

## Chapter 1:

### EXERCISE PHYSIOLOGY

#### Cardiovascular System

- Heart
- Blood Vessels
- Blood Flow

#### Cardiovascular System and Exercise

- Heart Rate
  - Response to Exercise
- Blood Pressure
  - Response to Exercise
- Stroke Volume
  - Response to Exercise
- Cardiac Output
  - Response to Exercise
- Blood Flow
- Blood Flow and Physical Activity
- $VO_{2\text{Max}}$

#### Respiratory Systems

- Organization
- Oxygen Flow

#### Nervous System

- Central Nervous System
- Autonomic Nervous System
- Peripheral Nervous System
- Peripheral Nerves

#### Energy Systems

- Adenosine Triphosphate (ATP)
- Phosphagen System (ATP-PCr)
- Anaerobic Glycolytic System (Lactic acid)
- Aerobic System
  - Glycolysis
  - Krebs Cycle
  - Beta Oxidation
  - Electron Transport Chain
- Anaerobic Threshold

#### Muscle Balance

#### Skeletal Muscle Tissue

- Muscle Anatomy
- Sliding Filament Theory
- Motor Unit Activation
- Neuromuscular Junction
- Muscle Contractions / Actions
- Muscle Fiber Types
- Distribution of Muscle Fibers
- Recruitment Order
- Muscle Responses to Exercise
- Muscle Hypertrophy
- Fat Metabolism
- Fat Cells
- Cellulite

## Chapter 2:

### ANATOMY, KINESIOLOGY & BIOMECHANICS

#### Anatomical Position

#### Planes of Motion

#### Axis of Rotation

#### Line of Gravity

#### Center of Mass

- Alterations in COM

#### Movement Terms

#### Range of Motion

- Active ROM
- Passive ROM
- Hypomobility
- Hypermobility

#### Joints

- Joint classifications
- Joint stability

#### Skeletal System

- Axial
- Appendicular
- Types of bones
- Composition of bones
- Bone growth

#### Muscular System

- Characteristics of muscle tissue
- Muscle structure
- Classification of muscles
- Muscle arrangement

#### Skeletal Muscles

#### Motion

#### Laws of Motion

#### Forces

- Internal
- External
- Gravity force

#### Levers

- Direction of Force
- Wheels and Axles
- Exercise Force
- Full Range of Motion

#### Torque & Lever Arm

#### Upper Extremity

#### Spine

#### Lower Extremity

## Chapter 3:

### RISK FACTORS & HEALTH SCREENING

#### Health History

#### Health Risk Assessment

- Cardiovascular Disease Risk Factors
- Cardiovascular, Pulmonary, and Metabolic Disease Signs/Symptoms

#### Risk Categories

- Medical Clearance
- Pregnant Client

#### Additional Factors

- Stress
- Respiratory Risk Factors
- Musculoskeletal Risk Factors
- Metabolic Risk Factors
- Medications
- Antihypertensives
- Bronchodilators
- Cold Medications

#### Health Screening Forms

- Physical Activity Readiness Questionnaire (PAR-Q)
- Health History Questionnaire (HHQ)
- Exercise History Questionnaire
- Informed Consent for Exercise Testing
- Medical Release Form
- Health History Evaluation

#### Motivation

## Chapter 4:

### FITNESS ASSESSMENT & TESTING

#### Components of a Fitness Assessment

#### Heart Rate Assessment

- Palpation of Pulse
- Exercise Heart Rate

#### Blood Pressure Assessment

#### Physiological Testing

- Age-Predicted Heart Rate Formula
- Heart Rate Reserve (Karvonen Formula)
- Rate of Perceived Exertion

#### Body Composition Assessment

- Skinfold Measurements
- Body Mass Index (BMI)
- Waist-to-Hip Ratio (WHR)
- Girth Measurements
- Calculation of Desired Body Weight

#### Cardiovascular Assessment

- Step Tests (3 min)
- 1 Mile Walk Test
- 1.5 Mile Run Test
- 12 Minute Walk/Run Test
- Treadmill Test

#### Muscular Strength Assessment

- 1 Rep Max (RM) Bench Press Test
- 10 Rep Max (RM) Bench Press Test
- 1 Rep Max (RM) Leg Press Test
- 10 Rep Max (RM) Leg Press Test

#### Muscular Endurance Assessment

- Push-up Test
- Bench Press Test (YMCA)
- Partial Sit-Up Test

#### Flexibility Assessment

- Trunk Flexion
- Shoulder Flexibility
- Hip Flexibility
- Hip Flexor Flexibility
- Hamstring Flexibility

#### Ideal Body Weight Formula

## Chapter 5:

### CARDIOVASCULAR TRAINING

#### Successful Programming

#### Benefits of Cardiovascular Fitness

#### Principles of Training

- Specificity
- Adaptation
- Reversibility
- Progression

#### FITT Principle

#### Progression

#### Calculating Calories Expended

- Total Daily Energy Expenditure (TDEE)
- Harris-Benedict Formula
- Katch-McArdle Formula

#### Caloric Expenditure Fuel Sources

#### HIIT v. LSD

#### Monitoring Intensity

- Maximal Heart Rate
- Heart Rate Reserve (Karvonen)
- Rating of Perceived Exertion (RPE)
- MET Method
- Talk Test Method

#### Designing the Cardiovascular Program

#### Cardiovascular Essentials

- Warm-up
- Conditioning
- Cool-down

#### Methods of Aerobic Training

- Continuous Training
- Interval Training
- Fartlek Training
- Circuit Training
- Cross Training

