilitation.

Essential Knowledge:
• Students will recognize importance of flexibility following injury.
• Students will recognize importance of strength following injury.
• Students will recognize importance of muscular endurance following injury.
• Students will recognize importance of functional activity following injury.
• Students will understand concept of progression and understand how an injured athletic may be progressed back to full participation in their sport.

Materials Needed:
• Projection device and/or computer with appropriate presentation software
• Proprioception equipment: balance board, foam rollers, physio-balls, rubber tubing, BOSU, turtle.

Textbook Reference:
• Chapters 16 and 17

Supplemental Materials:

Recommended Educational Materials:
• Sample exercise programs utilizing the progression theory
• FCPS Position Statement Care of Injured Athlete While Participating in Athletics
• Requirements for student-based project

Inappropriate Content and Student Practices:
• It is inappropriate for a student to design and implement an injury rehabilitation program for an athlete
• Inappropriate touching or sharing of personal information of others (SRR)

Appropriate Supplemental Content:
• Physical therapist or other guest speaker to discuss rehabilitation for different types of injuries and populations.
• Field trip to a rehabilitation facility.

Career Connection:
• Students will develop an understanding of why rehabilitation is important, components of rehabilitation, and the concept of progression of rehabilitation. Rehabilitation is the responsibility of many allied health care professionals.
CONTENT

Assessment:
• successful completion of a selected response or constructed response quiz/test
• Rehabilitation program project

Key Terms:
• atrophy
• closed chain
• concentric
• dynamic
• eccentric
• hypertrophy
• isokinetic
• isometric
• isotonic contraction
• muscle endurance
• open chain
• overload
• progression
• proprioception
• proprioceptive neuromuscular facilitation (PNF)
• range of motion (ROM)
• Specific Adaptations to Imposed Demands (SAID) principle
• static

Required Instructional Components:
Introduction to Rehabilitation and Movement

I. Principles of Rehabilitation and Movement
   A. Physiology of Movement
   B. Biomechanical Levers
      1. Classification
         a. Class 1
         b. Class 2
         c. Class 3
   C. Muscle Contractile Forces and
      1. Isometric
      2. Isotonic
         a. Concentric
         b. Eccentric
      3. Open versus closed kinetic chain
      4. Isokinetic Equipment
   D. Concept of Progression
      1. Function/form breakdown
      2. SAID principle
      3. Progressive resistance exercises
   E. Range of Motion (ROM)
      1. Active
      2. Passive
      3. Active resistive
      4. Proprioceptive neuromuscular facilitation (PNF)
   F. Proprioception
      1. Static
2. Dynamic
3. Functional
4. Equipment
5. Biomechanical Ankle Platform System (BAPS Board)
6. Balance Board
7. Rocker Board
8. Balance Disc
9. Physio-Balls
10. Foam Roll
11. Plyo-Rebounder/Minitramp
12. Rubber Tubing “Steamboats”

G. Strength
1. Hypertrophy
2. Atrophy
3. Overload principle

H. Muscle Endurance
1. As related to injury
2. Low resistance over time allowing muscle to heal and regain endurance

I. Sports Specific
1. Progression of function specific to sport
2. Strength
3. Endurance
4. Proprioception
5. Range of motion (ROM)

J. Return to Play
1. Approval process/procedures
   a. Appropriate personnel
      • qualified, educated medical/health professional
      • role of parent, athlete
   b. Establish protocols in advance
      • pain
      • functional ability
      • absence of contra-indicators
      • approval of protocols
         ▪ medical director
         ▪ administration
         ▪ coaching staff
LEARNING ACTIVITIES/LABS

Required:
• Bring samples of rehabilitation equipment to class, or go to the athletic training room. Demonstrate different uses of the equipment.
• Utilize school's fitness room to demonstrate the different forms of strengthening
• Proprioception lab
  ▪ Set-up station around the room with different proprioception exercises (i.e. mini tramp, stork stand, BAPS board, foam)
  ▪ Divide students into groups and have them rotate to each station
  ▪ Each student should try the exercise at the station
• Therapeutic Exercise Lab

Extension Ideas:
• Field trip to a local rehabilitation facility
• Interview an occupational or physical therapist
• Visit a physical therapy clinic to learn about the types of equipment used for rehabilitation
FCPS POSITION STATEMENT
CARE OF THE INJURED ATHLETE WHILE PARTICIPATING IN
FCPS ATHLETICS

I. PURPOSE
To provide for the health and safety of student athletes by establishing procedures for the
treatment and disposition of injuries sustained by student athletes during participation in FCPS athletics.

II. SPORTS MEDICINE TEAM
The Sports Medicine Team for athletic activities at each school shall consist of the
athletic trainers and the designated team physician or physicians (who shall be
designated M.D. or D.O. and licensed and in good standing to practice their
profession in the Commonwealth of Virginia). Members of the Sports Medicine Team
shall be responsible for providing first responder emergency first aid services, follow-
up evaluation and treatment, and rehabilitation services for injured athletes under
FCPS supervision. In addition, the Sports Medicine Team** shall make the final
determination of when an injured athlete may resume participation in FCPS athletics.

III. TREATMENT OF INJURIES
The team physician(s) shall provide emergency medical care and treatment to
students injured while participating in FCPS athletics. In the absence of a team
physician, the athletic trainer shall bear primary responsibility for providing emergency
care and follow-up treatment to injured athletes. In the absence of a Sports Medicine
Team member, the team coach shall bear the responsibility for providing first
responder and emergency first aid to injured athletes. The team coach shall confer
with the athletic trainer prior to permitting further participation of the injured athlete in
an athletic practice or competition. In the event a physician charged with the care and
treatment of an injured athlete determines that the athlete should not resume
participation in FCPS athletics, the athlete shall not be permitted to participate for the
period of time specified in writing by the physician, unless that physician or another
physician subsequently provides written authorization for participation. In the event
the attending physician determines that the athlete is in suitable condition to resume
participation in FCPS athletics, the athlete shall be re-evaluated by the athletic trainer.
If it is the judgment of the athletic trainer that the student athlete is not in suitable
physical condition to resume full participation, a restricted participation schedule will
be formulated by the athletic trainer to allow for additional recovery/healing, and a
progressive return to full participation. In the event there is a disagreement with the
judgment of the athletic trainer after the re-evaluation, the student athlete will not
participate beyond the athletic trainer’s recommendations until the Sports Medicine
Team has an opportunity to consult with the treating physician, and an agreement
between the treating physician and the Sports Medicine Team is made.

IV. CARE BY THIRD PARTIES
In no event shall the medical care of an athlete within Fairfax County Public Schools
facilities involve the manipulation, massage, diagnosis or adjustment of an injury or
condition without the approval of a member of the Sports Medicine Team.
Proprioception Lab

Directions: Your group will rotate to each station. Have each member of your group take a turn performing the exercise correctly. Answer the questions below for each exercise.

Station Name: ________________________________

Briefly describe the purpose of the exercise:

This exercise could be made more challenging in the following way(s):

Station Name: ________________________________

Briefly describe the purpose of the exercise:

This exercise could be made more challenging in the following way(s):

Station Name: ________________________________

Briefly describe the purpose of the exercise:

This exercise could be made more challenging in the following way(s):
Station Name: ______________________________

Briefly describe the purpose of the exercise:

This exercise could be made more challenging in the following way(s):

Station Name: ______________________________

Briefly describe the purpose of the exercise:

This exercise could be made more challenging in the following way(s):
Name: __________________

Therapeutic Exercise Lab I

**Directions:** Complete the lab activities with a partner. Read and follow the directions.

List six primary components or phases of rehabilitation.

1. 
2. 
3. 
4. 
5. 
6. 

The key to rehabilitation is prioritizing the six primary components. You can then choose a variety of exercises or treatments to accomplish the goal.

Instructor will provide orientation and demonstration of all exercises. Try each of the exercises in the table below. Please ask if you don’t know how to do something. Identify the purpose(s) of each in the space provided. Check off each task as you go.

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Purpose/Objective</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthotron, Bike, or Leg Ext. Machine</td>
<td></td>
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<tr>
<td>BAPS Board</td>
<td></td>
<td></td>
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<tr>
<td>Slant board</td>
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<tr>
<td>Straight leg raises with cuff weights</td>
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<tr>
<td>Hop around the “X” (Box jumps)</td>
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<td></td>
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<tr>
<td>Body Blade or similar device</td>
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<td></td>
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<tr>
<td>Hip flexion using cuff weights</td>
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<td></td>
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<tr>
<td>“Steamboats” with tubing</td>
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</tr>
<tr>
<td>Balance on Theraball (sitting) over padded mat</td>
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<tr>
<td>Stand on one foot and play catch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do shoulder ABD using tubing as resistance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wrist curls using light dumbbell</td>
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</tbody>
</table>
Therapeutic Exercise Lab I - Page 2

Progression is a key concept in rehabilitation. In addition to progressing from one phase to another (ie, control inflammation → increase ROM → increase strength), it is important to progress within each phase as well. This is done by gradually increasing the difficulty of the exercise so it becomes more challenging.

How can we increase the difficulty of rehabilitation exercises?

Pick two exercises from the previous table. Describe your starting point (Phase 1), giving specific parameters related to duration and intensity. Next, indicate how you would change the exercise to make it more difficult (Phase 2). Describe a third level of intensity in Phase 3.

Phase 1
- Name of exercise: ______________________________
- Parameters
  - Duration: ______________________________
  - Intensity: ______________________________

Phase 2
- Name of exercise: ______________________________
- Parameters
  - Duration: ______________________________
  - Intensity: ______________________________

Phase 3
- Name of exercise: ______________________________
- Parameters
  - Duration: ______________________________
  - Intensity: ______________________________
Let’s put it all together…

Now, choose a joint in the body. Describe a series of at least 6 exercises designed to address each phase of the rehabilitation process. Indicate the name of the exercise and the purpose.

Example: Low Back

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Williams flexion exercises</td>
<td>Increase ROM at hip</td>
</tr>
<tr>
<td>Bent knee deadlift</td>
<td>Increase strength of legs and back</td>
</tr>
<tr>
<td>Balance on ball while playing catch</td>
<td>Proprioception/body balance</td>
</tr>
</tbody>
</table>

Body area:

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Purpose</th>
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Therapeutic Exercise Lab II

**Directions:** With a partner, answer the following questions.

We discussed the 6 primary components of any rehabilitation program:
- Decrease pain
- Decrease inflammation
- Increase ROM
- Increase strength
- Proprioception
- Functional progression

We will explore each of these components, both in class and in the lab. When finished, you should have a better understanding of the entire rehabilitation process and see how each of these components fit together.

**Pain**

#1- We all experience pain
#2- However, pain is a relative sensation
#3- “Soreness” and “pain”, while related, are different

How is pain managed?

How can we manage pain?

