CO01: List all drugs with important effects on the autonomic and cardiovascular systems, and with effects
CO01.01: Describe the anatomical, neurochemical and physiological characteristics of the
CO01.02: Explain the principles of neurotransmitter synthesis, release and degradation
CO01.03: Differentiate between the autonomic nervous system and the somatic nervous system
CO01.04: Differentiate between the sympathetic and parasympathetic nervous system
CO01.05: Describe the physiological effects of both sympathetic and parasympathetic nervous system activation and inhibition on the organs that they innervate
CO01.06: Describe the various receptor families and subtypes that mediate activation of the parasympathetic and sympathetic nervous system
CO01.07: Describe the classic symptoms of mushroom poisoning
CO01.08: Explain the physiological results of sympathetic nervous system activation
CO01.09: Repeat the chemical structure of Norepinephrine and Epinephrine and the resulting
CO01.10: Differentiate between alpha1, alpha2, beta1, beta2 receptor activation on organ function
CO01.11: List the name of the most common diuretics used in patients with hypertension
CO01.12: List the clinical indications for diuretic use, other than hypertension
CO01.13: Describe the role of the renin-angiotension-aldosterone (RAA) system on blood pressure
CO01.14: List the drugs that interfere with the RAA system
CO01.15: List the drugs that block voltage-dependent calcium channels (calcium channel blockers, non-CCB)
CO01.16: Explain the differences in the cardiovascular effects of dihydro-pyridines (DHP) and non-DHP
CO01.17: List the clinical indications and contraindications for the use of CCB
CO01.18: List the antihypertensive drugs that activate potassium-channels
CO01.19: Describe their effects on blood pressure, afterload and preload
CO01.20: List most commonly used antihypertensive medications for intravenous use
CO01.21: Explain ischemic heart disease (IHD) and its consequences if untreated
CO01.22: Define the preventable and non-preventable risk factors that may lead to IHD
CO01.23: Discuss the possible clinical presentations of IHD
CO01.24: Describe the groups of drugs used to treat effort-induced angina, and Prinzmetal's angina, their mechanism of action, side effects, indications and contraindications
CO01.25: Explain the role of CCB in the treatment of IHD
CO01.26: Describe intracoronary devices employed to treat IHD
CO01.27: Explain heart failure and CHF (CHF), prevalence, main causes and its consequences if untreated
CO01.28: Discuss the main clinical symptoms present and the causes of death of patients with CHF
CO01.29: Describe systolic and diastolic dysfunction
CO01.30: List the drugs that improve symptoms but that do not reduce mortality associated with CHF, and those that decrease both morbidity and mortality
CO01.31: Define and classify arrhythmias and list the most common arrhythmias
CO01.32: Explain the major ions involved in the generation of pacemaker and non-pacemaker
CO01.33: Discuss atrial fibrillation and the drugs used for rate and rhythm control
CO01.34: List the anti-arrhythmic drugs with class III activity
CO01.35: Explain the metabolism of lipids including the role of the different apoproteins and
CO01.36: Define predisposing factors for dyslipidemias
CO01.37: Classify lipid disorders based on pharmacogenomic differences
CO01.38: List the recommendations for lipid levels in patients with different cardiovascular risk
CO01.39: Describe non-pharmacological life style interventions in patients with dyslipidemia
CO01.40: Describe the cardiovascular risk associated with dyslipidemia
CO01.41: Repeat the atherosclerosis process and its mediators
CO01.42: List the patient monitoring parameters of lipid lowering drugs
CO01.43: Classify lipid lowering drugs based on their efficacy and potency to manage blood lipid
CO01.44: List the predisposing factors associated with the toxicity of lipid lowering drugs
CO01.45: Classify the different types of anemias based on deficiencies and red blood cell count and
CO01.46: Describe iron absorption, metabolism and storage and its requirement throughout
CO01.47: Define hypochromic anemia and its symptoms
CO01.48: Discuss the different treatments of iron deficiency anemia and iron doses
CO01.49: Describe the limitations of parenteral administration of iron
CO01.50: Differentiate between recommended dietary allowance of iron and doses for the treatment
CO01.51: Explain the difference between Megaloblastic anemia and Iron deficiency anemia
CO01.52: Describe the absorption, metabolism and storage of vitamin B12 and folic acid
CO01.53: Describe the mechanisms of coagulation and platelet interactions in thrombogenesis
CO01.54: List the therapeutic targets of antithrombotic medications and their indications
CO01.55: Describe the major classes of antithrombotic drugs and the effect of structure on drug
CO02: Explain the mechanism of action of drugs used to treat hypertension, edema, heart diseases, lipid
CO02.01: Describe the major chemical classes of cholinergic agonists and the effect of structure on
CO02.02: Describe the subtypes of cholinesterase enzymes and the mechanisms by which
CO02.03: Describe the physiological actions of prototypical cholinergic agonists on various organ
CO02.04: Explain the therapeutic value and the therapeutic applications for an individual cholinergic
agonist based on its pharmacological classification
CO02.05: Describe the major chemical classes of cholinergic antagonists and the effect of structure on drug pharmacokinetics
CO02.06: Describe the physiological actions of prototypical cholinergic antagonists on various organ
CO02.07: Discuss the therapeutic value and the therapeutic applications for an individual
cholinergic antagonist based on its pharmacological classification
CO02.08: Explain the principles of reflex bradycardia and reflex tachycardia
CO02.09: Discuss the pharmacological and therapeutic rational for the use of Norepinephrine,
CO02.10: Describe the mechanisms of action for the various adrenergic agonists
CO02.11: Differentiate the physiological effects of the various adrenergic agonist drug classes
CO02.12: Discuss the therapeutic value and the therapeutic applications for an adrenergic agonist
