Paramedical program	
Specialization	**Pharmacy**
Course number	**020805121**
Course title	**Pharmacology 1**
Credit hours	**3**
Theoretical hours	**2**
Practical hours	**3**

Brief Course Description:

This course deals with drugs (specifications, effects, mechanisms of action side effects) . Drugs effecting Autonomic Nervous system, cardiovascular system (Hypotensive agents, anti Angina pectoris, Anti Arrhythmias, Anticoagulants, haemostatic agents, hypolipidimics, heart failure drugs).

Course Objectives:

Upon the completion of the course, the student will be able to:

1. Know drugs (indications, mechanisms of action, side effects, toxicity)
2. Get the basic knowledge of dosage and its relation with drugs effects and toxicity
3. Be familiar with the basic concepts of pharmacology and pharmacokinetics
4. Understand the classification and mechanisms of actions of drugs affecting Autonomic Nervous system
5. Understand the classification and mechanisms of actions of drugs affecting cardiovascular system
6. Know his/her role as a pharmacist assisstant (as one of health care providers) and how he/she could improve patient knowledge about drugs.
7. Effectively communicate with patients about the effectiveness and safety of drugs that affect ANS, CV system

Detailed Course Description:

Unit number	Unit subject	Unit content
1.	Introduction to pharmacology	What is the Drug Drugs sources (synthetic , natural) Nomenclature of drugs (chemical name , scientific name , brand name) Branches of pharmacology drug combinations drug incompatibility(physically , chemically and therapeutically) drug abuse, tolerance, Habituation, dependence ,addiction. drug interactions (synergism , potentiation , antagonism ,addition) side effect, adverse reaction, contraindications Drugs in pregnancy and lactation (drugs categories) Sensitivity of drugs (hypersensitivity , anaphylactic shock)
2.	The Dose	Effective dose , minimal effective dose , maximum effective dose ,Toxic dose , lethal dose . loading dose and maintenance dose. Therapeutic index Factors affecting drug dosing Dose response relationships .
3.	Pharmacokinetics and pharmacodynamics of drug	Pharmacokinetic of drug (drug absorption, drug distribution, drug metabolism, drug elemination) Pharmacodynamics • drug-receptor theory , Agonist, Antagonist, competitive antagonist , partial agonist , irreversible antagonist

		• enzyme inhibition • other principles of drug effects. Routes of drug administration with advantages and disadvantages of each (local , systemic) (oral , sublingual , rectally , inhalation , parenteral (I.V , IM , S.C , intradermal , intracardiac , intraarticular ,intrathecal , intraarterial) transdermal)
4.	**Drugs affecting Autonomic Nervons system**	Introduction on Autonomic Nervous system (its parts, distribution, nerves , neurotransmitors) Sympathetic Nervous system (receptors & their distribution) *Sympathomimetic drugs* (effects, medical indications, side effect, toxicity) epinephrine, norepinephrine, isoproterenol, dopamine, dobutamine, phenylphrine, ephedrine, Albuterol, xylometazoline, oxymetazoline, Naphazoline, amphetamines: (methamphetamine, methylphenidate) – *Sympatholytic drugs* (effects, medical indications, side effect, toxicity) Ergot alkaloids: ergotamine, ergometrine alpha blockers: phentolamine, phenoxybenzamine, tolazoline, prazosin, terazosin, doxazosin, Beta blockers: propranolol, metoprolol, atenolol, nadolol, timolol, labetalol, carvedilol Adrenergic neuronal blocker: Reserpine, methyldopa, Guanthidine, Guanfacine, Clonidine. Para sympathetic system (receptors and their distribution) – *Parasympathomimetic* (effect, medical indication, side effect, toxicity) acetylcholine, carbachol, bethanechol, muscarine, nicotine, pilocarpine, lobeline, neostigmine, physostigmine, edrophonium, ecothiophate, parathion, malathion)

