Jordan University of Science and Technology
Faculty of Medicine
MBBS Program Curriculum

Course Title: Cardiovascular System (CVS)
Course Code: M262
Credit Hours: 6 credits
Sequence: year 2, second semester, 6 WEEKS
Coordinator: Dr. Mohamad Jaffar, Mousar@just.edu.jo
Contact: medicine@just.edu.jo

A. Course description:
Cardiovascular Module is six credit hours course. It is designed to focus on anatomical with
development & physiological character of the system. It also includes the pathological and
Biochemical changes during diseases state and explains the pharmacological treatment of the
disease which includes the possible prevention of those diseases.
Last concentrate on some common cardiovascular disease as hypertension, ischemic heart
disease and arrhythmia

B. a. General Objectives:
Upon completion of this course students should be able to:
1. Identify the anatomy of mediastinum, heart chambers, valves, general and Topographic of
the great vessels and their distribution.
2. Describe the microscopic appearance of different parts of the cardiovascular system,
normal embryological development with their common congenital abnormalities.
3. Describe and understand the electrocardiogram cardiac cycle, hemodynamics, regulation of
blood flow and blood pressure, microcirculations, and the mechanism of circulatory shock.
4. Understand the metabolism of the cardiac muscles and the value of the cardiac enzymes
and Troponins and their role in the diagnosis of acute myocardial disease.
5. Recognize the role and types of lipoprotein disorders and the mechanism of formation of
atherosclerosis.
6. Recognize the characteristics of microorganisms that cause infection of the cardiovascular
system, their pathogenicity and methods of identification.
7. Define with the more common types of cardiovascular diseases with emphasis on (etiology,
mechanism, morphology and briefly to correlate the pathological aspects of diseases with
clinical manifestations).
8. Understand the mechanisms of action, pharmacokinetics, uses and adverse effects of
commonly used drugs in the treatment of cardiac failure, cardiac arrhythmias,
hypertension, angina and drugs used in hyperlipidemias.
9. Recognize the major cardiovascular risk factors in health and diseases.
10. Identify the nutritional and dietetic components in the etiology, management, and
prevention of cardiovascular diseases.
b. Methods of Instruction:
- Lectures.
- Group Discussion
- Practical classes.