**Inflammation**

#1- Inflammation is a consequence of EVERY injury
#2- For the most part, the amount of swelling depends directly on the nature and severity of the injury
#3- Excessive inflammation causes pain, limits ROM, but it is actually part of the healing process

How is inflammation managed?
Range of Motion (ROM)

#1 - In an uninjured person, ROM depends on the following:
  - Natural laxity of joints
  - Muscular development
  - General level of fitness

#2 - Limited ROM in one joint can negatively affect other joints
  - Kinetic Chain

How can we safely increase ROM?

Strength

#1 - Strength is the body’s ability to generate force

#2 - The amount of strength a person has depends on how often their muscles are asked to work
  - Strength must be developed - it doesn’t just happen
  - To develop strength, one must repeatedly challenge the body’s muscles to do more
  - Over time, when faced with increasing demands, the body’s muscles adapt and become stronger

#3 - Muscles that are not used lose the ability to produce force (i.e. following an injury)

How do we develop strength?

What devices do we use to develop strength?
**Proprioception**
#1- Proprioception describes the body’s awareness of its position in space.
#2- To some extent, proprioception affects every athletic movement
#3- A decreased proprioceptive awareness can lead to injury
#4- Proprioception and balance are closely related

What can be done to increase proprioception?

**Functional Progression**
#1- The object of EVERY rehabilitation program is to return the injured individual to their pre-injury level of function or better.
#2- Beneficial to incorporate sport-specific movements in the rehabilitation process.
#3- Important to periodically assess an individual’s ability to perform sport specific skills
  • This evaluation gauges the person’s readiness to return to play

Pick a sport (or a position within a sport- shortstop, midfielder, QB). What specific skills are required to be successful in that sport or position?

How can the basic sport skills be incorporated into the rehabilitation program?

**Complete the activity outlined below with your partner.**

In the LAB, choose one exercise designed to work on each of the six components of rehabilitation.

Perform each exercise on the same body part.

Example: suppose you have sprained your ankle. What exercises would you perform to improve ROM, strength, etc of that ankle?

Write a paragraph describing your impressions of the rehabilitation process. Include a description of what was more difficult than you expected? What was easier than you expected?
Module 12

Therapeutic Modalities

Objective:
• Students will understand how therapeutic modalities affect pain and healing

Essential Knowledge:
• Students will identify different types of cryotherapy including ice bag, slush, ice massage and chemical cold packs; and how each is used.
• Students will identify different types of thermal modalities including moist heat pack, paraffin, chemical heat, and dry heating pad, and how each is used.
• Students will identify the appropriate use of electrical modalities including ultrasound and electrical stimulation.
• Students will identify the appropriate use of manual modalities including massage and mobilization.

Materials Needed:
• ice bags or other cold packs
• hydrocollator, hot packs, hot pack covers, and towels

Textbook Reference:
• Chapter 16 (Therapeutic Modalities section)

Supplemental Materials:
• Clover, J.  Sports Medicine Essentials
• Electrical stimulation unit, T.E.N.S. unit, ultrasound unit, paraffin unit
• other less common modalities

Recommended Educational Materials:
Worksheets on modality types and functions
• ice versus heat fact sheet
• Ice versus heat lab worksheet

Inappropriate Content and Student Practices:
• demonstration of manual modalities (traction, massage, mobilization)
• student use of modalities as restricted by state regulations

Appropriate Supplemental Content:
• Invite a physical therapist or chiropractor to class to demonstration electrical and manual modalities.

Career Connection:  Field trip to physical therapy clinic would be good culminating activity. Therapeutic modalities are used in the treatment and rehabilitation of injuries in many settings. Students will gain basic knowledge of the different types of modalities that may be used in a variety of health care professions.
CONTENT

Assessment:
• ice versus heat investigation
• observation summary of use of modalities in the sports medicine setting
• selected or constructed response quiz/test

Key Terms:
• compression therapy
• cryotherapy
• electrotherapy
• manual therapy
• modality
• muscle re-education
• therapeautic
• thermotherapy

Required Instructional Components:
Introduction to Therapeutic Modalities

I. Modalities
   A. Purpose of Modalities
      1. Pain control
      2. Inflammation control
      3. Muscle re-education
      4. Other
   B. Examples of Modalities
      1. Cryotherapy (cold)
         a. Ice pack
         b. Slush
         c. Cold whirlpool
         d. Ice massage
         e. Cold spray
         f. Cold compression
         g. Chemical cold packs
      2. Thermotherapy (heat)
         a. Moist heat
            • warm whirlpool
            • hot pack (hydrocollator)
            • paraffin
         b. Dry heat (radiant heat)
            • chemical (ThermaCare)
            • infrared lamp
            • diathermy
            • electric heat pad
      3. Electrical (direct and indirect)
         a. Electrical stimulation
         b. Laser
         c. Ultrasound
      4. Compression
         a. Jobst pump
b. Cryocuff
5. Manual modalities
   a. Traction
   b. Massage
   c. Mobilization
LEARNING ACTIVITIES/LABS

Required:
- Match modalities with purpose
- Modalities lab
- Ice and heat application for pain control lab

Extension Ideas:
- Interview with a physical therapist or certified athletic trainer regarding prevalence and use of specific modalities in their employment setting.
- Research electrical modalities
  - Historical development
  - Current use
  - Why some modalities are considered inappropriate?
Modalities Lab

This lab will provide an opportunity to experience and compare different modalities.

Directions: Instructor will divide students into 5 equal groups. Groups will rotate through 5 stations. Each student will have the opportunity to experience at least one modality while group members record time and sensations.

Ice bag
Review indications and contraindications and list below.

Indications: ___________________________________________________________

Contraindications:______________________________________________________

Application
- Place one scoop of ice into an ice bag and remove air
- Using the Flexi-wrap, apply the bag to the subject's forearm

Time: Student will finish the ice application after 20 minutes

Sensations: Record sensations and when the student experiences them in the table.

<table>
<thead>
<tr>
<th>SENSATION</th>
<th>TIME (minutes)</th>
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<tbody>
<tr>
<td>1</td>
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<td>20</td>
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</tbody>
</table>

Describe the overall experience:
Slush/Ice Bath

Review indications and contraindications and list below.

Indications: ___________________________________________________________

Contraindications: _____________________________________________________

Application
- Fill 2/3 of container with cold water
- Add ice to create a “slush” between 55 ° - 64 ° F
- Instruct individual to place hand or foot in slush

Time
- Instruct individual to keep the hand or foot in the slush for 10 minutes

Sensations: Record sensations and when the student experiences them in the table.

<table>
<thead>
<tr>
<th>SENSATION</th>
<th>TIME (minutes)</th>
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</thead>
<tbody>
<tr>
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Compare the slush/ice bath with the ice bag:
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132
Ice Massage

Review indications and contraindications and list below.

Indications:

Contraindications:

Application
- Place a towel under the treatment area to catch water from melting ice
- Secure an ice cup (paper, foam, reusable plastic) and rub the ice surface on your hand to melt away rough ice. Peel away cup to expose ice as needed.
- Briskly but gently rub the ice over the entire injured area
- Recommended treatment sites include the lower leg or forearm

Time
- Instruct the individual to massage for 7 minutes

Sensations: Record sensations and when the student experiences them in the table.

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<tr>
<th>SENSATION</th>
<th>TIME (minutes)</th>
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Compare the slush and ice bag with the ice cup

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133
Contrast Bath

Review indications and contraindications and list below.

Indications: ___________________________________________________________

Contraindications: ____________________________________________________

Application

• Prepare two containers, one filled with warm water (102°-110° F), the other filled with cold water and ice (50°-66° F)
• Place hand or foot in the cold water for 2 minutes
• After 2 minutes, remove hand or foot and place in warm water for 1 minute
• After 1 minute, remove hand or foot and place in slush for 2 minutes
• Repeat this cycle 3 times for a total of 15 minutes finishing in cold

Sensations: Record sensations and when the student experiences them in the table.

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Describe the experience.

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Moist Heat

Review indications and contraindications and list below.

Indications: __________________________________________________________

Contraindications:______________________________________________________

Application
- Remove a hot pack from the hydrocollator using the tongs
- Place the hot pack in a terrycloth cover
- Place the pack on the mid-thigh or shoulder of the person
- DO NOT lie on the pack!!!!!!!
- Instruct the individual to mention if the pack feels too hot so a layer of towels can be placed between the hot pack cover and the person.

Time
- Instruct the individual to keep the hot pack on for 10-15 minutes

Sensations: Record sensations and when the student experiences them in the table.

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<th>SENSATION</th>
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Describe the experience?
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Ice and Heat Application for Pain Control Lab

Ice Application

Instructions:
1) Place 1-2 scoops of ice in an ice bag.
2) Tie off bag without air.
3) Ask if the person has had any negative reactions to ice.
4) Apply ice to the ankle for 20 minutes with ace wrap, snug but not too tight.
5) Check for circulation and loss of sensation.
6) Write down the sensations in the order that you feel them.
7) Empty ice in to the sink & throw bag away.
8) Complete questions below.

Sensations during 20 minutes:

Partner 1:
1. ___________ 2. ___________ 3. ___________ 4. ___________

Partner 2:
1. ___________ 2. ___________ 3. ___________ 4. ___________

1) What is occurring to the blood vessels in the structures being cooled?

2) What are 2 purposes of applying cold?

3) When is the application of ice most beneficial for an injury?

4) Why should you apply ice for approximately 20 minutes?

5) Why might more superficial structures receive ice treatment for less time?

6) If the cold treatment is synthetic and not natural water ice, what should you do to protect the skin?

7) What type of pain control is being employed by applying ice?
Moist Heat Application

Instructions:
1) Obtain a moist heat pack from the instructor already wrapped in a terrycloth cover or six layers of toweling. At 170°F, students are not permitted to handle directly out of hydrocollator unit.
2) Place the hot pack on the lower back or thigh (do not lay on the hot pack).
3) Check after 1-2 minutes that it is not too hot / re-check at 5 minutes.
4) If it feels too hot, two more layers of toweling should be added.
5) Remove the hot pack and return to the instructor after 20 minutes.

Sensations during 20 minutes:

Partner 1:
1. ____________ 2. ____________ 3. ____________ 4. ____________

Partner 2:
1. ____________ 2. ____________ 3. ____________ 4. ____________

1) What is occurring to the blood vessels in the structures being heated?

2) What are 2 purposes of applying heat?

3) When is heat generally most beneficial for an injury?

4) When is heat NOT appropriate to use as a modality?

5) What type of pain control is being employed by applying heat?
Module 13
Nutrition

Objective:
- Students will identify components of proper nutrition and the relationship of proper nutrition to athletic performance.

Essential Knowledge:
- Students will identify proper eating for an active lifestyle.
- Students will identify how to maintain proper hydration including short and long term fluid replacement, and the use of water and sports drinks.
- Students will identify dangers and signs of dehydration.
- Students will recognize dangers associated with supplements and ergogenic aids including creatine, ephedra, caffeine, androstenedione, and protein supplements.
- Students will identify eating disorders and how they are related to athletics.