		– *Parasympatholytics* atropine, Benzhexol, dicyclomine, oxybutynin, scopolamine, homatropine, ipratropium gangelion blocking agents (Pentolinium, Tri metaphan)
5.	**Drugs affecting cardiovascular systems**	Drugs (action, indication, side effect) used in treatment of • Hypertension : (alpha -blockers ,B blockers, Diuretics, Calcium antagonists, ACE inhibitors, Angiotensin 2 receptors antagonists, direct rennin inhibitors, Vasodialators, antihypertensive durgs, Centrally acting antihypertensive drugs) • Coagulation disorders , anti-platlet aggregation (aspirin, Clopidogrel, tecagrelor, teclopidine, dipyridamole) Glycoprotein IIb/IIIa inhibitors, Anticoagulants (Heparin, LMWH, warfarin) direct thrombin inhibitor, factor Xa inhibitors Thrombolytics (streptokinase, alteplase) • Hemostatic agents and drugs used in bleeding disorders (fibrinolytic inhibitors(aminocaproic acid , tranexamic acid , aprotinin , adrenalin , vit k , natural coagulant factors)) and local hemostatic agents . • Heart Failure (stages of heart failure, uses of cardiac glycosides) • Anti arrhythmic drugs (types of arrhythmia ,antiarrhythmic drugs (Na-channel blockers , beta blockers , Ca channel blockers , and others)) • Angina pectoris and acute coronary syndrome MI (types of angina ,nitrate vasodilators and its role in treatment)other drugs used in treating of angina .

		• Anti dyslipidemics (statins, fibrates, bile acid resins, niacin, ezetimibe, fish oil supplement)

Evaluation Strategies:

Exams		Percentage	Date
Exams	Midterm Exam	**30%**	--/--/----
	Final Exam	**50%**	--/--/----
Case discussion		**20%**	--/--/----

Teaching language:

- English

Teaching Methodology:

- Lectures, Discussions, quizzes and exams, Home works and home assignments.
- Case studies, presentations, group discussion, and field visits to hospitals (cardiology department)

References:

1. Lang, Basic & Clinical Pharmacology, Bertram G. Katzung, Anthony J. Trevor. 13e.2017
2. Lippincott's Illustrated Reviews: Pharmacology, Richard A. Harvey, Richard D. Howland, Mary J. Mycek, Pamela C. Champe , Publisher: Lippincott Williams & Wilkins, 6th edition 2015
3. Goodman & Gilman's The Pharmacological Basis of Therapeutics, Laurence L. Brunton, John S. Lazo, Keith L. Parker, Publisher: McGraw-Hill, 13th edition 2018
4. Jordan National Drug Formula , version 2 / 2011 / www.jfda.jo.rdu

Paramedical program	
Specialization	**Pharmacy**
Course number	**020805221**
Course title	**Pharmacology 2**
Credit hours	**3**
Theoretical hours	**2**
Practical hours	**3**

Brief Course Description:

This course aimed to study drugs (mechanism of action, therapeutics, pharmacological effects, precaution, side effect, toxicity) of central nervous system, respiratory system, gastrointestinal drugs, histamines and antihistamines , dermatology drugs and nutrients (vitamins and minerals).

Course Objectives:

Upon the completion of the course, the student will be able to:

1. To study drugs that affect CNS
2. Drugs affecting respiratory system.
3. Drugs affecting gastrointestinal tract
4. Identify histamines and antihistamines.
5. To study dermatology drugs and Nutrients (vitamins, proteins…)
6. Know his/her role as a pharmacist assisstant (as one of health care providers) and how he/she could improve patient knowledge about drugs.
7. Effectively communicate with patients about the effectiveness and safety of drugs that affect ANS, CV system

Detailed Course Description:

Unit number	Unit subject	Unit content
1.	**Drugs affect the central nervous system**	▪ Introduction to the nervous system . ▪ Neurotransmitter of the central nervous system ▪ Drugs that affect CNS (action, indication, main side effect , contraindication) - General anesthesia(preanesthetic medications , stages of anesthesia ,types of anesthesia ,IV anesthetic drugs (propofol ,thiopental ,etomidate, ketamine ,diazepam) maintenance or inhalational anesthesia (chloroform , diethyl ether , cyclopropane, nitrous oxide ,halothane , enflurane , isoflurane , desflurane , sevoflurane . - Local anesthesia (administration routes , types , uses , side effects . (surface applied (cocaine, benzocaine) , injected anesthesia (procaine , lidocaine , bupivacaine)) - Skeletal Muscle Relaxant (neuromuscular blockers or peripherally acting ,centrally acting drugs , direct acting drugs) the action , indication ,side effect of (tubocurarine ,succinylchlorine , gallamine ,benzodiazepines , baclofen , orphenandrine , tizanidine , mephenisin , botulinium toxin, dantrolene) - Sedatives and hypnotics the action , uses and side-effects of (barbiturate , benzodiazepines , and other miscellaneous drugs used for sedation . - Narcotic Analgesics, opioids (the action , uses and side effects , and classification of opioids (agonists , antagonists). Opioids : natural (codeine, morphine , thebaine , narcotine ,papaverine) , semisynthetic (hydromorphine , heroine) , and synthetic (dextropropoxyphene , fentanyl , pethidine , pentazocine , methadone) - Non- Narcotic Analgesics : the action , uses , side effect and dosing of (paracetamole) - Non-steroidal anti-inflammatory drugs : the action ,uses , side effect and classification of NSAIDS (COX 1 , COX 2 inhibitors) - Anti- depressant drugs (classification of antidepressants , the action , uses , side effects of (tricyclic antidepressant(amitriptyline , clomipramine , imipramine, nortriptyline) ,monoaminoxidase

		inhibitors (isocarboxide , selective serotonin reuptake inhibitors) - Anti psychotic and Anxiolytic (typical drugs (phenothiazine , butyrophenones , thioxanthene) atypical drugs (clozapine , olanazapine , sulpride - Anti Parkinson , the action , uses , and side effect of (anticholinergic anti-parkinson agents (benzatropine , benhexoln ,orphenandrine) ,dopamine agonists (bromocriptine , pergolide , cabergoline) , and miscellaneous agents as (amantadine , selegiline , levodopa)) - Anti Epilepsy (types of epilepsy ,drugs used in treating epilepsy(phenytoin , carbamazepine ,valproic acid , ethosuximide , phenoparbital , primidone , benzodiazepines , new epileptic drugs as (felbamate , gabapentin , lamotrigine)) - CNS – stimulant - Hallucinogens - Alcohols (ethanol , methanol , disulfiram reaction)
2.	**Histamine and Antihistamine**	▪ Histamine receptors ,distribution, biosynthesis, degradation. ▪ Anti histamins (general uses , side effects , ** H1 blockers first and second generations (diphenhydramine, hydroxyzine , promethazine, terfenadrine, phenothiazine chlorpheniramine, cyclazine, astimazole, loratadine desloratidine ,fexofenadine citrizine , levocitrizine.) ** H2 blockers (cimitidine, rantidine, nizatidine,famotidine) ** Drug inhibits histamine release, mast cell stabilizers (cromylon sodium , ketotifen)
3.	**Drugs affect the Gastro intestinal tract**	▪ Drugs used in Ulcer ** anti-acid (sodium bicarbonate , aluminum hydroxide ,magnesium hydroxide ,calcium salts), mucosal protective agents (sucralfate, bismuth)H2 blockers(ranitidine, famotidine, cimetidine , nizatidine), antimicrobial agents (treating of H-pylori peptic ulcer), prostaglandins (misoprostol), proton pump inhibitors(omeprazole , lansoprazole, esomeprazole , pantoprazole), antimuscarinic drugs(pirenipine)

