



LEADING THE WAY
KHALĪFAH • AMĀNAH • IQRĀ' • RAHMATAN LIL-ĀLĀMĪN
LEADING THE WORLD



AN INTERNATIONAL AWARD-WINNING INSTITUTION FOR SUSTAINABILITY

DEPARTMENT OF BASIC MEDICAL SCIENCES
KULLIYAH OF MEDICINE
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

PHARMACOLOGY STUDY GUIDE

Academic Session 2022/2023

Updated: March 2023

**MASTER OF MEDICAL SCIENCES,
MASTER OF HEALTH SCIENCES
&
PhD IN HEALTH SCIENCES**

Senate Endorsement Master of Medical Sciences:

25th March 2022 (486th Senate Meeting)

Senate Endorsement of Master & PhD of Health Sciences:

24th December 2021 (483rd Senate Meeting)

Prepared by:

Asst. Prof. Dr Aszrin Abdullah

Asst. Prof. Dr Nour El Huda Abd Rahim

Asst. Prof. Dr Wan Muhamad Salahudin Wan Salleh

Sr. Nur Hayati Bujang

Sr. Nur Asma Afiqah Mohd Yusof

Checked by:

Prof. Dr Sirajudeen Kuttulebbai Naina Mohamed Salam, Head of Department of Basic Medical Sciences, Kulliyah of Medicine

Prof. Dr Azrina Md Ralib, Deputy Dean Postgraduate, Kulliyah of Medicine

Prof. Dr Jamalludin A. Rahman, Dean, Kulliyah of Medicine

GENERAL CONTENTS

GENERAL CONTENTS	3
PHARMACOLOGY	5
<i>Directory of Course Instructors</i>	5
<i>List of Courses</i>	5
PHAR 7271: Introduction to General Pharmacology	6
<i>Section 1: Course Synopsis</i>	6
<i>Section 2: Learning Outcome</i>	6
<i>Section 3: Teaching Format and Guidelines</i>	6
<i>Section 4: Course Assessment</i>	6
<i>Section 5: Course Content</i>	7
<i>Section 6: Learning Resources</i>	7
PHAR 7272: Basic and Laboratory Pharmacology	8
<i>Section 1: Course Synopsis</i>	8
<i>Section 2: Learning Outcome</i>	8
<i>Section 3: Teaching Format and Guidelines</i>	8
<i>Section 4: Course Assessment</i>	8
<i>Section 5: Course Content</i>	9
<i>Section 6: Learning Resources</i>	9
PHAR 7279: Antimicrobial Agents II - Elective	11
<i>Section 1: Course Synopsis</i>	11
<i>Section 2: Learning Outcome</i>	11
<i>Section 3: Teaching Format and Guidelines</i>	11
<i>Section 4: Course Assessment</i>	11
<i>Section 5: Course Content</i>	12
<i>Section 6: Learning Resources</i>	12
PHAR 7373: Autonomic Pharmacology	14
<i>Section 1: Course Synopsis</i>	14
<i>Section 2: Learning Outcome</i>	14
<i>Section 3: Teaching Format and Guidelines</i>	14
<i>Section 4: Course Assessment</i>	14
<i>Section 5: Course Content</i>	15
<i>Section 6: Learning Resources</i>	16
PHAR 7374: Central Nervous System Pharmacology	17
<i>Section 1: Course Synopsis</i>	17
<i>Section 2: Learning Outcome</i>	17
<i>Section 3: Teaching Format and Guidelines</i>	17
<i>Section 4: Course Assessment</i>	17
<i>Section 5: Course Content</i>	18
<i>Section 6: Learning Resources</i>	19
PHAR 7375: Cardiovascular and Renal Systems Pharmacology	20
<i>Section 1: Course Synopsis</i>	20
<i>Section 2: Learning Outcome</i>	20
<i>Section 3: Teaching Format and Guidelines</i>	20
<i>Section 4: Course Assessment</i>	20
<i>Section 5: Course Content</i>	21
<i>Section 6: Learning Resources</i>	23
PHAR 7376: Respiratory and Gastrointestinal Pharmacology	24
<i>Section 1: Course Synopsis</i>	24
<i>Section 2: Learning Outcome</i>	24
<i>Section 3: Teaching Format and Guidelines</i>	24
<i>Section 4: Course Assessment</i>	24
<i>Section 5: Course Content</i>	25
<i>Section 6: Learning Resources</i>	26
PHAR 7377: Endocrine System Pharmacology - Elective	27
<i>Section 1: Course Synopsis</i>	27
<i>Section 2: Learning Outcome</i>	27
<i>Section 3: Teaching Format and Guidelines</i>	27
<i>Section 4: Course Assessment</i>	27
<i>Section 5: Course Content</i>	28
<i>Section 6: Learning Resources</i>	29
PHAR 7378: Antimicrobial Agents I - Elective	30
<i>Section 1: Course Synopsis</i>	30
<i>Section 2: Learning Outcome</i>	30