Materials Needed:
- projection device and/or computer with appropriate presentation software
- illustration or model of the gastrointestinal tract
- computer lab with internet access (mobile lab recommended)

Textbook Reference:
- Chapter 18 (Eating Disorders section)
- Chapter 28

Supplemental Materials:
- American College of Sports Medicine / American Dietetics Association (ACSM/ADA) Joint Position Statement “Nutrition and Athletic Performance” found at http://www.eatright.org
- Clover, J. Chapter 16
- Video: Body Image for Boys
- Nutrition information for fast food
- Teacher fact sheet

Recommended Educational Materials:
- Worksheet: How Much Should I Eat?
- Food Log and calculations

Inappropriate Content and Student Practices:
- benefits of supplements or ergogenic aids
- recommendation of supplements or ergogenic aids
- inappropriate for students to make recommendations for any ergogenic aids or supplements to others
**Appropriate Supplemental Content:**
- glycemic index (GI) and its effects on metabolism and athletic performance
- daily food intake analysis
- marketing and advertising of nutrition products

**Career Connection:**
- Proper nutrition is essential to staying healthy. Active individuals may need to modify their eating behaviors in various ways. Students will develop an understanding of the basic principles of good nutrition for active individuals.
CONTENT

Assessment:
- Analysis of sample daily food intake
- Complete body mass index (BMI) assignment
- Selected or constructed response quiz/test

Key Terms:
- anorexia athletica
- anorexia nervosa
- anthropometric measurement
- appetite
- body composition
- bulimia nervosa
- disordered eating
- eating disorders
- ergogenic aid
- hunger
- kilocalorie
- malnutrition
- metabolism
- minerals
- recommended daily allowance
- resting energy expenditure
- satiety
- supplements
- total energy expenditure
- vitamins

Required Instructional Components:
Introduction to Nutrition

I. Metabolism
   A. Define
   B. Balance of energy intake to energy expenditure
      1. weight loss
      2. weight gain
      3. maintain weight

II. Major Nutrients
   A. Carbohydrates
      1. major energy source
      2. 40-50% of diet for non-athletes and 60% of diet for athletes
      3. simple
         -honey
         -candy
         -fruit
         -soda
      4. complex
         -bread
         -cereal
         -vegetables
         -beans
         -nuts and seeds
         -pasta
   5. Fiber
      -peas
- corn
- apples
- bananas
- almonds
- kidney beans

B. Proteins
1. Amino acids
   - basic component of protein
   - form new tissues
   - repair damaged tissues
2. Teens need more than adults due to growth
3. Sources
   - meat and fish
   - Soy and tofu
   - dairy products
   - beans
4. 15-20% of athlete’s diet
5. Problems associated with ingesting too much protein
   - increase fat intake
   - loss of calcium from bones
   - dehydration

C. Fats
1. Necessary for life functions
2. Saturated
   - define
   - primarily animal products
   - limits/needs
3. Unsaturated
   - define
   - primarily plant products, oils
   - limits/needs
4. Health problems related to too much fat
   - heart disease
   - high blood pressure
   - diabetes
   - cancer
   - obesity
5. Cholesterol
   - fat-like substance found in all products containing animal fat
   - essential cholesterol helps perform cellular functions
   - non-essential cholesterol accumulates in blood vessels
   - level increases when we eat more saturated fat

D. Vitamins
1. help body perform functions
   - regulate metabolic process
2. found in all foods

E. Minerals
1. inorganic chemical elements
2. needed for life processes
- build bones and muscles
- conduct nerve impulses
- normal metabolism
- heart function
3. found in all food

F. Water
1. essential for life
2. about 57% of body weight
3. needed for:
   - kidney function and excretion
   - chemical reactions
   - sweating
   - blood flow
   - lubrication of joints
4. need at least 8, 8-ounce glasses per day
5. drink 1 liter for every 1,000 calories spent

III. Eating disorders
A. Anorexia
   1. Athletica- an eating disorder associated with high-competitive participation in athletic activity
   2. Nervosa- An eating disorder marked by prolonged decrease of appetite and refusal to eat, leading to self-starvation. It results in part from a distorted body image and intense fear of becoming fat, often linked to social pressures
      a. Losing 15-60% of body weight
B. Bulimia Nervosa- an eating disorder marked by the consumption of large amounts of food at one time (binge eating) followed by compensatory behavior such as self-induced vomiting, use of laxatives, excessive exercise, fasting or other practices to avoid weight gain.
      a. Most common eating disorder
      b. Usually don’t lose weight, gain weight
      c. Binge eating followed by purging
C. Disordered Eating- an abnormal change in eating pattern related to an illness, a stressful event, or a desire to improve one’s health or appearance. If it persists it may lead to an eating disorder.
   1. Problem sports
      a. Cheerleading
      b. Crew
      c. Cross country/track
      d. Dance
      e. Gymnastics
      f. Figure Skating
      g. Swimming
      h. Wrestling

IV. Athletic Nutrition
A. Pre-game meal
1. Content
   a. Should contain sufficient fluid to maintain hydration
   b. Low in fat and fiber to facilitate gastric emptying
   c. Relatively high in carbohydrates (CHO) preferably whole grains to prevent hunger
   d. Low Glycemic Index (GI) foods increase endurance capacity when compared to high GI foods.

2. Timing
   a. 3-4 hours before
   b. Low glycemic index snack 30-40 minutes before will increase fat oxidation
   c. Smaller meals should be eaten in closer proximity to the event/game

3. What to avoid
   a. Heavy syrups
   b. Whole milk
   c. High fat foods
   d. Foods that cause gas
   e. New foods

B. Post-game meal
   a. High in carbohydrates for restoration

C. Hydration
   a. 16 oz. of water for every pound of water weight lost within 24 hours.
   b. Water and 6% CHO drinks recommended
LEARNING ACTIVITIES/LABS

**Required:**
- Keep a 3-day log of food and fluid intake and write an analysis of nutritional habits
- Predict daily caloric need
- Research nutritional mineral on internet to complete worksheet and share with group members
- Students calculate their own body mass index (BMI) on [http://www.caloriecontrol.org/bmi.html](http://www.caloriecontrol.org/bmi.html)

**Extension Ideas:**
- Fad diet analysis
- Research prevalence of eating disorders in different sports
- Research an athlete who has been disqualified or banned from their sport due to a positive drug test. Have students present their findings to the class
- Compare and contrast drug testing programs of the NFL, NBA, MLB, IOC
- Evaluate advertisements about nutrition or supplements in magazines; how many advertisements were there, what images were used, what terms/phrases were used to promote product
- Research water and sports drinks and their use in hydration before, during, and after activity (6% CHO drinks) [http://www.gssiweb.com/sportssciencecenter/](http://www.gssiweb.com/sportssciencecenter/)
What are the Benefits of the Glycemic Index (GI)?

Eating a lot of high GI foods can be detrimental to your health because it pushes your body to extremes. This is especially true if you are overweight and sedentary. Switching to eating mainly low GI carbs that slowly trickle glucose into your blood stream keeps your energy levels balanced and means you will feel fuller, longer, between meals.

- Low GI diets help people lose and control weight
- Low GI diets increase the body's sensitivity to insulin
- Low GI carbs improve diabetes control
- Low GI carbs reduce the risk of heart disease
- Low GI carbs reduce blood cholesterol levels
- Low GI carbs can help you manage the symptoms of PCOS
- Low GI carbs reduce hunger for longer
- Low GI carbs prolong physical endurance
- High GI carbs help re-fuel carbohydrate stores after exercise

How to Switch to a Low GI Diet

The basic technique for eating the low GI way is simply a "this for that" approach - ie, swapping high GI carbs for low GI carbs. There is no need to count numbers or do any sort of mental arithmetic to make sure one is eating a healthy, low GI diet.

- Use breakfast cereals based on oats, barley and bran
- Use breads with wholegrains, stone-ground flour, sour dough
- Reduce the amount of potatoes you eat
- Enjoy all other types of fruit and vegetables
- Use Basmati, Doongara or Japanese koshihikari rice
- Enjoy pasta, noodles, quinoa
- Eat plenty of salad vegetables with a vinaigrette dressing
Prediction of Required Energy Expenditure (REE) as Basal Metabolic Rate

**Body Weight in pounds (lbs)**

**Height in inches**

**Men**  
REE = $66 + 6.23(\_\_\_\_\text{lb}) + 12.7(\_\_\_\_\text{in}) - 6.8(\_\_\_\_\text{age}) = \_\_\_\_\_\_\text{kcal/s/day}$

**Women**  
REE = $655 + 4.35(\_\_\_\_\text{lb}) + 4.7(\_\_\_\_\text{in}) – 4.7(\_\_\_\_\text{age}) = \_\_\_\_\_\_\text{kcal/s/day}$

**Physical activity Energy Expenditure as % of REE**

20-30% Sedentary  Mostly resting with little or no activity  
30-45% Light  Occasional unplanned activity e.g. going for a stroll  
45-65% Moderate  Daily planned activity, such as brisk walks to long jogs  
65-90% Heavy  Daily workouts requiring up to several hrs of continuous exercise  
90-120% Exceptional  Daily vigorous workouts for extended hours; training for Long endurance competition

Estimate your physical activity expenditure: \_\_\_\_\_\% x \_\_\_\_\_\text{(REE)} = \_\_\_\_\_\text{kcal/s/day}

Thermic effect of food = (REE + physical activity) x 0.1

Estimate your thermic effect: \_\_\_\_\_\text{(REE)} + \_\_\_\_\_\text{(activity)} x 0.1 = \_\_\_\_\_\text{kcal/s/day}

Total Energy Expenditure (TEE) = REE + physical activity + thermic effect of food

Calculate your TEE:

\_\_\_\_\_\text{(REE)} + \_\_\_\_\_\text{(activity)} + \_\_\_\_\_\text{(thermic)} = \_\_\_\_\_\text{kcal/s/day}

Weight loss and weight gain are based on the constant that 1 pound of fat = 3500 kcal

Projected change = Energy balance x 30 days/month

Projected weight change = Projected change / 3500 kcal/lb of fat

Example: Intake: 2500 kcal

TEE: 2400 kcal
Balance +100 kcal

Projected change = 3000 kcal
Projected weight change = $\frac{3000}{3500} = 0.85$ lb/month

$0.85$ lb/month x 12 = $=10.2$ lb/year

That’s 10 lbs a year gain from and an extra 100 calories a day!
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## Breakfast

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## Other:

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<tr>
<th>Calories From Each Nutrient:</th>
<th>CHO (gm x 4)</th>
<th>PRO (gm x 4)</th>
<th>FAT (gm x 7)</th>
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149
**Daily Calculations:**

My average daily caloric intake is:___________

I burn approximately ____________ calories per day (TEE)

My daily caloric balance is __________(indicate if a positive or negative number)

**Weekly Calculations:**

My weekly caloric intake is:____________

I burn approximately _____________ calories per week (TEE x 7)

I typically add __________ calories per week in snacks.

My weekly caloric balance is _________ (indicate if it is a positive or negative number)

**Calories from each nutrient divided by the total calories for the day:**

My percentage of CHO in my diet is: _______%  Is this appropriate?