		▪ Gastroesophageal reflux disease and role of anti-acid ▪ Anti-flatulent (antifoam , kaolin , activated charcoal) ▪ Antispasmodic agents(anticholinergic drugs (dicyclomine , hyoscyamine) ,mebeverine , peppermint oil). ▪ anti-vomiting-antiemetic (5-HT3 receptor antagonists (ondansetron) , dopamine antagonists (domperidone , olanzapine , haloperidol) antihistamines (cyclizine , diphenhydramine ,dimenhydramine , meclizine, promethazine) , cannabinoids , benzodiazepines , anticholenergics and other miscellaneous) ▪ Laxatives and purgative (bulk-foaming agents ,hyperosmotic laxative , stimulant and irritant , stool softnersor lubricants) ▪ anti diarrhea (antimotility agent (loperamide) ,anticholinergics , lactobacillus and acidobacillus ,adsorbents , narcotics (codeine , diphenoxylate)
4.	**Drugs affect the Respiratory system**	▪ Asthma management (bronchodilators(beta2 agonists ,anticholenergics , adrenergic agonists , methyl-xanthines (aminophylline ,theophylline) , anti-inflammatory (corticosteroids , leukotriene antagonists , mast cell stabilizers) ▪ Chronic obstructive pulmonary disease management ▪ Anti tussive (morphine-codeine , pholcodeine , dextromethorphane)Expectorant (ammonium chloride , ipecacuana , guaphensin) -mucolytic agents (ambroxol , bromohexine) demulcents (benzoin tincture) . (differentiate between productive and dry cough remedies)
5.	**Drugs affect the Nutrition**	▪ Anemia drugs (Iron, folic acid, B12) ▪ Minerals (zinc, copper, Chromium, manganese, selenium) ▪ Vitamins (A, K, E, D, C, B1, B2, B3, B6, B9)

6.	**Drugs affect the skin**	▪ Dermatological formulations (demulcents , emollients , astringents , counter irritant , rubefacients ,protective and absorbents , caustics and keratolytic agents) ▪ Eczema ▪ Psoriasis ▪ Anti pigmentation drugs (bleaching agents ▪ Acne Vulgaris – Etiology and Pathophysiology of Acne, Classification of Acne, Diagnosis of Acne, OTC and prescription treatment of Acne
7.	**Drugs Used in Gout**	▪ What is gout , treatment of gout (acute attack and repeated attacks , prophylactic drugs) the action , the uses and the side effects of ▪ Allopurinol ▪ Colchicine ▪ Uricosuric (Probenecid)

Evaluation Strategies:

Exams		Percentage	Date
Exams	midterm Exam	**30%**	--/--/----
	Final Exam	**50%**	--/--/----
Case study Homework and Projects		**20%**	--/--/----

Teaching language:

- English

Teaching Methodology:

- Lectures, Discussions, quizzes and exams, Home works and home assignments.
- Case studies, presentations, group discussion, and Field visits to hospitals and case reports (Psychatric hospitals, addiction treatment centre)

References:

1. Lang, Basic & Clinical Pharmacology, Bertram G. Katzung, Anthony J. Trevor. 13e.2017
2. Lippincott's Illustrated Reviews: Pharmacology, Richard A. Harvey, Richard D. Howland, Mary J. Mycek, Pamela C. Champe , Publisher: Lippincott Williams & Wilkins, 5th edition 2012
3. Goodman & Gilman's The Pharmacological Basis of Therapeutics, Laurence L. Brunton, John S. Lazo, Keith L. Parker, Publisher: McGraw-Hill, 12th edition 2011
4. Jordan National Drug Formula , version 2 / 2011 / www.jfda.jo.rdu

Paramedical program	
Specialization	**Pharmacy**
Course number	**020805222**
Course title	**Pharmacology 3**
Credit hours	**3**
Theoretical hours	**2**
Practical hours	**3**

Brief Course Description:

Study drugs of chemotherapy ,Antibiotics, Anti T. B , Anti cancer Anti amoebic , Anti malarial, Anti thelmintics , endocrine system, and reproductive system.

Course Objectives:

Upon the completion of the course, the student will be able to:

1- Understand the principle, theories and elements of chemotherapy, pharmacological effects and clinical applications.
2- Identify chemotherapy (Antibiotics, Antibacterial, anti tuberculosis, Anthelmentics, Anti amoebic, anti malarial , antiviral …)
3- To comprehend the mechanism of action of each pharmacological group, pharmacological effects, actual and potential side effects and contraindications.
4- Understand the concept of bacterial resistance and how it develops.
5- Identify chemotherapeutic agents used in treatment of cancers.
6- To study Hormones and drugs of endocrine system
7- To study drugs of reproductive system
8- Know his/her role as a pharmacist assisstant (as one of health care providers) and how he/she could improve patient knowledge about drugs.
9- Effectively communicate with patients about the effectiveness and safety of drugs
10- Collaborate and cooperate with other health providers to implement patient related care plan.

