I. Introduction

A) Components of the Cardiovascular System

1) Blood
2) Blood Vessels
3) Heart
4) Lymphatic Vessels

B) Blood Vessels

1) Types of Blood Vessels
   (a) arteries and arterioles
   (b) capillaries
   (c) venules and veins

2) Arteries and Arterioles
   (a) arterial wall—3 Layers of tissue
      (1) inner tunic
      (2) middle tunic
      (3) outer tunic
         fibrous connective tissue
      (4) precapillary sphincters control flow
         ex: fight or flight response
   (b) blood flow maintained by heart
3) (Slide 5) **Capillaries**
   (a) wall structure:
   
   (b) only small portion of capillaries are ‘open’—5% blood volume within capillaries
   
   (c) Function:

4) (Slide 6) **Veins**
   (a) wall structure:
   
   (1) inner tunic
   
   (2) middle tunic
   
   (3) outer tunic-fibrous CT
   
   (4) valves
   
   (b) function:
   
   (1) return blood to heart
   (2) 70% of blood volume in veins

(c) (Slide 7) **Blood Flow in veins Maintained**
C) (Slide 8) **Heart**

1) General
   - (a) size fist
   - (b) dorsal to sternum
   - (c) tilts to the left (apex)
   - (d) pericardial cavity (space within thoracic cavity)

2) (Slide 9) **External Heart Structures**
   - (a) 4 chambers
     - (1) right and left atria
     - (2) right and left ventricles

(b) (Slide 10) **Great Vessels**
   - (1) Aorta (arch)
   - (2) Pulmonary Trunk
   - (3) Superior vena Cava
   - (4) Inferior vena cava
   - (5) pulmonary veins
   - (6) base

(c) (Slide 11) **coronary blood vessels**

(d) apex
3) (Slide 12) **Heart Wall**  
(a) Pericardium or Pericardial Sac  
   (1) outermost  

(b) Myocardium  

(c) **Endocardium** :  
   (1) lines and covers internal heart chambers and structures  

4) (Slide 13) **Internal Heart Structures**  
(a) Review:  
   (1) right atria  
   (2) left atria  
   (3) right ventricle  
   (4) left ventricle  
   (5) aorta (arch)  
   (6) Pulmonary trunk  
   (7) Superior Vena Cava  
   (8) Inferior Vena Cava  
   (9) Base  
   (10) Apex  

(b) myocardium  
(c) trabeculae carneae  
(d) (Slide 14) right atrioventricular valve  
(e) left  
   atrioventricular  
   valve  
(f) chordae  
   tendineae  
(g) papillary  
   muscle  
(h) (Slide 15)  
   pulmonary  
   semilunar  
   valve  
(i)  

aortic semilunar  
   valve  
(j) interventricular  
   septum
5) **Double Pump**

(a) right atria

(b) right ventricle

(c) left atria

(d) left ventricle

6) **Valves**

(a) two atrioventricular valves
   (1) lie between atria and ventricles
   (2) chordae tendineae attach valve flaps to papillary muscle
   (3) papillary muscle-anchor

(b) right AV (tricuspid)

(c) left AV (bicupid or mitral)

(d) Two Semilunar Valves:
   (1) Location: flaps within arterial wall

   (2) Aortic Semilunar

   (3) Pulmonary Semilunar
7) (Slide 19) **Blood Flow through the heart**

(a) vena cava (from body)
(b) R atria
(c) R AV valve
(d) R ventricle
(e) Pulmonary semilunar
(f) Pulmonary trunk (to lungs)

(g) (Slide 20) pulmonary veins (from lungs)
(h) L atria
(i) L AV valve
(j) L ventricle
(k) Aortic semilunar
(l) Aorta (to body)

II. (Slide 21) **Cardiac Physiology**

A) **Cardiac Cycle** (heartbeat)

1) **sequence**
   (a) atria contract
   (b) ventricles contract
   (c) ensures blood flow in one direction
   (d) 70 beats per minute, approximately 0.85 seconds

2) **Heart Sounds:**
   (a) lub-AV valves closing
   (b) dup-semilunar valves closing

3) **Pulse:** vibration felt in arterial walls due to expansion of BV wall following contraction of ventricles
   (a) ‘pressure points’
   (b) indicates rate of heart beat

4) (Slide 22) **Contraction vs. Relaxation**

(a) **systole:**
   (1) blood pressure highest in arteries

(b) **diastole:**

(c) **sphyngmomanometer:** used to indirectly measure blood pressure
   (1) **systolic pressure**
   (2) **diastolic pressure**
   (3) both decrease with distance from left ventricle
B) Regulation of Heart Beat

1) **Intrinsic (internal) Control**
   (a) **sinoatrial node** (nervous tissue)

   (b) impulse spreads/wringing heart
       (1) atrioventricular node
       (2) atrioventricular bundle
       (3) purkinje fibers

   (c) results in ventricular contraction

2) **Extrinsic (external) control**
   (a) **cardiac control center**
       (1) (brainstem) Medulla Oblongata
       (2) autonomic nervous system
           (a) parasympathetic nervous system
           (b) sympathetic nervous system (fight or flight)

   (b) **hormones**
       (1) adrenal glands secrete epinephrine/adrenaline

C) **Vascular Pathways**

1) **Pulmonary Circuit**:
2) (Slide 26) **Systemic Circuit:**

3) (Slide 27) **Coronary Arteries**

   (a) *myocardial infaction*

   (b) *angina pectoris*: chest pain due to brief lack of oxygen to heart muscle (warning)

   (c) *congestive heart failure*