My Percentage of Proteins: _____%  Is this appropriate?

My Percentage of Fats: _______%  Is this appropriate?

Goals:

A) Stay at my present body type
B) Lose body fat only
C) Gain body fat only
D) Gain muscle and keep same body fat
E) Lose body fat and gain muscle

I should eat ________ calories per day to reach my goal
(remember, only 2 lb fat loss per week maximum)

I should eat **more** of the following nutrients:

I should eat **less** of the following nutrients:

I should change my workouts the following ways to reach my goal:
<table>
<thead>
<tr>
<th>Mineral</th>
<th>Functions</th>
<th>RDA / Dietary Recommendations</th>
<th>Related Diseases</th>
<th>Food Sources</th>
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<td>Calcium</td>
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<tr>
<td>Zinc</td>
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</tbody>
</table>
How Much Should I Eat?

**Directions:** Complete the equations below to get an estimate of how many calories you need to eat in one day. This estimate will allow you to maintain your current weight.

**Calculation of Basal Metabolic Rate (BMR)**

Women: \[ \text{BMR} = 655 + (4.35 \times \text{weight in pounds}) + (4.7 \times \text{height in inches}) - (4.7 \times \text{age in years}) \]

Men: \[ \text{BMR} = 66 + (6.23 \times \text{weight in pounds}) + (12.7 \times \text{height in inches}) - (6.8 \times \text{age in years}) \]

**Calculation of Daily Caloric Need (Harris-Benedict Equation)**

Determine activity level and corresponding multiplier:

<table>
<thead>
<tr>
<th>Activity level</th>
<th>Description</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>Little or no exercise</td>
<td>1.2</td>
</tr>
<tr>
<td>Lightly active</td>
<td>Light exercise/sports 1-3days/week</td>
<td>1.375</td>
</tr>
<tr>
<td>Moderately active</td>
<td>Moderate exercise/sports 3-5 days/week</td>
<td>1.55</td>
</tr>
<tr>
<td>Very active</td>
<td>Hard exercise/sports 6-7 days/week</td>
<td>1.725</td>
</tr>
<tr>
<td>Extra active</td>
<td>Very hard exercise/sports &amp; physical job or training twice daily</td>
<td>1.9</td>
</tr>
</tbody>
</table>

Determine caloric need:

\[ \text{BMR} \times \text{activity multiplier} = \text{calories needed to maintain weight} \]
Teacher Fact Sheet

II. Gastrointestinal physiology
A. Pathway (in to out)
B. Absorption process
   1. Mouth
      a. Saliva converts starches to sugars
      b. Chewing increases surface area exposed
      c. Tongue sensations of sweet, sour, salty and bitter
   2. Stomach
      a. Approximately 4 cup capacity
      b. Churning and mixing
      c. Contents leaves stomach 2-4 hrs after consumption
   3. Small intestine
      a. Approximately 20 ft in length
      b. Proteins broken down into single amino acids and absorbed
      c. Liver secretes bile to digest fats
      d. Food stays for 3-10 hours
      e. Approximately 95% of food is digested by the time it leaves the small intestine
   4. Large intestine
      a. 4.5 ft long
      b. Bacteria digest plant fibers
      c. Water absorbed
      d. Indigestible/unabsorbed protein passes through
      e. Remnants stay in large intestine for 24-72 hours before being eliminated

III. Terminology
A. Kcalorie
B. RDA
C. Hunger
D. Malnutrition
E. Appetite
F. Satiety
G. Metabolism

IV. Daily nutritional needs
A. Basal metabolism
B. Energy expenditure
C. Food pyramid
   1. Old FDA
      a. Serving sizes
   2. Mediterranean
   3. Asian
   4. Vegetarian
   5. Latino
D. Recommended Daily Allowance (RDA)
   1. 60% of RDA is sufficient for most people
   2. Megadose- 10 or more times the RDA

E. Macro nutrients
   1. Carbohydrate (CHO)
      a. Definition- Made of C,H, O- a large group of compounds
         including sugars, starches and dietary fiber. CHO’s are the
         primary source of energy for all body functions.
      b. Function- used for energy. CHO’s play a critical role in
         maintaining blood glucose and replenishing muscle
         glycogen. When we don’t get enough CHO’s our body will
         take it from proteins.
      c. 4 kcals per gram
      d. Amount needed (RDA)- current recommendation is 55-60%
         of daily caloric intake should come from CHO’s. A minimum
         of 50 to 100 grams are required to prevent ketosis from
         incomplete fat metabolism.
      e. Simple
         i. Monosaccharides are the basic building blocks of all
            sugars. Includes glucose (aka dextrose), Fructose, &
            Galactose.
         ii. Disaccharides- formed by two monosaccharides.
             a) Sucrose- comes from plant sources; glucose-
                fructose
             b) Lactose- comes from dairy; glucose-
                galactose
             c) Maltose- formed by two glucose molecules
      f. Complex- aka Polysaccharides or “starches”; Long chains on
         monosaccharides.
         i. Some units may have as many as 3000 or more units
            of glucose
         ii. Found in fruits, vegetables and grains
         iii. “Other Carbohydrates” on the nutritional labels;
            referring to starches
         iv. Starch is the storage form of glucose on plants
      g. Fiber- an indigestible complex carbohydrate found in plants
         i. Not caloric because the body cannot digest it
         ii. Insoluble fiber- e.g. cellulose. Does not dissolve in
             water.
            a) Sources- fruits, vegetables, dried beans,
               seeds, popcorn, brown rice and whole grain
               products
         iii. Soluble fiber- e.g. gum and pectin. Does dissolve in
             water
            a) Sources- Apples, oranges, pears, peaches,
               grapes, vegetables, seeds, oat bran, dried
               beans, oatmeal, barley and rye.
iv. Provides bulk to food to move food through colon more quickly possibly helping prevent colon cancer
v. Soluble fiber may help control blood glucose by slowing sugar absorption.
vi. Soluble and insoluble fibers have been found to have a cholesterol lowering effect.
vii. Although it is not considered an essential nutrient, the U.S. Surgeon General and many health organizations recommend a diet containing 20-35 grams of fiber a day.

2. Fat/Lipids
   a. Definition- a group of fat-soluble compounds that includes triglycerides, sterols, and phospholipids; made up of mainly fatty acids
   b. Function
      i. Used for energy; provides 60% of body’s resting energy needs.
      ii. Transportation of fat-soluble substances.
      iii. Essential fatty acids are needed for regulation of the BP, synthesis of certain hormones, and repair of cell parts.
      iv. Contributes to the flavor and texture of foods.
   c. 9 kcal per gram
   d. Amount needed (RDA)- Based on a 2,000 kcal diet total fat intake should not exceed 65 grams (29% of caloric intake) per day and should not exceed 20 grams of saturated fat as part of that total. Cholesterol intake should not exceed 300mg per day.
   e. All sources contain a mixture of saturated and unsaturated fats.
   f. Saturated – all carbons in the chain are joined or filled with hydrogen. Forms a solid at room temperature.
      i. Sources- animal fat, palm and coconut oil, cocoa butter and chocolate
   g. Unsaturated- carbons joined by double bonds so there are two fewer bonds holding hydrogens. Forms a liquid at room temperature.
      i. Sources- olive, sunflower, corn, flaxseed, and soybean oils
   h. Trans-fatty acids
      i. Behaves like a saturated fat and has been implicated to raise cholesterol levels
      ii. Sources- hydrogenated and partially hydrogenated vegetable oils, stick and tub margarines, fast foods, baked goods
   i. Essential fatty acids-fatty acids our bodies cannot produce
      i. Omega-3
a) Function - overall effect of dilating blood vessels, discouraging blood clotting, and reducing inflammation
b) Minimum of 3g per day is recommended
c) Sources - olive, canola, and soybean oils; nuts and seeds; fish e.g. salmon, tuna, bluefish, mackerel, trout

ii. Omega-6
a) Function - overall effect of constricting blood vessels, promoting blood clotting, and promoting inflammation
b) Minimum of 7g per day is recommended
c) Sources - Flaxseed, soybean and canola oils

iii. Omega-9
a) Sources - olive oil

3. Protein
a. Definition – Large, complex compounds consisting of many amino acids connected in varying sequences and forming unique shapes. (22 Amino Acids (AA) found in food, 9 are essential (body can't synthesize)). Made of C, H, O & N
i. Complete – contains all 9 essential AAs
ii. Incomplete- does not contain all 9 essential AAs
b. Function
i. Used for energy when there is an insufficient amount of CHO's available.
ii. Acts as enzymes to speed up chemical reactions
iii. Act as hormones
iv. Form antibodies
v. Transport many key substances such as oxygen, vitamins and minerals
vi. Structural proteins are integral building blocks of cells and tissue (collagen, keratin)
vi. Motor Proteins
viii. Channels and pumps in cell membranes
c. 4 kcal per gram
d. Complementary proteins - 2 or more incomplete food proteins whose assortment of amino acids make up for, or complement, each other’s lack of specific essential AAs so that the combination provides sufficient of all the essential AAs.
i. Beans and rice
ii. Beans and corn or wheat tortillas
iii. Rice and lentils
iv. Chickpeas and sesame paste (hummus)
v. Peanut butter on bread
e. Sources - fish, red meat, poultry, dairy, nuts and seeds, beans and legumes
f. Amount needed (RDA)- 0.8 grams per kilogram of body weight for females and 0.9 grams per kilogram of body weight for males over the age of 14 years of age; or 8-11% of caloric intake
   i. The average American's protein intake is closer to 15% of caloric intake.
   ii. 1.8 grams per kg body weight during resistance training
   iii. 1.2-1.4g per kg body weight during endurance work (used more as a fuel source)
   iv. When the diet lacks protein, the body breaks down muscle, organ and other tissues for protein leading to increased susceptibility to infection, impaired digestion and absorption of nutrients.