Detailed Course Description:

Unit number	Unit subject	Unit content	Time needed
1.	**Anti Bacterial drugs**	▪ Introduction ▪ Bases of classification of these drugs ▪ Bacterial Resistance ▪ Mechanisms of action , uses , spectrum , side and adverse effect , dosing and contraindication of : 1. Anti metabolite ** Sulfonamides 2. Cell wall inhibitors ** B lactam antibiotics (Penicilins, Cephalosporines, Carbapenems, Monobactam ** non- B lactam (Vancomycin, Fusidic acid, Bacitracin, Ticoplanin, Daptomycin, Cycloserine) 3. Protein synthesis inhibitors ** Macrolides (Erythromycin, Azithromycin, Roxithromycin, Clarithromycin, Spiramycin,) ** Aminoglycosides (Amikacin, streptomycin, kanamycin, Neomycin, Tobramycin, Gentamicin) ** Tetracyclines (Tetracycline, Doxycyclin, Minocyclin, Glycyclin) ** Chloromphenicol ** Lincosamides (Clindamycin, Lincomycin) 4. Drugs that inhibit DNA synthesis. ** Fluroqainolone (Ciprofloxacin, Ofloxacin, Norfloxacin, Gatifloxacin, Gemifloxacin) 5. Drugs that inhibit cell membrane ** polymixin ▪ Drugs used in the treatment of tuberculosis : first and second lines drugs (streptomycin , isoniazide, ethambutol , pyrazinamide ,rifampicin , rifabutin , ethionamide , capreomycin , cycloserine , amikacin) ▪ Antiseptics and disinfectants.(phenols , halogens,	

		alcohols , aldehydes , acids , heavy metals) ▪ Drugs used in the treatment of Urinary tract infection (nalidixic acid ,nitrofurantoin , phenazopyridine , methenamine)	
2.	**Anti Parasite drugs**	▪ Anti Amaebics What is amoebic dysentery , the two form of amoebiasis (bowel lumen amoebiasis and tissue invading amoebiasis) The action , uses ,side effects , contraindications of (emetine , diloxanide, paromomycin , iodoquinol , chloroquine , metronidazole , tinidazole , benznidazole) ▪ Anthelmentics Types of of warms , the action , uses ,side effects and cotraindication of each of (albendazole , mebendazole , niclosamide , piperazine , praziquantel , pyrantel pamoate , levamisole , niridazole , bithionol) Anti schistosomal agent ▪ Antimalarials drugs Life cycle of malarial parasite and site of drug action . The action , uses , side effects and contraindications of (quinine, chloroquine , primaquine , mefloquine ,amodiaquine , pyrimethamine , proguanil , sulfonamides , artemisinin , halofantrine , mepacrine)	
3.	**Antifungal drugs**	Fungal infections (superficial and systemic infections) Antifungal drugs :Mechanisms of action , uses , spectrum , side and adverse effect , dosing and contraindication of : ** Amphotericin B, Flucytosine, Azoles, Echinocandins, Nystatin, Griseofulvin, Terbinafine, Tolnaftate, undecylenic acid .	