Section 3: Teaching Format and Guidelines	30
Section 4: Course Assessment	30
Section 5: Course Content	31
Section 6: Learning Resources	31

Any absence due to sickness or any unforeseen circumstances must be notified to the course coordinators as soon as possible and must be supported by suitable documentation e.g. sick certification

PHARMACOLOGY

Directory of Course Instructors

No.	Name	Email	Department
1.	Assoc. Prof. Dr. Wael Mohamed Yousef Mohamed	waelmohamed@iium.edu.my	Basic Medical Sciences, KOM
2.	Asst. Prof. Dr. Mohd. Fadly Mohd. Noor	mohdfadly@iium.edu.my	Basic Medical Sciences, KOM
3.	Asst. Prof. Dr. Hidayatul Radziah Ismawi	hidayatulradziah@iium.edu.my	Basic Medical Sciences, KOM
4.	Asst. Prof. Dr. Nour El Huda Abd Rahim	elhuda@iium.edu.my	Basic Medical Sciences, KOM

List of Courses

	Course Title	Course Code	Course Classification	Credit Hours
1.	Introduction to General Pharmacology	PHAR 7271	Special Req	2
2.	Basic and Laboratory Pharmacology	PHAR 7272	Elective	2
3.	Antimicrobial Agents II	PHAR 7279	Elective	2
4.	Autonomic Nervous System	PHAR 7373	Elective	3
5.	Central Nervous System Pharmacology	PHAR 7374	Elective	3
6.	Cardiovascular and Renal Systems Pharmacology	PHAR 7375	Core	3
7.	Respiratory and Gastrointestinal Systems Pharmacology	PHAR 7376	Core	3
8.	Endocrine System Pharmacology	PHAR 7377	Elective	3
9.	Antimicrobial Agents I	PHAR 7378	Elective	3

PHAR 7271: Introduction to General Pharmacology

Course Coordinator: Asst. Prof. Dr. Mohd Fadly Mohd Noor

Section 1: Course Synopsis

In this course, the general pharmacology topics will be taught and discussed. This includes Drug Receptors Interactions, Pharmacodynamics, Pharmacokinetics, Clinical Pharmacology, Discovery & Development of Drugs, Evaluation of drugs in man, Rational Prescribing & Prescription Writing. This course will equip the student with general understanding on various important topics in pharmacology.

Section 2: Learning Outcome

1. Differentiate and explain the principles of pharmacodynamics & pharmacokinetics.
2. Point out and explain the importance of basic pharmacodynamics & pharmacokinetics in therapeutic practice.
3. Analyze and explain the relevant knowledge of pharmacodynamics & pharmacokinetics in research projects.

Section 3: Teaching Format and Guidelines

1. Lecture
2. Assignment
3. Seminar
4. Viva
5. Self-directed learning

Section 4: Course Assessment

Assignment	30%
Viva	60%
Participation/Attendance	10%

Section 5: Course Content

No.	Topic
	Introduction <ul style="list-style-type: none">• The nature of drugs• Drug-Body Interactions
1.	Drug receptors & molecular pharmacology <ul style="list-style-type: none">• Drug-receptor complex• Signaling and transducer mechanisms• Receptor regulation
2.	Pharmacodynamics <ul style="list-style-type: none">• Dose-response curve• Therapeutic index
3.	Pharmacokinetics I <ul style="list-style-type: none">• Absorption• Bioavailability and first pass metabolism• Volume of distribution• Biotransformation
4.	Pharmacokinetics II <ul style="list-style-type: none">• Drug excretion• Basic clinical pharmacokinetics• Dosage kinetics of drugs
5.	Clinical pharmacology <ul style="list-style-type: none">• Pharmacological aspects of drug abuse• Principles of therapeutic evaluation
6.	Discovery & Development of Drugs <ul style="list-style-type: none">• Ethics
7.	<ul style="list-style-type: none">• Evaluation of Drugs in Man• Experimental Therapeutics• Rational Prescribing

Section 6: Learning Resources

Required Textbook

1. Brunton, L., Hilal-Dandan, R. & Knollmann, B. C. (2018). Goodman & Gilman's: The pharmacological basis of therapeutics (13th ed.). McGraw-Hill Education.
2. Katzung, B. G. (2018). Basic and clinical pharmacology (14th ed.). McGraw-Hill Education.