C. Specific objectives

<table>
<thead>
<tr>
<th>#</th>
<th>Lecture Title</th>
<th>Lecture Objectives</th>
</tr>
</thead>
</table>
| 1 & 2 | Introductory Case Presentation for CVS | 1. Understand the general outline of the CVS module.  
2. Be familiar with the modalities of teaching throughout the course.  
3. Acknowledge the important relation between normal and abnormal structure and function.  
4. Appreciate the importance of basic sciences in clinical application. |
| 3 | Mediastinum & pericardium (Anatomy) | 1. Describe divisions of the mediastinum.  
2. Describe the outline and normal position of the heart.  
3. Understand and identify relations of different parts of the heart in the middle mediastinum.  
4. Identify and list various contents of the mediastinum.  
5. Define the pericardium and describe its covering layers.  
6. Describe its attachment to the diaphragm and the root of the great vessels.  
7. Discuss the pericardial space and its recesses and pericardial fluid in normal conditions.  
8. Describe innervations of the fibrous pericardium. |
| 4 | Heart chambers, valves Conductive system and Innervations of the heart (Anatomy) | 1. Describe divisions of the heart into four chambers and the internal and external features of each chamber.  
2. Describe different parts of the conductive system of the heart and their arrangement and function within the myocardium.  
3. Understand and describe the principle of cardiac referred pain.  
4. Identify papillary muscles and describe their locations and importance.  
5. Describe the atrio-ventricular valves and their position and the attachment of the cusps to papillary muscles and their functional importance.  
6. Describe the aortic and pulmonary semilunar valves and their position and functional importance. |
| 5 | Development of The heart (Anatomy) | 1. Discuss the primary formation and folding of the heart tube.  
2. Describe the formation of different chambers of the heart.  
3. Understand and describe the establishment of fetal circulation and its hemodynamics and subsequent cardiovascular changes that take place after birth.  
4. Describe and understand causes of major congenital malformation incurred during these developmental stages and their clinical implications. |
| 6 | Organization of CVS (Physiology) | 1. Describe the systemic and pulmonary circulations and their differences.  
2. Explain the functional parts of CVS.  
3. Discuss blood volumes and pressure in different parts of CVS.  
4. Describe the blood velocity and flow through different parts of CVS and its relation to cross sectional area.  
5. Discuss the basic functions of CVS. |
| 7 | Histology of the myocardium and blood vessels (Anatomy) | 1. Describe the microscopic structure of the cardiac muscle and the histological appearance of the intercalated discs and Purkinje fibers.  
2. Describe the histological features of Endocardium, and Epicardium.  
3. Describe the ultra structure of the heart skeleton.  
4. Describe the histological appearance of arteries and veins and their differences.  
5. Describe the ultra structural features of different types of capillaries. |
<table>
<thead>
<tr>
<th></th>
<th>8</th>
<th>Surface anatomy of the CVS (Anatomy)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.</td>
<td>Describe the surface landmarks of the heart.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>Describe the surface anatomy of great vessels entering and leaving the heart.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>Describe the surface markings of heart valves and ideal sites for their auscultation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.</td>
<td>Describe the surface markings of Peripheral and central pulses that are commonly used for palpation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Physiology of cardiac muscle (Physiology)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.</td>
<td>Discuss the cardiac conductive system and its function.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>Describe the action potential of the cardiac muscle and its components.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>Define the refractory period and the excitation-contraction coupling</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.</td>
<td>Discuss the control of excitation and conduction of the heart.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>ECG (Physiology)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.</td>
<td>Identify waves of ECG and the cause of each.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>Define the normal intervals and segments, PR and QT interval. PR and ST segment.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>Discuss the bipolar and unipolar leads and their locations.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.</td>
<td>Discuss the bipolar limb lead and the cardiac axis.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Cardiac arrhythmia (Physiology)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.</td>
<td>Define different ectopic foci of excitation and the mechanism of re-entry phenomena.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>Describe different types of arrhythmia and the ECG appearance in each type. Atrial fibrillation, atrial flutter, supra ventricular tachycardia, ventricular tachycardia and ventricular fibrillation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>Discuss different types of conduction block. Incomplete (first and second degree) and complete heart block.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Antiarrhythmic drugs (Pharmacology)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.</td>
<td>Describe the main features of the major groups of antiarrhythmic drugs.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>Describe mechanism of action of each group.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>Understand Pharmacokinetics, clinical uses and major toxic effects of the drugs used in the treatment of arrhythmias.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>Cardiac cycle (Physiology)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.</td>
<td>Identify the systolic and diastolic period.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>Discuss the changes of pressure and volumes in left ventricle, left atrium and the aorta during cardiac cycle.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>Explain the meaning of isovolumic contraction, period of ejection and isovolumic relaxation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.</td>
<td>Discuss the volume-pressure relationship in the left ventricle.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.</td>
<td>Explain the development of first and second heart sounds.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>Cardiac Output &amp; Its regulation (Physiology)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.</td>
<td>Define the cardiac output and cardiac index.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>Discuss the role of venous return and cardiac reserve and their effect on cardiac output.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>Describe the role of right atrial pressure and mean circulatory filling pressure.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.</td>
<td>Study the effect of increased sympathetic activity and blood volume on cardiac output.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.</td>
<td>Study the methods for measurement of cardiac output.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>Pumping of the heart (Physiology)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.</td>
<td>Discuss the intrinsic and extrinsic factors that affect cardiac pumping.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>Explain the Frank-starling mechanism.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>Describe the effect of autonomic nervous system on the heart pumping.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.</td>
<td>Describe the effect of K⁺ and Ca²⁺ on the heart function.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.</td>
<td>Discuss the energy and oxygen utilization of the heart.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>Metabolism in the cardiac muscle under physiological and pathological conditions (Biochemistry)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.</td>
