

## **KIN 391 – Physiology of Exercise**

### **Bioenergetics and Metabolism**

1. Energy Transfer
  - 1.1 phosphate bond energy
  - 1.2 energy release from CHO
  - 1.3 energy release from fat
  - 1.4 energy release from protein
2. Energy transfer in exercise
  - 2.1 immediate energy
  - 2.2 short-term energy
  - 2.3 long-term energy
3. Energy expenditure at rest and during physical activity
4. Replenishment of energy stores during recovery from exercise

### **Cardiovascular Function**

1. Components of the cardiovascular system
2. Blood pressure and exercise
3. Cardiovascular regulation and integration
  - 3.1 intrinsic regulation of HR
  - 3.2 extrinsic regulation of HR
4. Functional capacity of the cardiovascular system
  - 4.1 cardiac output
  - 4.2 stroke volume
  - 4.3 HR
  - 4.4 oxygen extraction and the a-v O<sub>2</sub> difference
  - 4.5 cardiovascular adjustments to upper body exercise
  - 4.6 cardiac hypertrophy and the “athlete’s heart”
5. Response of the cardiovascular system to exercise
  - 5.1 short-term, light-to-moderate submaximal aerobic exercise
  - 5.2 long-term, moderate-to-heavy submaximal aerobic exercise
  - 5.3 incremental exercise to maximal
  - 5.4 static exercise

### **Respiratory Function**

1. Structure of the respiratory system

- 1.1 conducting zone
  - 1.2 respiratory zone
2. Mechanics of breathing
  - 2.1 inspiration
  - 2.2 expiration
3. Lung volumes and capacities in healthy individuals
4. Regulation of pulmonary ventilation
5. Response of the respiratory system to exercise
  - 5.1 short-term, light-to-moderate submaximal aerobic exercise
  - 5.2 long-term, moderate-to-heavy submaximal aerobic exercise
  - 5.3 static exercise
  - 5.4 entrainment

### **Skeletal Muscle Function**

1. Gross structure of skeletal muscle
  - 1.1 levels of organization
  - 1.2 chemical composition
  - 1.3 blood supply
2. Ultrastructure of skeletal muscle
3. Chemical and mechanical events during muscle action and relaxation
  - 3.1 sliding filament theory
  - 3.2 excitation-contraction-coupling
  - 3.3 sequence of events in muscle action
4. Muscle fiber types
  - 4.1 slow twitch fibers
  - 4.2 fast twitch fibers
  - 4.3 fast twitch subdivisions
  - 4.4 fiber type differences between athletic groups
  - 4.5 metabolic adaptations
5. Mechanical factors influencing muscle contraction
6. Muscular fatigue
  - 6.1 influence of fiber type distribution
  - 6.2 possible sites and causes of muscular fatigue
7. Muscular adaptations to exercise training

## **Exercise and Thermal Stress**

1. Thermoregulation in heat stress: heat loss
  - 1.1 by radiation
  - 1.2 by conduction
  - 1.3 by convection
  - 1.4 by evaporation
    - 1.41 at high ambient temperatures
    - 1.42 heat loss in high humidity
  - 1.5 integration of heat-dissipating mechanisms
2. Effects of clothing on thermoregulation
3. Exercise in the heat
  - 3.1 circulatory adjustments
  - 3.2 core temperature during exercise
  - 3.3 water loss in the heat
  - 3.4 maintaining fluid balance
4. Factors that modify heat tolerance
  - 4.1 acclimatization
  - 4.2 training status
  - 4.3 age and gender
  - 4.4 body composition