## Cardiovascular Activities

- Walking
- Jogging / Running
- Aerobics
- Swimming
- Indoor Cycling
- Racquet Sports

## Cardiovascular Equipment / Safety

- Treadmill
- Stationary Bike
- Stair Climber
- Elliptical Trainer
- Rowing Machine

## Sample Programs

## Fat Burning Myths – Q&A

## Chapter 6:

### MUSCULAR STRENGTH & ENDURANCE

#### Benefits of Muscular Fitness

#### Rules of Strength Training

#### Strength Training Principles

- Specificity
- SAID Principle
- Overload
- Frequency
- Volume
- Adaptation
- Progressive Resistance (PRE)
- Maintenance
- Retrogression / Reversibility

#### Strength Production / Movement

- Concentric Contraction
- Eccentric Contraction
- Isometric Contraction
- Prime Mover / Agonist
- Antagonist
- Assistors/Synergists
- Stabilizers/Fixators

#### Strength Training Guidelines

- High Intensity
- Submaximal

#### Strength Training Adaptations

##### Program Design

- Health Screening
- Fitness Testing
- Prescription Design
- Selection of Exercises
- Order of Exercises
- Frequency of Exercise
- Resistance and Repetitions
- Number of Sets
- Form and Technique
- Speed of Exercises
- Breathing
- Exercise Progression
- Rest Between Sets
- Rest Between Workouts
- Routine
- Cool Down
- Flexibility
- Monitoring

#### Exercise Routine Methods

## Strength Training Equipment

### Muscle Fatigue

### Muscle Soreness

- Immediate Onset Muscle Soreness
- Delayed Onset Muscle Soreness ( DOMS)

### Common Training Mistakes

### Risk v. Benefit

### Strength Training Factors

### Overtraining

### Strength Training Exercises

## Chapter 7:

### FLEXIBILITY TRAINING

#### Developing Flexibility

#### Determining Flexibility

#### Factors Limiting Flexibility

- Connective Tissue
- Strength Training

#### Benefits of Flexibility

- Joint Health
- Spinal Alignment
- Strength

#### What Happens During Stretching

- Tendons
- Muscle/Tendon Junction
- Ligaments
- Fascia
- Joint Design
- Proprioceptors
- Myostatic (Stretch) Reflex /Muscle Spindles
- Golgi Tendon Reflex
- Lengthening Reaction

#### Flexibility Training Guidelines

- Warm-up
- Breathing
- Posture
- Order
- When to Stretch

#### Risky Stretches

#### Types of Stretches

- Ballistic
- Static
- Passive
- Dynamic
- Proprioceptive Neuromuscular Facilitation (PNF)

#### Myofascial Release

#### Program Development

- Frequency
- Intensity
- Time
- Type

#### Stretching Exercises

- Static
- Dynamic
- PNF
- Self-Myofascial Release

## Chapter 8:

### SPECIAL POPULATIONS

#### Pregnancy

#### Seniors

- Physiological Changes
- Guidelines
- Precautions

#### Osteoporosis

- Guidelines

#### Arthritis

- Osteoarthritis
- Rheumatoid

#### Youth

- Differences between Youth and Adult
- Guidelines

#### Obesity

- Exercise
- Guidelines
- Considerations

#### Hypertension

- Guidelines

#### Hypotension

#### Diabetes

- Type I
- Type II

#### Asthma

#### Coronary Artery Disease

#### Menopause

## Chapter 9:

### INJURY PREVENTION & EMERGENCY PROCEDURES

#### Types of Tissue

- Muscle Tissue
- Tendon Tissue
- Ligament Tissue
- Bone Tissue

#### Tissue Reaction to Injury

- Inflammation
- Treatment (PRICE Protocol)
- Ice

#### Acute Injuries

- Muscle Strains
- Sprains
- Ankle Sprains
- Treatment of Ankle Sprains

#### Chronic Injuries

- Tendonitis
- Bursitis
- Impingement Syndrome
- Low Back Pain
- IT Band Syndrome
- Patella Femoral Syndrome
- Shin Splints
- Stress Fractures of the Lower Leg
- Plantar Fasciitis
- Achilles Tendonitis

#### Heat-Related Illness

- Acclimatization
- Heat Cramps
- Heat Exhaustion
- Heat Stroke

#### Acute Emergencies

- Diabetes
- Myocardial Infarction (Heart Attack)
- Stroke
- Seizure
- Dyspnea (Difficulty Breathing)
- Syncope (Fainting)

#### CPR - Adult

- With Breaths
- Hands-only

## Chapter 10:

### SPORTS NUTRITION

#### Food Pyramid System

#### MyPlate

- Food Basics
- Grains
- Vegetables
- Fruits
- Dairy Products
- Protein
- Oils
- Snacks

#### Macronutrients

- Proteins
- Carbohydrates
- Fiber
- Fats

#### Fluid & Hydration

- Sports Drinks
- Water Intoxication

#### Glycemic Index

#### Micronutrients

- Vitamins
- Minerals

#### Daily Caloric Requirements

- Dietary Requirements

#### Weight / Fat Loss

## **Ergogenic Aids & Dietary Supplements**

- Androstenedione
- DHEA
- Ephedrine
- Ephedra (Ma Huang)
- Creatine Monohydrate
- Caffeine
- L-Glutamine
- Anabolic Steroids

## **Alcohol Effects on Metabolism**

## **Caffeine Effects on Metabolism**

## **Disorders**

- Anorexia Nervosa
- Bulimia Nervosa
- Exercise Bulimia