<td>Understand the major sources of energy for the cardiac muscle.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>Discuss ketone bodies synthesis and utilization during starvation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>Discuss the specificity of lactate metabolism in hypoxic heart muscle.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.</td>
<td>Discuss the specificity of metabolism of the cardiac muscle under pathological conditions (diabetes).</td>
<td></td>
</tr>
</tbody>
</table>
| 17 | Microbiology of carditis (Pathology) | 1. Understand the characteristics of microorganisms that cause infection of the cardiovascular system: their pathogenicity and methods of identification.  
2. Understand the role of streptococcus viridians in endocarditis.  
3. Understand the role of streptococcus pyogenes in rheumatic fever. |
| 18 | Valvular heart disease, Rheumatic fever and Rheumatic heart disease I (Pathology) | 1. To know the main features of rheumatic fever (RF)  
2. To discuss the etiology and pathogenesis of RF.  
3. To be familiar with the pathognomonic lesion of RF & rheumatic heart disease (RHD).  
4. To describe the changes in the heart and other organs in RF.  
5. To describe the chronic sequel of RHD. |
| 19 | Endocarditis  
Myocarditis (Pathology) | 1. To know the different types of endocarditis.  
2. To classify infective endocarditis.  
3. To discuss the pathogenesis and list organisms causing endocarditis.  
4. To compare and contrast acute & subacute bacterial endocarditis.  
5. To list the possible complications of bacterial endocarditis.  
6. To describe briefly Marantic & Libman-sack endocarditis. |
| 20 | Cardiomyopathy-Pericardium and cardiac tumors (Pathology) | 1. To list the major etiological factors of myocarditis.  
2. To discuss briefly the main features and effects of the main types of cardiomyopathies.  
3. To classify pericarditis according to type of exudate.  
4. To describe the pathology of the common types of heart tumors. |
| 21 | Cardiac enzymes and other proteins markers (Biochemistry) | 1. Discuss the role of cardiac enzymes CK, LDH and AST in the diagnosis of heart disease.  
2. Discuss the role of myoglobin, troponin, natriuretic peptides and D-dimers in the diagnosis of cardiovascular disease. |
| 22 | Blood vessels I-Arterial system (Anatomy) | 1. Describe locations and branches of the ascending aorta and arch of aorta.  
2. Describe locations of arteries in the region of the head and neck and their immediate relations  
3. Describe locations of arteries in the region of thorax and their immediate relations  
4. Describe locations of arteries in the abdomen and pelvis with their immediate relations  
5. Describe locations of branches and continuation of the subclavian artery into the upper limb and their immediate relations  
6. Describe locations of branches and continuation of external and internal iliac artery into the lower limb and their immediate relations |
| 23 | Blood vessels II– Venous system (Anatomy) | 1. Describe the Caval system (course and relations of superior and inferior vena cava).  
2. Describe tributaries of the superior vena cava draining the head, neck and upper limbs.  
3. Describe tributaries of the inferior vena cava draining the abdomen, pelvis and lower limbs.  
4. Describe the Azygous system and its drainage area.  
5. Describe the important surface landmarks of major veins from clinical point of view.  
6. Discuss the principle of function of muscular venous pump and their location in the human body.  
7. Describe the portal venous system.  
8. Describe Cavo Caval and porto Caval anastamosis |
| 24 | Hemodynamic I (Physiology) | 1. Study relationship between pressure, flow and resistance.  
2. Discuss laminar and turbulent blood flow.  
3. Understand methods for measurement of blood flow.  
4. Define blood pressure and its standard unit.  
5. Discuss resistance to blood flow, peripheral and pulmonary resistance and the effect of hematocrit on vascular resistance. |
| 25 | Hemodynamic II (Physiology) | 1. Describe vascular distensability and its difference in arteries and veins.  
2. Study and understand Laplace law.  
3. Discuss vascular compliance and delay compliance.  
4. Describe arterial pressure pulsation and transmission of pressure pulses to the peripheral arteries.  
5. Discuss the function of the veins, venous pressure, venous resistance, venous valve and venous pump.  
6. Define the blood venous reservoir and their function. |
| 26 | Development of the vascular system (Anatomy) | 1. Describe the formation of dorsal aorta.  
2. Describe the formation of aortic arches and their fate.  
3. Revise the process of transformation of fetal into adult circulation and the major changes that occur.  
4. Describe major congenital malformations incurred during these stages and their clinical implications. |
| 27 | Blood pressure (Physiology) | 1. Define the blood pressure during systole, diastole and the pulse pressure.  
2. Define mean arterial blood pressure, circulatory filling pressure, and central venous pressure.  
3. Explain the hydrostatic effect on the blood pressure in different parts of CVS during different positions.  
4. Discuss the methods of blood pressure measurements. |
| 28 | Blood pressure regulation I (Physiology) | 1. Discuss the mechanism of the nervous regulation (acute) of BP.  
2. Explain the role of autonomic nervous system (vasoconstrictor tone) in BP regulation.  
3. Describe the reflex mechanisms for maintaining normal pressure, role of baroreceptors, chemoreceptors and low-pressure receptors.  
4. Discuss the central nervous system ischemic response factor in regulating arterial pressure. |
| 29 | Blood pressure regulation II (Physiology) | 1. Discuss the long-term mechanism for regulation of blood pressure.  
2. Explain the renal output curve.  
3. Discuss the relationship between fluid intake and renal output and body fluid volume, autoregulation.  
4. Discuss the role of Renin-angiotensin system in regulation of blood pressure.  
5. To discuss the role of aldosterone in blood pressure regulation. |
| 30 | Microcirculation (Physiology) | 1. Describe the flow of blood to capillaries and the effect of pre-capillary sphincter.  
2. Discuss the exchange of different substances between blood and interstitial fluid and factors that affect this exchange.  
3. Identify the primary forces that control fluid movement through capillary membrane.  
4. Discuss the formation of lymph and lymph flow.  
5. Describe factors that regulate lymph flow and development of edema. |
| 31+ 32 | Vasculitis (1+2) (Pathology) | 1. To define vasculitis & list the possible causes of this condition.  
2. To discuss the mechanism of vasculitis.  
3. To understand the relation between, Antineutrophil cytoplasmic antibody (ANCA) and vasculitis.  
4. To classify vasculitis.  
5. To describe the main features of the following types of vasculitis:  
A- Polyarteritis nodosa.  
B- Wegneres granulomatosis.  
C- Giant cell arteritis.  
D- Microscopic polyangitis,  
E- Thromboangitis obliteranse.  
F- Kawasaki disease. |
<table>
<thead>
<tr>
<th>Page</th>
<th>Topic</th>
<th>Relevant Areas</th>
<th>Relevant Knowledge</th>
</tr>
</thead>
</table>
| 33   | Blood flow to the tissue | Physiology | 1. Describe the local long mechanism that control blood flow to tissues, including acute and long term control.  
2. Discuss the metabolic and myogenic theory for control of blood flow.  
3. Discuss Autoregulation of the local blood flow with different levels of blood pressure.  
4. Explain the mechanism of endothelial deriving relaxing factor (EDRF), the nitric oxide (NO).  
5. Discuss the changes that can develop in long-term regulation, including tissue vascularity, angiogenesis and collateral circulation.  
6. Discuss humoral regulation of blood flow, by vasoconstrictor and vasodilator agents. |
| 34   | Plasma lipoproteins and cholesterol I | Biochemistry | 1. Discuss Cholesterol metabolism and its regulation  
2. Discuss tri acylglycerol metabolism  
3. Discuss the lipoprotein structural features and types.  
4. Understand important laboratory tests of blood lipids and lipoproteins. |
| 35   | Plasma lipoproteins and cholesterol II | Biochemistry | 1. Discuss the metabolism of blood lipoproteins  
2. Understand the role of blood lipids in atherosclerosis  
3. Describe various types of hyperlipidemias. |