F. Micro nutrients
   1. Vitamins- Organic molecules, individual units, needed in much smaller amounts than the macronutrients but are crucial in body function. They supply no energy but they do regulate reactions that supply us with energy.
      a. Water soluble vitamins
         i. Definition- Water-soluble and excess is excreted in urine;
            a) B complex
               1) Thiamin B1
               2) Riboflavin B2
               3) Niacin
               4) Pantothenic Acid
               5) Folate
               6) B6
               7) B12
               8) Biotin
            b) C
            ii. Function
               a) Vitamin B complex – coenzymes
               b) Vitamin C
                  1) Antioxidants
                  2) Collagen synthesis
                  3) Enhances the absorption of nonheme iron
                  4) Synthesis of cell compounds
                  5) Immune function
            iii. Sources
               a) Vitamin B complex- fortified cereals, animal products, oats, tomatoes, broccoli, egg yolks, dairy products, seeds and nuts, non-citrus fruits
               b) Vitamin C - potatoes, citrus fruits, tomatoes, broccoli, spinach, kiwi, strawberries
iv. Amount needed (RDA)
   a) Can be toxic at 10 times the RDA
b. Fat soluble vitamins
   i. Definition-Soluble in lipids and excess is stored in adipose tissue & liver; A,D,E,K
   ii. Function
      a) Vitamin A
         1) Beta-carotene is pro-vitamin form
         2) Retinoids- 3 active forms of Vitamin A in the body
         3) Crucial for proper growth, reproduction, immunity and cell differentiation, maintains healthy bones and vision.
         4) Antioxidants
      b) Vitamin D
         1) essential for bone health; deficiency associated with osteoporosis
         2) regulate blood calcium
      c) Vitamin E
         1) Antioxidant
         2) Preserving cell membranes
         3) Preserving red blood cells
         4) Scar healing
         5) Function enhanced by vitamin C and other antioxidants
         6) Has anti-clotting properties
      d) Vitamin K
         1) Bone health
         2) Blood clotting
   iii. Sources
      a) Vitamin A- beef and chicken liver, dark green and yellow-orange vegetables and orange fruits such as spinach, carrots, mangoes, cantaloupes
      b) Vitamin D- exposure to sunlight; oily fish, fortified foods, egg yolks, butter, liver
      c) Vitamin E – Vegetable oils; dark green leafy vegetables; nuts and seeds; strawberries
      d) Vitamin K – dark, green leafy vegetables, corn, tomatoes, and can be made in the GI tract by bacteria (10-15%)
iv. Amount needed (RDA)
   a) Vitamin A – 1,000 micrograms for males, 800 micrograms for females, & 2000 micrograms for strength/endurance athletes
   b) Vitamin D- 200-400 IU
   c) Can be toxic at 5 times the RDA
c. Minerals
i. Definition-Calcium, Iron, Potassium, Sodium, Zinc, Chromium Picolinate

ii. Function

iii. Sources

iv. Amount needed (RDA)

G. Nutritional labeling

1. Based on RDAs
2. How to measure serving sizes
3. Serving size vs. Supersize

H. Supplements/ergogenic aides- any substance, process, or procedure that may, or is perceived to, enhance performance through improved strength, speed, response time, or endurance of the athlete.

1. Ways they work
   a. Directly on the muscle fiber
   b. Counteract fatigue products
   c. Supply fuel needed for muscle contraction
   d. Affect cardiovascular system
   e. Affect respiratory system
   f. Delay the onset of fatigue or the perception of fatigue
   g. Counteract the inhibitory effects of the CNS on muscle contraction

2. Ephedra
   a. Other names: ephedrine, ma huang
   b. Stimulant
   c. Increases metabolism by heart rate, respiratory rate, blood pressure and opening airways.
   d. Linked to many deaths
      i. Heart attacks
      ii. Heat strokes
      iii. Since 1997 the FDA has documented at least 70 deaths and over 1,400 “adverse events” linked to ephedrine including stroke, seizures and psychotic episodes.
   e. Should not be used in conjunction with caffeine or other stimulants
      i. Red Bulls, etc. combines the two

3. Caffeine
   a. CNS stimulant, stimulates adipose lipolysis, diuretic and potentiator of muscle contraction
   b. Potential benefits- increases the mobilization of free fatty-acids (FFA), facilitates the release of Ca+ in skeletal muscle which increases the ability to generate rapid force development
   c. Contradictory evidence-those who normally ingest caffeine do not see the results; CHO intake before or during exercise negates the effects of caffeine; causes glycogen sparing;
has been shown to prolong endurance time and lower Rate of Perceived Exertion (RPE)

d. **Drawbacks**- diuretic function, can be addictive w/withdrawal symptoms; IOC limits 12 mg/L in urine, this would take 13.5mg/kg. The ergogenic effect occurs at 4.4mg/kg

4. **Androstenedione**
   a. Precursor to testosterone
   b. In large amounts can cause similar side effects as anabolic steroids
      i. Opposite gender effects
      ii. High blood pressure
      iii. Acne
      iv. Increase in cholesterol

5. **Creatine-**AA that forms the main component of creatine phosphate (CP).
   a. Contained in meats
   b. *Proposed benefit* - more CrP available, the greater the ability of skeletal muscles to maintain ATP concentration and sustain muscle contractions
   c. Unclear of the long-term effects
   d. Each molecule of creatine must attach itself to a molecule of water; increasing risk of dehydration

6. **Protein Supplements**
   a. Excess calories = fat gain, not muscle gain
   b. Purified protein supplements can contribute to calcium loss and harm bone health
   c. Excess protein = excess nitrogen which increases the risk of dehydration, increased urine production resulting in dehydration
   d. Single amino acids supplement can interfere with the absorption of other amino acids and alter neurotransmitter activity.

7. **CHO supplements** (e.g. power gels, Gatorade)
   a. Appropriate for endurance events more than one hour
   b. Should drink the same amount of water as CHO's consumed

V. **Hydration**

A. **Water**
   1. No RDA
   2. Men-16 cups(3.7L/day, 130 oz.); women 12 cups(2.7 L/day,95 oz.)

B. **Active vs. inactive**
   1. High carbs, fruits and vegetables, salads help delay dehydration

C. **Fluid replacement**
   1. How much to replace and how long it takes
      a. 16 oz. of water for every pound of water weight lost within 24 hours.
      b. Drink water before, during and after activity
   2. **Choices of replacement fluids**
      a. Water is best
b. Optimum temperature is 55° F for best absorption rate
c. 5% polymer sugar solution for longer than 45 min
d. No fruit juices or anything greater than 8% CHO
e. Avoid caffeinated and carbonated beverages

3. Short term sport vs. long term sport
   a. Should begin replacing fluids shortly after onset of exercise and continue consuming every 15-20 min

4. Environmental impact
   a. During 100% humidity - air completely saturated with water vapor
   b. Skin evaporation of sweat is impossible → important cooling system is closed
   c. Water beads and rolls off skin, no benefit when H2O doesn’t evaporate
   d. On dry day → air holds moisture and fluid evaporates from skin
   e. At high altitudes- lose more H2O, need to over-hydrate. This is mainly caused by increased water losses from the lungs due to the increased ventilation of cold, dry air. There is also increased urinary loss of water due to the diuretic effects of altitude and cold.
   f. Heat acclimatization is crucial

VI. Weight loss/gain
   A. Body composition
      1. Methods of measurement
         a. Hydrostatic Weighing
         b. Skinfold
         c. Circumference measurements
         d. Body Mass Index (BMI)
         e. Soft-tissue roentgenogram
         f. Bioelectrical Impedance Analysis (BIA)
         g. Near Infrared analysis
         h. Total Body Electrical Conductivity
         i. Air displacement (BODPOD)
         j. DEXA – Dual Energy X-ray Absorptiometer
   
B. Energy Balance
   1. Energy intake = caloric intake of ingested foods
   2. Energy Expenditure = Total Energy Expenditure (TEE)
   3. Intake > Expenditure = Positive Balance (Weight gain)
   4. Expenditure > Intake = Negative Balance (Weight loss)
   5. Resting Energy Expenditure (REE)
      a. Harris-Benedict Equation
   6. TEE = REE + physical activity + thermic effect of food consumed
   7. Weight loss and gain based on the constant that one lb of fat is 3500 kcals

C. Fad diets
   1. Atkins
   2. South Beach
3. Zone
4. Sugar-busters

D. Commercial diets
1. Using regular food
   a. Weight watchers
2. Pre-packaged food
   a. Jenny Craig
   b. Slimfast
   c. LA Weightloss

VII. Pre-game meal
A. Content
   i. Should contain sufficient fluid to maintain hydration
   ii. Low in fat and fiber to facilitate gastric emptying
   iii. Relatively high in carbohydrates (preferably whole grains to prevent hunger)
   iv. Low Glycemic Index (GI) foods increase endurance capacity when compared to high GI foods.

B. Timing
   i. 3-4 hours before
   ii. Low glycemic index snack 30-40 minutes before will increase fat oxidation
   iii. Smaller meals should be eaten in closer proximity to the event/game

C. What to avoid
   i. Heavy syrups
   ii. Whole milk
   iii. High fat foods
   iv. Foods that cause gas
   v. New foods

VIII. CHO loading
A. Appropriate only for endurance events longer than 80 minutes
   a. Not appropriate for football, 10Ks, hiking, basketball, soccer, weightlifting, etc.

B. Should not be done more than twice a year

C. Water gain with CHO
   a. 1g of CHO = 3g of water
   b. CHO drink recommended for intense exercise lasting more than 1 hour
Teacher Fact Sheet

Eating Disorders

- 5-10 million adolescent girls and women struggle with eating disorders
- 1 million boys and men struggle with eating disorders

The acceptance of natural beauty is compromised by the lack of diverse body types in the media.
- The average American woman is 5’4” and weighs 140 pounds
- The average American model is 5’11” and weighs 117 pounds
- Most fashion models are thinner than 98% of American women

- Almost half of American elementary school students between 1st and 3rd grades want to be thinner
- Almost half of American women are on a diet on any given day
- 1 in 4 men are on a diet on any given day
- 35% of “normal dieters” progress to pathological dieting. Of those, 1 in 4 will progress to partial or full syndrome eating disorders

- Americans spend over $40 billion on dieting and diet related products each year

Anorexia Nervosa - defined as losing 15-60% of body weight
- 3rd most common chronic illness in adolescent girls

Anorexic restrictors - lose by severe dieting
Anorexic bulimics - lose by purging

Symptoms - Major weight loss from excessive/continuous dieting
  - amenorrhea
  - emaciation
  - vegetarians that do it for fat intake reasons are suspect
  - compulsive exercising w/emaciation → orthopedic problems
  - lanugo and hair loss

Diagnosis - refusal to maintain normal body weight
  - intense fear of becoming fat even though they are underweight
  - distorted self-image → lack of self-confidence
  - denial of seriousness of emaciation and starvation
  - amenorrhea for at least 3 months

Complications
  - death rate of 4-20% of anorexia cases. Risk is two times higher for anorexic bulimics. Suicides are 50% of deaths
  - heart disease most common problem. Develop arrhythmias and bradycardia. Decreased blood flow and decreased blood pressure. Heart muscle starves →atrophy. Increased cholesterol levels.
- Electrolyte imbalance- Ca and K critical to electroconductivity of heart leading to arrhythmias. Dehydration.
- Change in reproductive hormones, thyroid functions and increase in stress hormones.
- amenorrhea $\rightarrow$ sterility and bone loss. Increased chance of miscarriage.
- retarded growth in children
- anemia is a common result
- GI complications

 Treatment
- moderate to severe cases admitted to hospital
- therapy
- nutritional counseling
- treatment of mental disorders through therapy and medication
- family therapy

 Who’s at Risk?
- avoidance personalities- perfectionists, emotionally inhibited, rarely rebel, seen as “good”, lack of self (low self-esteem)
- narcissism-inability to empathize with others, need for admiration, hypersensitive to criticism and defeat
- girls who participate in “appearance” sports (Ice skating, gymnastics, endurance athletes, and dancers
- boys that are in gymnastics or in weight class sports (boxing, rowing)