Recommended Textbook

1. Brown, M. J., Sharma, P., Mir, F., & Bennett, P. N. (2018). Clinical Pharmacology (12th ed.). Elsevier Ltd.

PHAR 7272: Basic and Laboratory Pharmacology

Course Coordinator: Asst. Prof. Dr. Wael Mohamed Yousef Mohamed

Section 1: Course Synopsis

This course is aimed to expose the students to common procedures and laboratory techniques in pharmacology. All the basic laboratory topics are essential for the students particularly when they plan to carry out their own research project. Practical and hand-on laboratory sessions are the main teaching methodology used.

Section 2: Learning Outcome

1. Design & organize a laboratory project and display technical skills in handling relevant instruments.
2. Experiment on different animal models for research and compare the outcome
3. Point out ethical issues related to animal study in pharmacology.
4. Integrate the knowledge and skills acquired to solve issues in research work.

Section 3: Teaching Format and Guidelines

1. Lecture
2. Assignment
3. Practical
4. Examination

Section 4: Course Assessment

Assignment	30%
Examination	60%
Participation/Attendance	10%

Section 5: Course Content

No.	Topic
1.	Introduction to Laboratory I <ul style="list-style-type: none">• Common Procedure & Techniques• Basic equipment
2.	<ul style="list-style-type: none">• Study design in preclinical & laboratory study• Ethic in animal study
3.	Intoduction to Laboratory II <ul style="list-style-type: none">• Sample preparation, handling, stability & storage• Type of samples
4.	<ul style="list-style-type: none">• Type of equipment and devices• Human and animal samples
5.	Practical I <ul style="list-style-type: none">• Handling of experimental animal• Drug preparation technique
6.	Practical II <ul style="list-style-type: none">• Insulin measurement• Radioimmunoassay technique• Gamma counter
7.	<ul style="list-style-type: none">• Enzyme immunoassay technique• Fluorescence detector
8.	Practical III <ul style="list-style-type: none">• Basic & Protocol Preparation• Type of animal used• Isolated heart technique
9.	Practical IV <ul style="list-style-type: none">• Basic & Protocol Preparation• Type of animal used• Bilateral occlusion of common carotid arteries techniques
10.	Practical V <ul style="list-style-type: none">• Basic & protocol preparation• Type of animal used• Organ and tissue perfusion• Langerdorff technique
11.	Practical VI <ul style="list-style-type: none">• Basic & Protocol preparation• Type of animal used• Multi-channel cardiovascular assessments• Effect of drugs on cardiovascular system

Section 6: Learning Resources

Required Textbook

1. Brunton, L., Hilal-Dandan, R. & Knollmann, B. C. (2018). Goodman & Gilman's: The pharmacological basis of therapeutics (13th ed.). McGraw-Hill Education.
2. Katzung, B. G. (2018). Basic and clinical pharmacology (14th ed.). McGraw-

Hill Education.

Recommended Textbook

1. Brown, M. J., Sharma, P., Mir, F., & Bennett, P. N. (2018). Clinical Pharmacology (12th ed.). Elsevier Ltd.

PHAR 7279: Antimicrobial Agents II

Course Coordinator: Asst. Prof. Dr Hidayatul Radziah Ismawi

Section 1: Course Synopsis

This course has been designed to expose the students towards understanding the various antimicrobial agents i.e. the general antibiotics and antituberculosis drugs. Their mechanism of actions, drug- resistance, drug interactions, pharmacokinetics, clinical uses, and adverse effects will be covered. The course can assist students to produce a research proposal in this field. Relevant ethical and Islamic issues on antimicrobial agents' use will also be highlighted.