| 36   | Arteriosclerosis  Atherosclerosis (I) | Pathology | 1. To define the term arteriosclerosis.  
2. To list the three morphologic variants of arteriosclerosis.  
3. To describe the main pathological features and disease associations of: medial calcification, hyaline & hyperplastic arteriolosclerosis.  
4. To define the term atherosclerosis (AS).  
5. To describe the gross & histological features of AS.  
6. To list the complications and effects of atheromatous plaque. |
| 37   | Atherosclerosis (II) Aortic aneurysms | Pathology | 1. To list the risk factors associated with atherosclerosis.  
2. To understand the links between atherosclerosis and hypercholesterolemia.  
3. To outline the different theories proposed for the pathogenesis of AS, with special emphasis on response to injury hypothesis.  
4. To recognize the precursor lesions of AS.  
5. To define aneurysm and list its types.  
6. To know the possible effects of thoracic & abdominal aneurysms.  
7. To discuss the Pathology of syphilitic aortitis and its effects on the aorta and heart.  
8. To define the term dissecting hematoma (dissecting aneurysm)  
9. To discuss the etiology, mechanism and possible outcome of dissecting hematoma. |
| 38   | Hypertension | Physiology | 1. Define hypertension.  
2. Discuss the relationship between pressure, volume and peripheral resistance, and study the mechanism of development of hypertension.  
3. Discuss essential hypertension and its mechanism of development.  
5. Complication of hypertension on the human body. |
| 39   | Antihypertensive drugs I | Pharmacology | 1. List the major groups of drugs used in the treatment of hypertension and give an example in each group.  
2. Describe the values of diuretics used in the treatment of hypertension.  
3. Describe the values of centrally acting antihypertensive drugs their indications and adverse effects.  
4. Describe the values of adrenoceptor agents in the treatment of hypertension.  
5. List the major indications, contraindications, pharmacokinetics and adverse effects of commonly used adrenoceptor agents. |
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Goals</th>
</tr>
</thead>
</table>
| **40** | Antihypertensive drugs II (Pharmacology) | 1. Understand the role of peripheral vasodilators in the treatment of hypertension.  
2. List the most commonly used vasodilator drugs.  
3. Understand the pharmacokinetics, indications, contraindications and adverse effects of commonly used vasodilators.  
4. Describe the role and mechanism of action of angiotensin receptor blocking agents and give an example of these drugs' pharmacokinetics and adverse effects.  
5. Describe the role of angiotensin converting enzyme inhibitors (ACEI) and give an example of commonly used drugs, their pharmacokinetics, indications, contraindications and adverse effects. |
| **41** | Epidemiology of Cardiovascular disease (CVD) (Public Health) | 1. Define CVD.  
2. Understand Mortality and morbidity distribution of the CVD.  
3. Appreciate the time trend of CVD disease worldwide.  
4. Identify non-modifiable and modifiable CVD risk factors.  
5. Understand the findings reported by Framingham study. |
| **42** | Cardiovascular disease risk factors (cont.) (Public Health) | 1. Describe the physical and behavioral CVD risk factors.  
2. Describe the psychosocial predictors of CVD.  
3. Appreciate the Alameda study findings of CVD-related risk factors. |
| **43** | Hyperlipidemias (Pharmacology) | 1. Define the therapeutic strategies for the treatment of hyperlipidemia.  
2. Understand the indications to use antihyperlipidemic drugs.  
3. Classify the drugs used in the treatment of hyperlipidemias.  
4. Understand the mechanism of action of HMG-CoA reductase inhibitors, their values, indications, contraindications, adverse effects and give an example of commonly used drugs in this group.  
5. Describe the mechanism of actions, clinical uses and toxicity of fibric acid derivatives.  
6. Understand the role of drugs, which reduces the fat absorption from GIT (ezetimibe and orlistat). |
| **44** | Coronary circulation & venous drainage of the myocardium (Anatomy) | 1. Describe the origin of left and right coronary arteries and their course, branches and distribution.  
2. Describe sites of anastomosis between branches of coronary arteries.  
3. Describe the normal variation in the course of the coronary arteries and their branches.  
4. Describe venous drainage of the heart and cardiac veins (their names, location and drainage areas).  
5. Describe the location and termination of the coronary sinus and its tributaries. |
| **45** | Coronary circulations (Physiology) | 1. Explain normal coronary blood flow during systole and diastole to different parts of the myocardium.  
2. Discuss the local factors for control of coronary blood flow, local metabolism as primary factor and the oxygen demand.  
3. Describe the effect of autonomic nervous system on coronary arteries, role of Alpha and Beta-receptors.  
4. Define ischemic heart disease, the cause of cardiac pain and the mechanism of collateral circulation.  
5. Diagnosis of Coronary artery disease, angina pectoris and Myocardial infarction. |
| **46** | Ischemic heart disease (IHD) I (Pathology) | 1. To define the term IHD.  
2. To list the syndromes associated with IHD.  
3. To understand the pathogenesis of IHD.  
4. To correlate the type of angina pectoris with the pathology of coronary arteries.  
5. To describe the pathology of myocardial infarction (MI) including: types, gross, histology and sites. |
| 47 | Ischemic heart disease (IHD) II Hypertensive heart disease (HHD) (Pathology) | 1. To outline the main clinical features of MI.  
2. To list the possible complications of MI.  
3. To describe the main features of chronic ischemic heart disease.  
4. To list causes of sudden cardiac death (SCD) and outline the mechanism of SCD.  
5. List the criteria of HHD.  
6. Describe the gross and histological features of the heart in HHD. |
| 48 | Antianginal drugs (Pharmacology) | 1. Define the therapeutic strategies for treatment of angina pectoris.  
2. List the groups of drugs commonly used in the treatment of angina.  
3. Classify and describe the pharmacokinetics of nitrates.  
4. Understand the mechanism of action of nitrates and their organ-system effects.  
5. Describe the clinical uses and method of administration of nitrates.  
6. List the major toxic effects of nitrates and nitrites.  
7. Understand the role of calcium channel blockers in the treatment of angina.  
8. List the most commonly used calcium channel blockers in the treatment of angina with their pharmacokinetics, indications, contraindications and adverse effects.  
| 49 | Exercise (Physiology) | 1. Describe the mechanism of blood flow to the skeletal muscle during rest and exercise.  
2. Study the circulatory readjustment during exercise.  
3. Discuss the mechanism of increasing cardiac output and arterial blood pressure during exercise (stroke volume and heart rate).  
4. Discuss the relationship of cardiovascular performance to the level of oxygen consumption during exercise. |
| 50 | Prevention and control of CVD (Public Health) | 1. Appreciate the differences between Mass Strategy and High Risk Strategy in prevention and control of CVD  
2. Understand the benefits and efficiency in screening for CVD risk factors.  
3. Get exposed to the North Karelia Project for prevention and control of CVD |
| 51 | Varicose veins Tumors of blood vessels (Pathology) | 1. To discuss the pathogenesis of varicose veins (VV).  
2. To know the different sites where VV can occur  
3. To list the sequel of VV.  
4. To know the criteria of differentiation between benign, border line & malignant blood vessel tumors.  
5. To give examples of the different types of tumors. |
| 52 | Peripheral Vascular Disease (Vascular Surgery) | 1. Definition.  
2. Signs and Symptoms  
3. Investigations  
4. Management |
| 53 | heart failure and Circulatory shock (Physiology) | 1. Define heart failure (HF).  
2. Discuss the different types of HF.  
3. Study the signs and Symptoms of HF.  
4. Investigations of HF.  
5. Causes of HF.  
6. Define circulatory shock, and the difference between cardiogenic and hypovolumic shock.  
7. Discuss the stages of shock; non-progressive and progressive.  
9. Discuss the effects of shock on the human body. |
# Drugs used in the treatment of heart failure (Pharmacology)