 Causes
- Emotional disorders- 40-60% of eating disorder patients experience depression or anxiety disorders
- Prone to Obsessive-Compulsive Disorders $\rightarrow$ excessive dieting, food obsessed
- Have mothers who tend to be over-involved in child’s life
- Overly critical fathers and brothers
- More than 50% of eating disorder patients show symptoms of Post-traumatic Stress Disorder
- Eight times more common in people who have relatives with anorexia

 Bulimia Nervosa- most common, binge-purge cycle
  Binge- usually 1000 calories, but can range from 100-2000 kcals
  Purge- vomiting or taking laxatives or diuretics
  Average bulimics have 14 cycles per week
  - normally don’t lose weight, gain weight

 Symptoms- usually subtle because they are not underweight
- preoccupied with food
- abuse diuretics, laxatives, emetics
- can be compulsive exercisers
- strain of vomiting can break blood vessels in the eyes
- salivary glands swell, pouch-like appearance around mouth
- Gastric acid erodes tooth enamel, cavities, gum disease
- Self-induce vomiters form cut and callouses on the tops of the knuckles
- Distorted body-imaging, tend to overestimate size
Diagnosis
- Two episodes per week for three months
- Categorized as purging or non-purging

Complications
- Less long-term effect if it doesn’t develop into anorexia
- Tooth erosion, cavities, gum disease
- Water retention, bloating
- Fluid loss → decrease in K levels → weakness, near paralysis, arrhythmias
- Rupture of esophagus
- Walls of rectum weakened by purging causing prolapse
- Prone to depression, at risk for impulsive behavior (promiscuity, kleptomania)
- Drug and alcohol abuse more common
- Self-destructive behaviors

Treatment
- Nutritional therapy
- Cognitive-behavioral therapy
- Medicate with antidepressants, Tofranil, Serotonin Reuptake Inhibitors (e.g. Prozac, Zoloft, Paxil, Effexor)
- Can be related to Seasonal Affective Behavior
- Hypnosis

Who’s at Risk
- Borderline personalities - unstable moods, thought patterns; can’t stand to be alone; demand constant attention; cause chaos by emotional weapons such as tantrums, suicide threats and hypochondria
- Narcissism
- Girls who go through puberty early. These girls start sport specific training before they see what body type they will end up with which may not suit the sport they have chosen.
- Poor body image

Causes:
- Anxiety disorders & depression
- Person’s mother tends to be critical and distant

Anorexia Athletica - combination of anorexia and bulimia characterized by an intense fear of becoming fat even when underweight. A weight loss of at least 5% normal body weight is usually done by the reduction of total caloric intake and compulsive exercising. Many will binge and purge or use diuretics or laxatives.

Common Symptoms
- Weight loss of 5% or more of expected body weight
- Delayed puberty or menstrual dysfunction
- Absence of medical illness or affective disorder explaining the weight reduction
- GI complaints
- Excessive fear of becoming obese
- Restriction of caloric intake
- Purging methods
- Binge eating
- Compulsive exercise outside the normal routine
- Disturbance of body image
Female Triad
(http://www.cruciblefitness.com/nutrition/etips/AthleticFemale.htm)
-decrease aerobic capacity
-bone loss
-decreased reaction time
-muscle spasm and cramps
-decreased strength and speed

A person can demonstrate disordered eating without having an eating disorder. Most patterns begin with eliminating certain foods such as red meats or sweets. The allowed foods progressively narrow. The more restrictive the behavior becomes the more compulsive all behavior becomes.

Common physical symptoms of disordered eating
-Dry skin,
-Brittle hair and nails
-cold intolerance
-blue-gray skin
-lightheadedness
-constipation

Warning Signs of Disordered Eating
1. A preoccupation with food, calories and weight
2. Repeated expressed concerns about being or feeling fat, even when weight is average or below average
3. Increasing criticism of one’s body
4. Secretly eating or stealing food
5. Eating large meals, then disappearing or making trips to the bathrooms
6. Consumption of large amounts of food not consistent with the athlete’s weight
7. Bloodshot eyes, especially after trips to the bathroom
8. Swollen parotid glands at the angle of the jaw, giving chipmunk like appearance
9. Vomiting, or odor of vomit in the bathroom
10. Wide fluctuations in weight in short periods of time
11. Excessive laxative use
12. Compulsive, excessive exercise that is not part of athlete’s training regimen
13. Periods of severe caloric restriction
14. Unwillingness to eat in front of others
15. Expression of self-depreciating thoughts following eating
16. Wearing baggy or layered clothing
17. Mood swings
18. Appearing preoccupied with the eating behavior of others
19. Continuous drinking of diet soda or water
Lipids

**Phospholipids** - Lecithin is basis of mayonnaise

**Steroids** - Central core consists of four fused rings and is shared by all steroids
- include estrogen, testosterone, corticosteroids such as cortisol/cortisone, aldosterone, and cholesterol

**Lipoproteins** - clusters of proteins and lipids
- means of carrying lipids, including cholesterol, around in blood
  - LDL - low density lipoprotein (the bad lipoprotein) associated with depositing of cholesterol on artery walls
  - HDL - high density lipoprotein (the good lipoprotein) associated with carrying cholesterol out of the bloodstream; is more dense and compact than LDL
  - chylomicron - carries dietary fat to cells

**Trans-fatty acids**
- Manufacturers “hydrogenate” unsaturated fats to make them solid at room temperature such as in margarine
- Hydrogenation breaks the double carbon bonds in unsaturated fats and artificially adds hydrogen
- Vegetable oils become partially hydrogenated
  - can form two different types of bonds:
    - cis bond - where attached pieces are on the same side
    - trans bond - attached pieces are on opposite sides known as trans-fatty acids
- When oil is reused for frying as in fast food restaurants more of the cis bonds are turned into trans bonds
- trans-fatty acids are thought to be cancer causing
- trans-fatty acids can negatively affect blood lipids, raising LDL levels and maybe lowering HDL levels
- trans-fatty acids found in margarine, cookies, crackers, snacks and fried foods

**Monounsaturated fats** - believed to be heart friendly, lowering the risk of heart disease and some types of cancer
- tend to increase levels of HDL and decrease LDL
- oils that have high levels of oleic acid are excellent sources of monounsaturated

**Polyunsaturated fats** - believed to be beneficial to the heart. Oils high in linoleic and linolenic fatty acids (polyunsaturated fats) are less stable when exposed to heat and air and often require hydrogenation to prevent the oil from breaking down. As oil breaks down it can produce off-flavors in foods.

**Saturated fats** - most often found in animal products such as meat, dairy and cheese. Associated with increase in serum cholesterol levels by raising levels of LDL cholesterol. Saturated fat content given on nutrition labels to help control intake.
**Essential Fatty acids**—essential for immune function, vision, formation of cell structures and hormone production

*Omega 3 fatty acids*—common form is alpha-linolenic acid. Found in fresh water fish (salmon, halibut, trout, tuna, and sardines) Can also be obtained from regular consumption of canola and soybean oil or nuts.
- tend to decrease blood clotting and inflammatory processes
- regular consumption of fish linked with decrease in risk of heart disease and better heart rhythm.

*Omega 6 fatty acids*—common form is linoleic acid
- tend to increase blood clotting and inflammatory processes

**Symptoms of lipid deficiency**
- scaly skin
- reduced growth & wound healing—edema (swelling)
- subcutaneous hemorrhage
- amenorrhea in females
- diarrhea
- infection
- anemia

Obesity—eating large amounts of dietary fat contributes to obesity (fast food and convenience foods)

Heart Disease—High LDL or Low HDL counts are a risk factor
- high blood triglycerides are associated with high LDL counts

<table>
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<tr>
<th>For age 20 &amp; above Total cholesterol</th>
<th>LDL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desirable</td>
<td>&lt;200</td>
</tr>
<tr>
<td>Borderline high</td>
<td>200-239</td>
</tr>
<tr>
<td>Very high</td>
<td>&gt;240</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adult Triglycerides levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
</tr>
<tr>
<td>Borderline high</td>
</tr>
<tr>
<td>High</td>
</tr>
<tr>
<td>Very high</td>
</tr>
</tbody>
</table>

Managing weight and blood pressure also decrease risk

**Dietary factors:**

Choose foods low in saturated fat and in total fat
- high in starch and fiber
- low in cholesterol
Cancer
Evidence suggest 30-40% of cancers are due to poor food choices
Emphasis placed on high intake of fresh fruits and vegetables
Limit alcohol intake
Limit intake of refined sugars, salt, red meat
Do not eat charred food; avoid burning meat juices, limit intake of foods cooked in direct flame

Fat breakdown must be synchronized with CHO breakdown. Glucose needed to breakdown fatty acids, if not they become ketone bodies

Fatty acids yield substantially more ATP than glucose

Lipogenesis- builds long-chain fatty acids

Endoplasmic reticulum builds triglycerides from fatty acids

Fats used during Oxygen Energy System (aerobic exercise) rely on CHO and fats

Endurance training increases the body's capacity to use fat as a fuel
use of fatty acids decrease with an increase in intensity; at 25% VO2 max fatty acids are major fuel, at 85% glucose is main fuel

Recommended 15-25% of total calories from fat from unsaturated fats
Appendix A: Glossary

Abduction
Movement away from the midline of the body.

Abrasion
Superficial injury to the skin or body tissue caused by a rubbing or scraping.

Acute injury
Injury with sudden onset and short duration.

Adduction
Movement of the body toward the midline of the body.

Agility
Gracefulness of a person that is quick and nimble.

Ambient Temperature
Environmental air temperature measured in degrees of Fahrenheit or Celsius.

Amputation
To cut off (a projecting body part), especially by surgery.

Anaphylaxis
Increased susceptibility or sensitivity to a foreign protein or toxin as the result of previous exposure to it.

Anatomical Position
Standing posture with the arms at the side and the palms of the hands facing forward.

Anorexia Athletica
Lack of or loss of appetite; aversion to food.

Anorexia Nervosa
Serious eating disorder marked by a pathological fear of weight gain and a loss of appetite. The anorexic has a low body weight and low body fat but may exercise excessively and avoid eating.

Anterior
Pertaining to the front of the body.
Anthropometric Measurement
Technique that deals with the measurement of the size, weight, and proportions of the human body.

Appendicular Skeleton
Bones of the extremities: shoulder girdle, arms, hands, legs, feet, and pelvis.

Appetite
Natural recurring desire for food.

Articular Cartilage
Thin layer of connective tissue covering the ends of long bones.

Assessment
Orderly collection of objective and subjective data on an athlete’s health status.

Atrophy
Weakness and wasting away of tissue or of an organ; diminution of the size of a body part.

Avulsion
Forcible tearing away of a part or a structure.

Axial Skeleton
Bones of the body that comprise the spine, chest, and head.

Ballistic Stretching
Bouncing type of movement used to lengthen or stretch tissue.

Biaxial
Having two axes.

Blister
Local swelling of the skin that contains watery fluid and is caused by burning, irritation, or friction injury.