based on its pharmacological classification
CO02.13: Describe the major chemical classes of adrenergic antagonists and the effect of structure on drug pharmacokinetics
CO02.14: Discuss the physiological actions of prototypical adrenergic antagonists on various organ
CO02.15: Discuss the therapeutic value and the therapeutic applications for an individual adrenergic
antagonist agent based on its pharmacological classification
CO02.16: Describe the effects of sympathetic and of renin-angiotensin-aldosterone (RAA)
stimulation and inhibition on blood pressure
CO02.17: Explain the concept of preload and afterload
CO02.18: State the concept of endothelium-dependent and endothelium-independent vasodilators
CO02.19: Describe the role of nitric oxide and prostacyclin on blood vessel function
CO02.20: List the endogenous substances with vasodilating and vasoconstricting actions on blood
CO02.21: Explain the effects of phosphodiesterase V inhibitors on blood vessels and nitric oxide
CO02.22: State the second messengers involved on the vasodilator and vasoconstrictor action of
drugs and endogenous substances
CO02.23: List the drugs that decrease the activity and the effects of sympathetic stimulation, and
CO02.24: Explain the cardiovascular and non-cardiovascular effects of blockers of alpha1, beta1
CO02.25: Describe the effects of centrally acting alph2 agonists on blood pressure and the
CO02.26: State how are diuretics classified based on their renal site of action and their effects on
serum and urinary electrolytes
CO02.27: Discuss the use of diuretics in patients with gout
CO02.28: Describe the factors that may make a patient resistant to diuretics
CO02.29: Describe the mechanism by which the RAA drugs lower blood pressure
CO02.30: Discuss the similarities and differences between ACEI, ARB, Renin inhibitor and aldosterone antagonists on blood pressure, angiotensin II and bradykinin levels
CO02.31: Explain the mechanism of the renoprotective actions of RAA inhibitors in diabetic
CO02.32: Discuss the role of calcium and of voltage-dependent calcium channels on the heart and on the vascular smooth muscle
CO02.33: Describe their mechanisms of action, side effects, indications and contraindications
CO02.34: Discuss the cardioprotective action of beta blockers in subjects with IHD
CO02.35: Describe the groups of drugs used to treat CHF, their mechanisms of action, side effects, indications and contraindications
CO02.36: Explain why digoxin is effective in the treatment of atrial fibrillation
CO02.37: Describe the groups of drugs used to treat arrhythmias, their mechanism of action, side effects, indications and contraindications
CO02.38: Discuss the mechanisms of action, indications, side effects and drug interactions of the different lipid lowering drugs
CO02.39: Describe the treatment and prophylaxis of megaloblastic anemia including side effects
CO02.40: Describe the mechanism of action, indications, side effects and clinical monitoring parameters of erythropoiesis-stimulating agents
CO02.41: Classify the specific antithrombotic agents by their mechanisms of action
CO02.42: Discuss the therapeutic value and the therapeutic applications for an individual antithrombotic agent based on its pharmacological classification

CO03: Recognize the major side effects and drug interactions of drugs used to treat autonomic,
CO03.01: Describe the side effects of cholinergic agonists
CO03.02: Describe the side effects and toxic effects of acetylcholinesterase inhibitor exposure
CO03.03: Explain the major drug interactions of the cholinergic agonists
CO03.04: State and describe the treatments for acetylcholinesterase inhibitor toxicities
CO03.05: Describe the side effects of anti-cholinergic drug use
CO03.06: Describe the major drug interactions and toxicities of anti-cholinergic drugs
CO03.07: Explain how receptor selectivity influences the side effect profile of anti-cholinergic drugs
CO03.08: Describe the drug interactions associate with each anti-cholinergic drug
CO03.09: Describe the side effects of anti-cholinergic drug use
CO03.10: Describe the major drug interactions and toxicities of the anti-cholinergic drugs
CO03.11: List the side effect profile of drug that interfere with the sympathetic nervous system
CO03.12: Explain receptor selectivity and the clinical advantages and disadvantages of using sympathetic nervous system drugs with and without receptor selectivity
CO03.13: List the compelling indications and the contraindications for the clinical use of beta
CO03.14: Describe the side effects most commonly associated with each of the classes of diuretics
CO03.15: Discuss the risks associated with decreases and increases in serum potassium
CO03.16: List the indications, contraindications, and the side effect profile of drugs that interfere
CO03.17: Describe the clinical indications and side effect profile of drugs that interfere with the RAA
CO03.18: Discuss the interaction between phosphodiesterase V inhibitors and organic nitrates, and nitric oxide generating beta blockers
CO03.19: Discuss anti-arrhythmic and non-anti-arrhythmic drugs that prolong that QT and their
CO03.20: Describe the clinical significant drug interactions in patients receiving amiodarone
CO03.21: Explain iron side effects and toxicity
CO03.22: Explain the side effects of the specific antithrombotic drugs
CO03.23: Describe the drug interactions of the specific antithrombotic drugs
CO03.24: Discuss and describe the treatment of toxicities associated with the various anti-
CO03.25: Discuss genetic polymorphism in limiting certain antiplatelet efficacy
CO04: Explain to patients the rationale for the use of the above described group of drugs
  CO04.01: Discuss the role of the pharmacist when dispensing antihypertensive drugs, including
  CO04.02: discuss the role of the pharmacist in preventing adverse side effects of antihypertensive
  CO04.03: Explain life-style modifications in hypertension control
  CO04.04: Discuss counseling patients treated with organic nitrates, with special attention to issues
    related to drug tolerance and dependence
  CO04.05: Explain how to counsel a patient receiving two or more drugs that prolong the QT interval