1. Understand the therapeutic strategies in congestive cardiac failure.
2. Classify and give examples of digitalis glycosides.
3. Describe the pharmacokinetics of digitalis.
4. Understand the mechanism of action and the effects of digitalis.
5. List the major toxic effects and their treatment of digitalis.
6. Describe the role of diuretics, ACE inhibitors, vasodilators and B1-selective adrenoceptor agonists in the treatment of congestive cardiac failure.

# Surgical Aspects of Coronary Artery Disease and Valvular Heart Disease (Cardiac Surgery)

1. Indications for Mitral & Aortic valve surgery.
2. Indications for Coronary Artery Bypass Graft (CABG).
3. Complications of cardiac surgery.
4. Recent advances in valvular heart surgery.

## D. Weekly Teaching activities:

### a. Summary of the teaching activities in the CVS

<table>
<thead>
<tr>
<th>Department</th>
<th># of Lectures</th>
<th># of Practical</th>
<th># of Seminars 2 subjects All (30) (15) groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy</td>
<td>9</td>
<td>2+1 Histology</td>
<td>0</td>
</tr>
<tr>
<td>Physiology</td>
<td>18</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pathology</td>
<td>10</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Microbiology</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pharmacology</td>
<td>6</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Public Health</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Multidisciplinary</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Peripheral Vascular disease</td>
<td>1</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Cardiac Surgery</td>
<td>1</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>55</strong></td>
<td><strong>8</strong></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>
### b. Practical Laboratory Sessions