Body Composition
Relative proportions by weight of fat and lean tissue.

Bulimia Nervosa
Eating disorder characterized by bouts of bingeing and self-induced vomiting.

Bursa
Fluid-filled sac between a tendon and a bone that eases the friction of muscle movement.
Carbohydrate
   Essential nutrient that provides the primary source of fuel for the body; sugars and starches.

Cardiovascular Endurance
   Ability of the cardiovascular system (heart, lungs, blood vessels) to provide oxygen for extended periods of exercise.

Catastrophic Injury
   Relates to an injury causing a permanently disabled condition or death.

Central Nervous System (CNS)
   Body system that consists of the brain and the spinal cord.

Certified Athletic Trainer (ATC)
   Person who manages the health and well-being of the physically active and athletic population.

Chronic Injury
   Injury with long onset and long duration.

Circumduction
   Movement of a limb in a circular pattern. This occurs when a ball-and-socket joint (shoulder or hip) or gliding joint (wrist) encompasses several directions with one motion.

Closed Kinetic Chain
   Sequence of actions in which the body part farthest from the trunk is fixed during movement; the distal joint segment is stationary (push-up or squat).

Compression
   Increasing physical pressure on a structure.

Compression Therapy
   Use of compression over a body part to limit or decrease blood flow.

Concentric (Positive) Contraction
   Muscle shortens while contracting against resistance.

Concussion
   Temporarily impaired brain function caused by an impact to the head or by a rotational force of the head. A more serious form of head injury that is characterized by one or more of the following features: loss of consciousness, amnesia, seizure, or change in mental activity.

Confidential
   Done or communicated in confidence; secret.
**Contusion**
Injury resulting from a direct blow or force that does not interrupt the skin; typically bruising is seen.

**Core Body Temperature**
Internal temperature of the human body necessary to maintain homeostasis. Usually approximates 98.6 degree Fahrenheit.

**Cryotherapy**
Therapeutic use of cold to reduce discomfort, limit progression of tissue edema, or to break a cycle of muscle spasm.

**Deep Posterior Compartment**
Located in the lower leg, contains the popliteus, flexor digitorum longus, flexor hallucis longus, and tibialis posterior muscles.

**Depression**
Movement of a body part downward in a frontal plane.

**Diagnosis**
Establishing the cause and nature of a specific medical condition.

**Diathermy**
Therapeutic generation of local heat in body tissues by high-frequency electromagnetic radiation, electric currents, or ultrasonic waves.

**Dislocation**
Injury that disrupts the alignment of bones at a joint, resulting in obvious deformity.

**Disordered Eating**
Ingestion of a non-nutritionally balanced diet.

**Distal**
Away from the midline.

**Dorsiflexion**
Flexing the toes and foot toward the body.

**Dynamic Stretching**
Actively moving a joint through the limits of its range of motion.

**Eating Disorder**
Psychological disorder, such as anorexia nervosa or bulimia, which involves insufficient or excessive food intake.

**Eccentric (Negative) Contraction**
Muscle lengthens while contracting against resistance.
Ecchymosis
Bruising caused by hemorrhage.

Ectomorph
Individual having a lean body build.

Edema
Tissue swelling caused by increased levels of intracellular fluid.

Effusion
Swelling within the joint cavity.

Electrical Stimulation (E-Stim)
Use of electrical impulses to produce muscle contractions

Electrotherapy
Treating disease by electrical devices.

Elevation
Movement of a body part upward in a frontal plane.

Emergency Action Plan (EAP)
Formal document outlining the steps that should be taken in the event of a medical crisis or disaster.

Emergency Medical Services (EMS)
Response system in a particular area that is called upon in the event of a medical crisis or traumatic injury. This usually consists of personnel trained in basic or advanced life support and the ambulance or equipped emergency vehicle to transport an injured victim to a hospital emergency room.

Endomorph
Individual characterized by relatively large amount of adipose tissue.

Endurance
Ability to withstand fatigue and tolerate prolonged activity.

Environmental Illness
Illness associated with extreme heat, such as heat exhaustion or heat stroke, or extreme cold, such as frostbite or hypothermia.

Ergogenic Aid
Any agent that enhances energy utilization, including energy production and efficiency, that is meant to enhance performance.

Ethics
Principles of morality.
Eversion
Movement that turns the sole of the foot outward, through subtalar joint motion.

Extension
Movement that increases the angle between two bones.

External Rotation
Rotation of a limb away from the midline.

Family Educational Rights and Privacy Act (FERPA)
Family Educational Rights and Privacy Act (FERPA) (20 U.S.C. § 1232g; 34 CFR Part 99) is a Federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education.

Fast Glycolytic Muscle Fiber
Fibers contracting rapidly using glycolisis as the source of energy.

Fast Oxidative Muscle Fiber
Fibers contracting rapidly using oxygen as the source of energy.

Fats
Basic nutritional compounds made up of fatty acids.

Flexibility
Ability to move a joint through a range of motion.

Flexion
Decreasing the angle of a joint.

Folliculitis
Inflammation of a hair follicle.

Fracture
Break in a bone or the act of breaking a bone.

Frontal Plane
Plane that separates the body into front and back halves.

Glasgow Coma Scale (GCS)
Standard guide used to rate various states of consciousness.

Glenohumeral Joint
Synovial ball-and–socket joint of the shoulder.

Gliding joint
Freely movable joint that allows bones to make a sliding motion.
Glycogen
Polysaccharide formed and stored.

Health Insurance Portability and Accountability Act (HIPPA)
Health Insurance Portability and Accountability Act (HIPAA) (Public Law 104-191) offers protections for millions of American workers that improve portability and continuity of health insurance coverage.

Heat Stress Disorder
Group of conditions due to overexposure or overexertion in excess environmental temperature.

Hematoma
Formation caused by pooling of blood and fluid within a tissue space.

Hemorrhage
Escape of blood from vessels; bleeding.

History
Portion of the assessment process consisting of understanding the injured athlete’s chief complaint, determining exactly how the injury occurred, assessing functional problems that exist, noting signs and symptoms, and determining preexisting medical conditions.

Horizontal
Parallel to or in the plane of the horizon.

Horizontal Abduction
Movement of the glenohumeral joint away from the midline with the humerus in 90 degrees of flexion through the transverse plane.

Horizontal Adduction
Movement of the glenohumeral joint toward the midline with the humerus in 90 degrees of flexion through the transverse plane.

Hydration
Level of fluid balance.

Hydrocollator
Stainless steel container filled with hot water that is used to maintain silica-gel packs at a constant 160-170 degrees for use as a heat therapy modality.

Hyperextension
Extension of a joint beyond the natural range of motion.

Hypertrophy
Increase in the size of muscle tissue.
**Hypoxia**  
Lack of an adequate amount of oxygen supply to tissue.

**Impetigo**  
Contagious skin disease characterized by itching and the development of a yellow crusted exterior with the appearance of an abrasion.

**Inferior**  
One point, or structure, being lower than another.

**Inflammation**  
Localized protective process that occurs when tissues are subjected to chemical or physical trauma; pain, heat, redness, and swelling occur.

**Insertion**  
Part of the skeletal muscle that is attached to the bone that moves about a joint.

**Inspection**  
Act of visual examination or review.

**Internal Rotation**  
Rotation of a limb toward the midline.

**Inversion**  
Movement that turns the sole of the foot inward, toward the midline of the body.

**Isokinetic Equipment**  
Machine that allows the muscle to contract only at a specific speed.

**Isometric Contraction**  
Movement that causes the muscle to contract against resistance without changing its length.

**Isotonic Contraction**  
Movement that causes the muscle fibers to shorten and lengthen against a consistent resistance when lifting and lowering a weight.

**Joint Mobilization**  
Therapeutic technique using passive movement of a joint.

**Kilocalorie**  
Amount of energy required to raise 1 kg of water 1 degree C. Most commonly used in nutritional assessment of food and referred to as a calorie.

**Laceration**  
Injury that results from a tear in the skin; often with a jagged edge.
Lateral
Pertaining to point of reference away from the midline of the body.

Lateral Flexion
Side bending of the trunk in the frontal plane.

Liability
Legal responsibility and accountability to another person.

Longitudinal Axis
Of, relating to, or occurring in the lengthwise dimension, e.g., a *longitudinal* bone fracture; Extending along or relating to the anteroposterior axis of a body or part.

Malnutrition
Faulty nutrition due to inadequate or unbalanced intake of nutrients or their impaired assimilation or utilization.

Manual Therapy
Form of therapy that the practitioner uses his hands to move or create resistance for the patient.

Massage
Kneading and stroking of muscles and other soft tissue for therapeutic purposes.

Medial
Toward the midline of the body.

Medical Malpractice
Sometimes referred to as medical negligence, occurs when a health care provider violates the governing standard of care when providing treatment to a patient, causing the patient to suffer an unfavorable result. Medical malpractice can result from an action taken by the medical practitioner, or by the failure to take a medically appropriate action.

Mesomorph
Individual with a robust, muscular body build (a somatotype).

Metabolism
Chemical processes occurring within a living cell or organism that are necessary for the maintenance of life. In metabolism some substances are broken down to yield energy for vital processes while other substances, necessary for life, are synthesized.

Minerals
Inorganic substance involved in many biochemical and physiological processes required for the growth, maintenance, repair, and health of tissues and bones.
**Modality**
Treatment of injury, including heating, cooling, and mechanical/electrical methods.

**Muscular Endurance**
Ability of a muscle to perform repetitive movements for an extended period. It can be developed by using a large number of repetitions and a small amount of weight.

**Muscular Strength**
Ability to exert force against a resistance. It can be developed by using a low number of repetitions and heavy weight.

**Neuropraxia**
Cessation of function of a nerve without degenerative changes.

**Nutrition**
Process by which a living organism assimilates food and uses it for growth and replacement of tissues; science or study that deals with food and nourishment.

**Objective**
Sign of a disease or injury observed by someone other than the patient.

**Oblique**
Neither perpendicular nor parallel from the base. Being on an incline or slanted.

**Observation**
Noting of a fact, occurrence or visual inspection of injury.

**Open Kinematic Chain**
Sequence of action in which the body part farthest from the trunk is free during movement.

**Opposition**
Movement of the thumb to touch each finger.

**Origin**
Part of the skeletal muscle that is attached to the stationary bone.

**Overload**
Progressive overworking of muscles, at a controlled, increased rate, to achieve consistent gains in strength.

**Palpation**
Manually identifying structures and tissue integrity during examination.
Paraffin
Wax warmed to a liquid state, used to provide heat therapy.

Periodization
Varying conditioning techniques in training specificity, intensity, and volume organized in planned periods or cycles within the overall program.

Peripheral Nervous System (PNS)
Division of the nervous system, made up of 12 pairs of cranial nerves and 31 pairs of spinal nerves, and autonomic nerves.

Personal Health Information (PHI)
Confidential personal information related to the health of an individual.

Plantar Flexion
Movement that extends the ankle and points the toes.