4.	**Antiviral drugs**	Classification of viral drugs (drugs that directly impair virus replication , drugs that modulate the host immune system) ▪ Antiviral drugs (action , uses side effects and contraindication of : ** Acyclovir, Valacyclovir, Famciclovir, Penciclovir, idoxuridine, vidarabine , Trifluridine, Amantadine, Rimantadine, zidovudine, didanosine Interferones.	
5.	**Anticancer and Immuno-suppressant agents**	▪ introduction to cancer (definition , cancer cell cycle, classification according to tumor origin) classification to cytotoxic agents ▪ Alkylating agents(nitrogen mustard , nitrous urea, cisplatin ,carboplatin , oxaliplatin , bulphan ▪ Antimetablites (purine analogues , pyrimidine analogues , antifolates) ▪ Plant Alkaloids (vinca alkaloids , podophyllotoxin , taxanes) ▪ Antibiotics (actinomycin , anthracyclines , doxorubicin , daunorubicin , valrubicin , idarubicin , epirubicin , bleomycin , plicamycin , dactinomycin) ▪ Anticancer hormones (Estrogen & Androgen Inhibitors, prednisolone ▪ Radioactive isotops ▪ Immunotherapy (interferon , levamisole , interleukins) ▪ Miscelleneous Taxol, Mitotane , asparaginase	

6	**Hormones**	▪ Introduction to endocrine glands ▪ Pituitary gland hormones (anterior pituitary (somatotropin ,TSH , ACTH , prolactin , gonadotropins(LH , FSH) , posterior pituitary (oxytocin ,ADH)) Drugs (bromocriptine , desmopressin) ▪ Thyroid gland hormones (thyroxin) Drugs (levothyroxine .liothyronine , radioactive iodine , lugol's iodine , carbimazole , methimazole , propylthiouracil) ▪ Parathyroid gland hormones(parathormone) Drugs (etidronatedisodium) ▪ Suprarenal gland (adrenal gland) hormones (glucocorticoids , mineralocorticoids) Drugs (prednisolone , triamcinolone , dexamethasone , betamethasone , flucinolone ,flumethasone , beclomethasone) • Pancreas hormones (glucagon, insulin) ** Diabetes Mellitus **Manufactured insulins (regular human insulin ,intermediate acting insulin(NPH , isophane insulin , suspension monotard ,semilent) long acting analogs (protamine zinc insulin) ,mixture of soluble and biphasic insulin (biphasic isophaneinsulin , biphasic insulin aspart , biphasic insulin lispro) ** Oral Hypoglycemic drugs: (Bignanides (metformin)Sulfonyl ureas (tolbutamide, chlorpropamide, glipizide, glyburide , glimipride , gliclazide), Meglitinides, Thiazolidinediones,(rosiglitazone, pioglitazone) Dipeptidyl peptidase inhibitors, α- Glucosidase inhibitors(acarbose) ▪ Sex hormones (gonal hormones (gonadotrophic hormone FSH -LH , androgen , estrogen , progesterone) ** Oral contraceptives ** Drugs induced fertilization ** Drugs used in the treatment of male impotence	

		The indications , side effects , contraindication of (ethinyl estradiol , diethyl stilbesterol , mestranol , clomiphene , tamoxifen , medroxy progesterone , norgesterol , medroxyprogessteron , norethisterone ,levonorgestrol , mifepristone , methyl testosterone , mesterolone , sustanon , cyproterone , sildenafil , vardenafil , tadalafil , alprostadil , prostaglandin E1)	

Evaluation Strategies:

Exams		Percentage	Date
Exams	Midterm Exam	**30%**	--/--/----
	Final Exam	**50%**	--/--/----
Case discussion and presentation		**20%**	--/--/----

Teaching language:

- English

Teaching Methodology:

- Lectures, Discussions, quizzes and exams, Home works and home assignments.
- Case studies, presentations, group discussion, and field visits to hospitals and case report (cancer centre, endocrine department)

References:

1. Lang, Basic & Clinical Pharmacology, Bertram G. Katzung, Anthony J. Trevor. 13e.2017
2. Lippincott's Illustrated Reviews: Pharmacology, Richard A. Harvey, Richard D. Howland, Mary J. Mycek, Pamela C. Champe , Publisher: Lippincott Williams & Wilkins, 5th edition 2012
3. Goodman & Gilman's The Pharmacological Basis of Therapeutics, Laurence L. Brunton, John S. Lazo, Keith L. Parker, Publisher: McGraw-Hill, 12th edition 2011
4. Jordan National Drug Formula , version 2 / 2011 / www.jfda.jo.rdu