<table>
<thead>
<tr>
<th></th>
<th>PRACTICLE TITLE</th>
<th>OBJECTIVES</th>
</tr>
</thead>
</table>
| 1 | Morphological and surface anatomy of the Heart & mediastinum. | 1. Describe the normal location and surface makings of the heart, its valves and great vessels.  
2. Identify the heart and its great vessels in-situ in the cadaver and in cross sections.  
3. Appreciate important relations of the heart in the middle mediastinum.  
4. Examine external and internal features of the heart including its pericardium in wet specimens and plastic models.  
5. Describe location, subdivisions and list different parts and contents of the mediastinum.  
6. Identify images of the heart and its blood supply in plain chest X-ray, angiograms and CT scans.  
7. Revise the normal developmental embryology of the heart and its great vessels and recall congenital abnormalities that may result if something goes wrong. |
| 2 | ECG                                                  | 1. Explain the differences between Unipolar and bipolar leads  
2. To locate the position of different bipolar and unipolar leads.  
3. To be familiar with ECG machine and how to record the ECG.  
4. To identify different waves, intervals and segments of the ECG and the shapes and amplitude of each.  
5. To understand the methods of calculation the heart rate and the cardiac axis from the recording ECG. |
| 3 | Morphological and surface anatomy of blood vessels-Arterial and venous system | 1. Identify main arteries and veins and there branches in the thorax upper limb and lower limb  
2. Identify main arteries and veins in the head and neck and their branches and important relations  
3. Identify main arteries and veins in the abdomen and their branches and important relations.  
4. Study and identify the above arteries in angiograms and cross sections.  
5. On the living subject locate and feel the important pulses in the above regions (common carotid, superficial temporal, subclavian, abdominal aorta axillary, brachial, radial, ulnar, femoral, popliteal, dorsal pedal and posterior tibial) |
| 4 | Pathology of the Heart-I                             | 1. To recognize the gross & histological appearance of recent & old MI.  
2. To see examples of morphological complications of MI.  
3. To be able to recognize the pathognomonic lesion of RHD.  
4. To identify the gross pathology of Rheumatic valvular lesions. |
| 5 | Histology of the Heart and blood vessels.            | 1. Examine the detailed microscopic structure of the cardiac muscle.  
2. Examine, compare and understand the microscopic structure of walls of different caliber blood vessels.  
3. Examine and study the ultrastructure of blood capillaries and sinusoids by the aid of electron micrographs. |
| 6 | Blood pressure and heart sounds                      | 1. To define the blood pressure in systole and diastole.  
2. To explain the methods of measurement of blood pressure (palpation and auscultation) during systole and diastole.  
3. Explain the mechanism of development of Kortkoff sounds during measurement of blood pressure.  
4. To discuss the difference of pressure values in different parts of the body during different position.  
5. To discuss the cause of heart sounds and their relation to the ECG.  
6. To identify the location of different region on the chest wall to hear the maximal intensity of the component of each heart sound.  
7. Define Heart Murmur.  
8. Explain the mechanism of development of heart murmur.  
9. Discuss different types of heart murmur. |
Pathology of the Heart and blood vessels

1. To recognize different forms of endocarditis grossly.
2. To look at the three different types of cardiomyopathies grossly.
3. To identify the more common forms of congenital heart diseases.
4. Identify the gross and microscopic features of arteriosclerosis
5. Study histological features of vasculitis and common types of blood vessel tumours.

Effects of beta blockers and cigarette on the cardio-vascular system

1. To understand the effects of beta adrenoceptor drugs on the blood pressure and pulse.
2. To be able to measure the BP and pulse during exercise.
3. To recognize the differences between BP and pulse during exercise in people receiving beta blockers.
4. To be able to advice patients taking beta blockers what to do to minimize its adverse effects.
5. To understand the pharmacological effects of cigarette smoking on BP and pulse.
6. Measure the BP and pulse after smoking one cigarette.

C. Seminars.
   1) Hypertension
   2) Ischemic heart disease and heart failure

E. Assessment and Evaluation:

<table>
<thead>
<tr>
<th>EXAM FORMAT</th>
<th>WEIGHT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRST EXAM</td>
<td>Written</td>
</tr>
<tr>
<td>SECOND IN-COURSE EXAM</td>
<td>Theory/Practical</td>
</tr>
<tr>
<td>SMALL GROUP DISCUSSION</td>
<td>Discussion</td>
</tr>
<tr>
<td>FINAL EXAM</td>
<td>Written</td>
</tr>
</tbody>
</table>

F. Recommended Text Books and Atlases:

1- Anatomy:

2- Physiology:

3- Biochemistry:
   - Supplementary Departmental Handouts.

4- Pharmacology:

5- Pathology:
   - Supplementary. Departmental Handouts.

6- Microbiology:

7- Public Health:
   - Supplementary Departmental Handouts.