Posterior
Toward the back of the body. Affecting the back or dorsal surface

Progression
Advancement of an exercise or activity from simple to complex, slow speeds to fast speeds, and less aggressive activities to more aggressive activities.

Pronation of the Ankle
Eversion and abduction of the foot.

Pronation of the Forearm
Rotation of the forearm in such a way that the palm of the hand faces backward in anatomical position or downward when the arm is flexed to a right angle of the body.

Prone
Having the front or ventral surface downward; especially: lying facedown.

Proprioception
Ability of the body to give information to the brain regarding the body’s position, movements being performed, and forces acting on it.

Proprioceptive Neuromuscular Facilitation (PNF)
Combination of relaxing and contracting of the muscles; an initial isometric contraction against maximum resistance is held at the end of the range of motion, followed by relaxation and passive stretching.

Protein
Essential nutrient that contains nitrogen and helps the body grow, build, and repair tissue.
**Protraction**
Movement of a body part forward in a transverse plane.

**Proximal**
Toward the attachment of the limb to the trunk.

**Psychrometer**
Device used to determine dry bulb temperature, humidity and wet bulb temperature.

**Puncture Wound**
Injury caused by a sharp object that penetrates the skin.

**Quadriplegia**
Inability to move arms and legs.

**Radial Deviation**
Wrist movement away from the radius in the frontal plane.

**Range of Motion (ROM)**
Degrees a joint can be moved, usually its range of flexion and extension.

**Recommended Daily Allowance**
Daily dietary intake level of a nutrient that is considered sufficient to meet the requirements of nearly all (97-98%) healthy individuals in each life-stage and gender group. The RDAs are established by the Food and Nutrition Board of the (US) National Academy of Sciences.

**Relative Humidity**
Ratio of the amount of water vapor in the air at a specific temperature to the maximum amount that the air could hold at that temperature (expressed as %).

**Resting Energy Expenditure**
Daily calories burned by an individual when not involved in physical activity.

**Retraction**
Occurs when scapulas are adducted or pulled together.

**Ringworm**
Several Contagious diseases of the skin, hair, or nails of humans and domestic animals caused by fungi (as of the genus *Trichophyton*) and characterized by ring-shaped discolored patches on the skin that are covered with vesicles and scales called also *tinea*.

**SAID Principle**
Specific Adaptations to Imposed Demands. Conditioning technique that produces adaptations specific to the activity performed and only in the muscles and energy systems that are stressed.
Sagital Axis
Axis around which upward and downward rotation occurs.

Sagital Plane
Plane that divides the body into left and right halves.

Satiety
Quality or state of being fed or gratified to or beyond capacity.

Slow Oxidative Muscle Fibers
Muscle fibers that contract relatively slowly using oxygen to help utilize energy.

SOAP Note
Document outlining the findings of an injury assessment using Subjective, Objective, Assessment, and Plan of action components.

Somatotype
Structure or build of a person, displaying the characteristics of an ectomorph, an endomorph, or a mesomorph; classify according to physique.

Spasm
Sudden, violent, involuntary contraction of muscle or of a hollow organ (as an artery, the colon, or the esophagus) that consists largely of involuntary muscle fibers; state or condition of a muscle or organ affected with spasms.

Sprain
Traction, tearing, or over stretching injury to a ligament.

Staphylococcus
Genus of gram-positive bacteria normally present on the skin and in the upper respiratory tract and prevalent in localized infections.

Static Stretching
Gradual, slow stretching of the muscle through the entire range of motion, pausing at the end and holding that position for at least 10 seconds.

Strain
Twisting or pulling injury that occurs to a muscle or tendon through overuse, overstretch, or overexertion.

Strength
Capacity to create force against resistance.

Streptococcus
Genus of gram-positive bacteria found in the throat, respiratory tract, and intestinal tract.
Subjective
One's perception of one's own states and processes not observable by an examiner, e.g., a subjective symptom like headache or blurred vision.

Subluxation
Incomplete or partial dislocation of a joint.

Superficial
Close to the body's outer surface.

Superior
One point, or structure, being higher than another.

Supination of the Ankle
Movement of the ankle that involves turning the sole of the foot upward.

Supination of the Forearm
Movement of the forearm that involves turning the palm of the hand upward.

Supine
Lying on the back or with the face upward.

Supplement
Something added that completes, makes up for a deficiency, or extends or strengthens the whole; e.g., dietary supplements.

Synovial Fluid
Clear, viscous lubricating fluid secreted by membranes in joint cavities, sheaths of tendons, and bursae.

Therapeutic
Of or relating to the treatment of disease or disorders by remedial agents or methods; Having or exhibiting healing powers: a therapeutic agent; therapeutic exercises.

Thermotherapy
Treatment of injury or disease by therapeutic application of heat.

Tinea
Group of fungal infections that cause ringworm, jock itch, athlete's foot, and various other skin diseases.

Tinea Cruris
Fungal infection found in the groin area; often referred to as jock itch.

Tinea Pedis
Fungal infection that thrives in warmth and dampness in the interdigital spaces and soles. Often referred to as athlete's foot.
**Total Energy Expenditure (TEE)**
Total amount of calories burned in all daily activities.

**Traction**
Pulling of or tension established in one body part by another; a pulling force exerted on a skeletal structure (as in a fracture) by means of a special device or apparatus, e.g., a traction splint.

**Transverse Axis**
Axis that allows left and right rotation of a joint.

**Transverse Plane**
Plane that divides the body into top and bottom halves.

**Trauma**
Stress incurred by the body that may lead to a wound, injury or condition.

**Triaxial**
Having three axes.

**Uniaxial**
Of, relating to, or affecting one axis.

**Ulnar Deviation**
Wrist movement away from the ulna in the frontal plane.

**Ultrasound (US)**
High frequency sound waves that can be used to create therapeutic deep heating.

**Vasoconstriction**
Decrease in the diameter of a blood vessel especially constriction of arterioles leading to a decreased blood flow to a body part.

**Vasodilation**
Increase in the diameter of a blood vessel that results from relaxation of smooth muscle within the vessel wall. This causes an increase in blood flow.

**Vertical**
Of or relating to the vertex of the head; being or situated at right angles to the horizon; upright.

**Vitamin**
One of the six nutrients that is a complex organic compound required in small amounts for normal growth and metabolic processes.
**Wet Bulb Temperature**

Measurement using a standard mercury-in-glass thermometer, with the thermometer bulb wrapped in muslin, which is kept wet. The evaporation of water from the thermometer has a cooling effect, so the temperature indicated by the wet bulb thermometer is less than the temperature indicated by a dry-bulb (normal, unmodified) thermometer. The rate of evaporation from the wet-bulb thermometer depends on the humidity of the air - evaporation is slower when the air is already full of water vapor. For this reason, the difference in the temperatures indicated by the two thermometers gives a measure of atmospheric humidity.
Appendix B: Websites

American College of Sports Medicine
   http://www.acsm.org

American Physical Therapy Association:
   http://www.apta.org

Anatomy:
   http://www.gwc.maricopa.edu/class/bio201/index.htm
   http://www.sohp.soton.ac.uk/biosci/anatomy1/htm

Discovery School.com (Puzzlemaker):
   http://www.puzzlemaker.com

Female Triad:
   http://www.cruciblefitness.com/nutrition/etips/AthleticFemale.htm

Fitness Advantage:
   http://www.fitness-advantage.com

Gatorade Science Institute
   http://www.gssiweb.com/sportssciencecenter/

International Fitness Professionals Association:
   http://www.ifpa-fitness.com

National Athletic Trainers’ Association:
   http://www.nata.org

National Strength and Conditioning Association Certification Commission:
   http://www.nsca-cc.org

University of Minnesota, WebAnatomy:
   http://www.gen.umn.edu/faculty_staff/jensen/1135/webanatomy/

Family Education Rights and Privacy Act (FERPA)

Fairfax County Public Schools Factsheets

Health Insurance Portability and Accountability Act of 1996
   http://www.hhs.gov/ocr/hipaa/

Virginia “Good Samaritan” Law
Appendix C: Approved Instructional Materials

Recommended Student Text and Publications


Supplemental Text and Publications


American College of Sports Medicine / American Dietetics Association (ACSM/ADA) Joint Position Statement “Nutrition and Athletic Performance” found at http://www.eatright.org


Special edition on concussion management *J Athl Train*. 2001; 36(3)

Approved Sports Medicine Videos


Summary: Provides an introduction to the skeletal system, emphasizing its importance in providing structural support for the body. Topics covered include how the skeletal and muscular systems work together to enable movement; the relationship between bones and joints; connective tissue; functions of the skeletal system, including support, protection, movement, storage, and blood cell production; and the types of bones and joints.


Summary: The widespread nature of muscle tissue in the body is introduced as this program looks at the complex movements involved in a few different exercises. The nature of muscle itself is examined, from its gross structure to its detailed microstructure, where chemical energy is harnessed to produce movement. As muscle forms the basis for much of a person’s body shape, we explore the ways in which this shape can be changed by the activities we perform. The program provides an introduction to the following topics:

- Location and uses of smooth, skeletal, and cardiac muscle
- Muscle structure and function
- Aerobic and anaerobic respiration
- Relationship between muscle mass and body shape
- Physical fitness


Summary: As the idealized male physique continues to be hyped in movies, on TV, in magazines, and on billboards, a rapidly growing number of men are becoming obsessed with appearance. Men spend billions on gym memberships and home exercise equipment – and women are no longer alone in battling anorexia and body dysmorphic disorder. This program explores some of the issues facing young men today as they struggle to define themselves amidst the flood of media-generated images of male physical perfection. Experts as well as a number of young patients grapple with problems such as steroid abuse, eating disorders, exercise addiction, and phony food supplements.
Appendix D: Materials for First Aid and CPR

First Aid: American Heart Association Heartsaver First Aid Materials and Equipment

EQUIPMENT
1. Student workbook
2. Instructor manual with lesson maps
3. Skill testing checklist
4. TV and DVD player, VCR, or computer with projector and screen
5. Course DVDs or videotapes
6. Pair of latex gloves
7. Epinephrine auto-injector trainer
8. Small stack of gauze pads (4 x 4 inches)
9. 1 bandage/roll gauze
10. 1 sheet, blanket, or other cover
11. 1 item about 12 inches high to support elevated legs
12. Magazine or other household products for splinting

CPR: Basic Life Support for Healthcare Providers Course Materials

EQUIPMENT

The following list of recommended equipment is based on a ratio of 6 participants to 1 instructor.
1. TV with DVD or computer with projector and screen
2. Course DVD
3. Test answer key
4. Instructor manual with lesson maps

For every 3 participants, one each of the following (see below for teaching stations):
1. AED trainer with adult pads
2. Child AED pads or package picture
3. Adult/child manikin
4. Infant manikin
5. Bag mask
6. Manikin cleaning supplies

For each participant, 1 of the following:
1. Student manual
2. Written test and answer sheets
3. Critical skills testing checklist
4. Critical skills descriptions
5. Practice check sheets for remediation
6. One-way valve or pocket mask
Appendix E: Bibliography


