



| <b>Paramedical program</b> |                       |
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| <b>Specialization</b>      | <b>Pharmacy</b>       |
| <b>Course number</b>       | <b>020805121</b>      |
| <b>Course title</b>        | <b>Pharmacology 1</b> |
| <b>Credit hours</b>        | <b>3</b>              |
| <b>Theoretical hours</b>   | <b>2</b>              |
| <b>Practical hours</b>     | <b>3</b>              |

## 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, hypolipidemics, 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 assistant (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                  | <p>What is the Drug<br/>           Drugs sources ( synthetic , natural )<br/>           Nomenclature of drugs ( chemical name , scientific name , brand name )<br/>           Branches of pharmacology<br/>           drug combinations<br/>           drug incompatibility( physically , chemically and therapeutically )<br/>           drug abuse, tolerance, Habituation, dependence ,addiction.<br/>           drug interactions (synergism , potentiation , antagonism ,addition )<br/>           side effect, adverse reaction, contraindications</p> <p>Drugs in pregnancy and lactation<br/>           (drugs categories )<br/>           Sensitivity of drugs ( hypersensitivity , anaphylactic shock )</p> |
| 2.          | The Dose                                      | <p>Effective dose , minimal effective dose , maximum effective dose , Toxic dose , lethal dose .<br/>           loading dose and maintenance dose.<br/>           Therapeutic index<br/>           Factors affecting drug dosing<br/>           Dose response relationships .</p>   |
| 3.          | Pharmacokinetics and pharmacodynamics of drug | <p>Pharmacokinetic of drug<br/>           (drug absorption, drug distribution, drug metabolism, drug elimination)<br/>           Pharmacodynamics</p> <ul style="list-style-type: none"> <li>• drug-receptor theory , Agonist, Antagonist, competitive antagonist , partial agonist , irreversible antagonist</li> </ul>  |



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|    |  | <ul style="list-style-type: none"> <li>• enzyme inhibition</li> <li>• other principles of drug effects.</li> </ul> <p>Routes of drug administration with advantages and disadvantages of each (local , systemic )<br/>( oral , sublingual , rectally , inhalation , parenteral ( I.V , IM , S.C , intradermal , intracardiac , intraarticular ,intrathecal , intraarterial ) transdermal )</p>   |
| 4. | <p style="text-align: center;"><b>Drugs affecting<br/>Autonomic<br/>Nervons<br/>system</b></p> | <p>Introduction on Autonomic Nervous system ( its parts, distribution, nerves , neurotransmitors )</p> <p>Sympathetic Nervous system ( receptors &amp; their distribution)</p> <p><u>Sympathomimetic drugs</u> (effects, medical indications, side effect, toxicity )<br/>epinephrine, norepinephrine, isoproterenol, dopamine, dobutamine, phenylphrine, ephedrine, Albuterol, xylometazoline, oxymetazoline, Naphazoline, amphetamines: (methamphetamine, methylphenidate)</p> <p>– <u>Sympatholytic drugs</u> (effects, medical indications, side effect, toxicity )</p> <p>Ergot alkaloids: ergotamine, ergometrine<br/>alpha blockers: phentolamine, phenoxybenzamine, tolazoline, prazosin, terazosin, doxazosin,<br/>Beta blockers: propranolol, metoprolol, atenolol, nadolol, timolol, labetalol, carvedilol</p> <p>Adrenergic neuronal blocker: Reserpine, methyldopa, Guanthidine, Guanfacine, Clonidine.</p> <p>Para sympathetic system (receptors and their distribution)</p> <p>– <u>Parasympathomimetic</u> ( effect, medical indication, side effect, toxicity )<br/>acetylcholine, carbachol, bethanechol, muscarine, nicotine, pilocarpine, lobeline, neostigmine, physostigmine, edrophonium, ecothiophate, parathion, malathion)</p> |

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|    |   | <p>– <u>Parasympatholytics</u><br/>atropine, Benzhexol, dicyclomine, oxybutynin, scopolamine, homatropine, ipratropium</p> <p>gangelion blocking agents ( Pentolinium, Tri metaphan)</p>   |
| 5. | <b>Drugs affecting cardiovascular systems</b> | <p>Drugs ( action, indication, side effect) used in treatment of</p> <ul style="list-style-type: none"> <li>• Hypertension : ( alpha -blockers ,B blockers, Diuretics, Calcium antagonists, ACE inhibitors, Angiotensin 2 receptors antagonists, direct rennin inhibitors, Vasodialators, antihypertensive durgs, Centrally acting antihypertensive drugs)</li> <li>• 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 )</li> <li>• 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 .</li> <li>• Heart Failure (stages of heart failure, uses of cardiac glycosides)</li> <li>• Anti arrhythmic drugs ( types of arrhythmia ,antiarrhythmic drugs (Na-channel blockers , beta blockers , Ca channel blockers , and others ))</li> <li>• Angina pectoris and acute coronary syndrome MI ( types of angina ,nitrate vasodilators and its role in treatment )other drugs used in treating of angina .</li> </ul> |



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|  |  | <ul style="list-style-type: none"><li>• Anti dyslipidemics (statins, fibrates, bile acid resins, niacin, ezetimibe, fish oil supplement)</li></ul> |
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## 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