8- Cardiology and Cardiovascular Surgery:
   - Supplementary Departmental Handouts.
# CVS WEEK 1

<table>
<thead>
<tr>
<th>TIME &amp; DATE</th>
<th>SUN</th>
<th>MON</th>
<th>TUE</th>
<th>WED</th>
<th>THU</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:15-9:05</td>
<td>Introductory Case Presentation for CVS (Multidisciplinary)</td>
<td>Organization of CVS (Physiology)</td>
<td>Heart chambers, Heart valves, conductive system and innervation of the heart (Anatomy)</td>
<td>Development of The heart (Anatomy)</td>
<td>Cardiac arrhythmia (Physiology)</td>
</tr>
<tr>
<td>9:05-10:05</td>
<td>Mediastinum &amp; pericardium (Anatomy)</td>
<td>ECG (Physiology)</td>
<td>Surface anatomy of the CVS (Anatomy)</td>
<td>Histology of the myocardium and Blood vessels (Anatomy)</td>
<td></td>
</tr>
<tr>
<td>10:05-11:05</td>
<td>Physiology of cardiac muscle (Physiology)</td>
<td>Cardiac cycle (Physiology)</td>
<td>Microbiology of carditis (Microbiology)</td>
<td>Cardiac Output &amp; Its regulation (Physiology)</td>
<td></td>
</tr>
<tr>
<td>11:15-2:00</td>
<td>Physiology Lab 1 (A1) ECG</td>
<td>Anatomy Lab 1(A1+A2)</td>
<td>Physiology Lab 1 (B2) ECG</td>
<td>Physiology Lab 1 (B1) ECG</td>
<td></td>
</tr>
<tr>
<td>(Lab)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:15-5:00</td>
<td>Physiology Lab 1 (A2) ECG</td>
<td>Physiology Lab 1 (B1) ECG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIME &amp; DATE</td>
<td>SUN</td>
<td>MON</td>
<td>TUE</td>
<td>WED</td>
<td>THU</td>
</tr>
<tr>
<td>------------</td>
<td>----------------------------</td>
<td>---------------------------------------------</td>
<td>----------------------------------------</td>
<td>-----------------------</td>
<td>---------------------------</td>
</tr>
</tbody>
</table>
| **8:15-9:05** | Pumping of the heart  
(Physiology)  
(15) | Endocarditis, valvular diseases and myocarditis  
(Pathology)  
(18) | Blood vessels – Venous system II  
(Anatomy)  
(21) | Vasculitis 1  
(Pathology)  
(24) | Blood flow to the tissue  
(Physiology)  
(27) |
| **Science Hall (2)** | **9:05-10:05** | Antiarrhythmic drugs  
(Pharmacology)  
(16) | Blood vessels - Arterial system I  
(Anatomy)  
(19) | Cardiomyopathy, tumors of the heart & Pathology of pericardium  
(Pathology)  
(22) | Hemodynamic I  
(Physiology)  
(25) | Microcirculation  
(Physiology)  
(28) |
| **10:05-11:05** | Rheumatic heart disease  
(Pathology)  
(17) | Metabolism of cardiac muscles  
(Biochemistry)  
(20) | Development of the vascular system  
(Anatomy)  
(23) | Hemodynamic II  
(Physiology)  
(26) | Vasculitis 2  
(Pathology)  
(29) |
| **11:15-2:00 (Lab)** | Physiology Lab 1 (C1)  
ECG  
Anatomy Lab 1 (B1+B2) | Physiology Lab 1 (D2)  
ECG  
Anatomy Lab 1 (E1+E2) | Physiology Lab 1 (E2)  
ECG  
Pathology Lab1(A1+A2)  
Anatomy Lab1(D1+D2) | Pathology Lab1(C1+C2)  
Anatomy Lab2(D1+D2) | Pathology Lab1 (B1+B2)  
Anatomy Lab2(E1+E2)  
Physiology Lab 1 (C2)  
ECG |
| **2:15-5:00 (Lab)** | Physiology Lab 1 (D1)  
ECG | Physiology Lab 1 (E1)  
ECG |                          |                          |                          |
# CVS WEEK 3

<table>
<thead>
<tr>
<th>TIME &amp; DATE</th>
<th>SUN</th>
<th>MON</th>
<th>TUE</th>
<th>WED</th>
<th>THU</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:15-9:05</td>
<td>Arteriosclerosis and Atherosclerosis I (Pathology) (30)</td>
<td>Atherosclerosis (2) and aortic aneurysm (Pathology) (33)</td>
<td>Plasma lipoproteins and Cholesterol (1) (Biochemistry) (36)</td>
<td>Coronary circulation and venous drainage of the myocardium (Anatomy) (39)</td>
<td>Epidemiology of Cardiovascular disease (CVD) I (Comm. Medicine) (42)</td>
</tr>
<tr>
<td>9:05-10:05</td>
<td>Blood pressure (Physiology) (31)</td>
<td>Blood pressure regulation 2 (Physiology) (34)</td>
<td>Plasma lipoproteins and Cholesterol (2) (Biochemistry) (37)</td>
<td>Antihypertensive drugs II (Pharmacology) (40)</td>
<td>Exercise (Physiology) (43)</td>
</tr>
<tr>
<td>10:05-11:05</td>
<td>Blood pressure regulation 1 (Physiology) (32)</td>
<td>Hypertension (Physiology) (35)</td>
<td>Antihypertensive drugs I (Pharmacology) (37)</td>
<td>Cardiac enzymes and other proteins markers (Biochemistry) (41)</td>
<td>Ischemic heart disease (IHD) I (Pathology) (44)</td>
</tr>
<tr>
<td>11:15-2:00 (Lab)</td>
<td>Physiology Lab2 (D1+D2) BP</td>
<td>Physiology Lab2 (E1) BP</td>
<td>Physiology Lab2 (E2) BP</td>
<td>Pathology Lab2(B1+B2) Anatomy Lab3(A1+A2) Physiology Lab2 (C1) BP</td>
<td>Pathology Lab2(C1+C2) Anatomy Lab3(B1+B2)</td>
</tr>
<tr>
<td>2:15-5:00 (Lab)</td>
<td>Pharma. Lab1 (A1+A2)</td>
<td>Physiology Lab2 (C2) BP Pharma. Lab2 (B1+B2)</td>
<td>Pharma. (C1+C2) BP</td>
<td>Pharma. Lab1 (D1+D2) BP</td>
<td>Pharma. Lab (E1+E2)</td>
</tr>
</tbody>
</table>
### CVS WEEK 4

<table>
<thead>
<tr>
<th>TIME &amp; DATE</th>
<th>SUN</th>
<th>MON</th>
<th>TUE</th>
<th>WED</th>
<th>THU</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8:15-9:05</strong></td>
<td><strong>Cardiovascular disease risk factors 2</strong> <em>(Comm. Medicine)</em> <em>(45)</em></td>
<td><strong>Coronary circulations &amp; CAD</strong> <em>(Physiology)</em> <em>(48)</em></td>
<td><strong>Circulatory shock and heart failure</strong> <em>(Physiology)</em> <em>(51)</em></td>
<td><strong>Peripheral Vascular Disease</strong> <em>(Vascular Surgery)</em> <em>(54)</em></td>
<td>SEMINAR</td>
</tr>
<tr>
<td><strong>9:05-10:05</strong></td>
<td><strong>IHD (2) &amp; Hypertensive Heart Disease</strong> <em>(Pathology)</em> <em>(46)</em></td>
<td><strong>Varicose veins and pathology of lymphatics and tumour of blood vessels</strong> <em>(Pathology)</em> <em>(49)</em></td>
<td><strong>Drugs used in the treatment of heart failure</strong> <em>(Pharmacology)</em> <em>(52)</em></td>
<td><strong>Surgical Aspects of Coronary Artery Disease and Valvular Heart Disease</strong> <em>(Cardiac Surgery)</em> <em>(55)</em></td>
<td>SEMINAR</td>
</tr>
<tr>
<td><strong>10:05-11:05</strong></td>
<td><strong>Prevention and Control of CVD</strong> <em>(Comm. Medicine)</em> <em>(47)</em></td>
<td><strong>Antianginal drugs</strong> <em>(Pharmacology)</em> <em>(50)</em></td>
<td><strong>Drugs used in hyperlipidemias</strong> <em>(Pharmacology)</em> <em>(53)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>11:15-2:00</strong></td>
<td><strong>Pathology Lab2(D1+D2) Anatomy Lab3(C1+C2) Physiology Lab 2 (B1+B2)</strong></td>
<td><strong>Pathology Lab2(E1+E2) Anatomy Lab3(D1+D2)</strong></td>
<td><strong>Anatomy Lab3(E1+E2)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2:15-5:00</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIME &amp; DATE</td>
<td>SUN</td>
<td>MON</td>
<td>TUE</td>
<td>WED</td>
<td>THU</td>
</tr>
<tr>
<td>------------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>8:15-9:05</td>
<td>SEMINAR</td>
<td>SEMINAR</td>
<td></td>
<td></td>
<td>INCOURSE EXAMINATION SUNDAY</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>APRIL 25, 2010</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Time: 8.15-10.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Location: (10H1+10H2+10H3</td>
</tr>
<tr>
<td>9:05-10:05</td>
<td>SEMINAR</td>
<td>SEMINAR</td>
<td></td>
<td>SELF LEARNING</td>
<td>+10H4+N2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:05-11:05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:15-2:00</td>
<td>(Lab)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:15-5:00</td>
<td>(Lab)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
D. Weekly Teaching activities:
a. Summary of the teaching activities in the CVS

<table>
<thead>
<tr>
<th>Department</th>
<th># of Lectures</th>
<th># of Practical</th>
<th># of Seminars 2 All (30) subjects (15) groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy</td>
<td>9</td>
<td>2+ 1 Histology</td>
<td>0</td>
</tr>
<tr>
<td>Physiology</td>
<td>\</td>
<td>2 Physiology</td>
<td>0</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pathology</td>
<td>10</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Microbiology</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pharmacology</td>
<td>6</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Public Health</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Multidisciplinary</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Peripheral Vascular disease</td>
<td>\</td>
<td>\</td>
<td>\</td>
</tr>
<tr>
<td>Cardiac Surgery</td>
<td>\</td>
<td>\</td>
<td>\</td>
</tr>
<tr>
<td>Total</td>
<td>55</td>
<td>8</td>
<td>30</td>
</tr>
</tbody>
</table>