Section 2: Learning Outcome

1. Distinguish and explain the different antimicrobial agents (antibiotics) based on the pharmacodynamics and pharmacokinetics characteristics.
2. Distinguish and explain use of antimicrobial agents (antibiotics) for a particular disease and recognize the role of combined antimicrobial agents.
3. Distinguish and explain the significance of inappropriate use and adverse effects of antimicrobial agents (antibiotics).
4. Distinguish and explain the appropriate clinical application in term of dosing, duration and monitoring.

Section 3: Teaching Format and Guidelines

1. Lecture
1. Assignment
2. Seminar
3. Self-directed learning

Section 4: Course Assessment

Assignment	30%
Examination	60%
Participation/Attendance	10%

Section 5: Course Content

No.	Topic
1.	General Principles of Antimicrobial Therapy <ul style="list-style-type: none">• Bacterial resistance• Selection of an antimicrobial agent• Advantages & disadvantages with combined antimicrobial therapy
2.	General Principles of Antimicrobial Therapy <ul style="list-style-type: none">• Superinfections• Misuse of antibiotics
3.	Beta-Lactam Antibiotics <ul style="list-style-type: none">• Penicillin I
4.	Beta-Lactam Antibiotics <ul style="list-style-type: none">• Penicillin II
5.	Beta-Lactam Antibiotics <ul style="list-style-type: none">• Penicillin III
6.	Beta-Lactam Antibiotics <ul style="list-style-type: none">• Cephalosporins I
7.	Beta-Lactam Antibiotics <ul style="list-style-type: none">• Cephalosporins II
8.	Other Beta-Lactam Drugs <ul style="list-style-type: none">• Classification• Pharmacokinetics & Pharmacodynamics
9.	Sulfonamides <ul style="list-style-type: none">• Classification• Pharmacokinetics & Pharmacodynamics Quinolones <ul style="list-style-type: none">• Classification• Pharmacokinetics & Pharmacodynamics
10.	Tetracyclines, Chloramphenicol <ul style="list-style-type: none">• Classification• Pharmacokinetics & Pharmacodynamics
11.	Macrolides <ul style="list-style-type: none">• Classification• Pharmacokinetics & Pharmacodynamics
12.	Aminoglycosides <ul style="list-style-type: none">• Classification• Pharmacokinetics & Pharmacodynamics
13.	Antimycobacterial Drugs I <ul style="list-style-type: none">• Overview of disease• First-line agents
14.	Antimycobacterial Drugs II <ul style="list-style-type: none">• Second-line agents• Drugs active against Atypical Mycobacteria

Section 6: Learning Resources

Required Textbook

1. Brunton, L., Hilal-Dandan, R. & Knollmann, B. C. (2018). Goodman & Gilman's: The pharmacological basis of therapeutics (13th ed.). McGraw-Hill Education.
2. Katzung, B. G. (2018). Basic and clinical pharmacology (14th ed.). McGraw-Hill Education.

Recommended Textbook

1. Brown, M. J., Sharma, P., Mir, F., & Bennett, P. N. (2018). Clinical Pharmacology (12th ed.). Elsevier Ltd.

PHAR 7373: Autonomic Pharmacology

Course Coordinator: Assoc. Prof. Dr. Mohd Fadly Mohd Noor

Section 1: Course Synopsis

This course aims to expose the students to the functional organization of autonomic nervous system, cholinergic & adrenergic neurotransmission, and pharmacological modification of autonomic functions. The course will assist students to produce a research proposal in this field.

Section 2: Learning Outcome

1. Distinguish the basic organization of the autonomic nervous system.
2. Compare and contrast the cholinergic and adrenergic transmissions.
3. Attribute and explain the adrenergic and cholinergic functions in health and diseases.
4. Point out and explain the rational use of autonomic drugs clinically.

Section 3: Teaching Format and Guidelines

1. Lecture
2. Assignment
3. Seminar
4. Self-directed learning

Section 4: Course Assessment

Assignment	30%
Examination	60%
Participation/Attendance	10%

Section 5: Course Content

No.	Topic
1.	Introduction: <ul style="list-style-type: none"> Anatomy & general functions of the ANS. Parasympathetic, Sympathetic, and Enteric nervous system.
2.	Neurotransmission: <ul style="list-style-type: none"> Historical aspects & evidence for Neurohumoral Transmission. Steps involved in Neurotransmission.
3.	Cholinergic Transmission: <ul style="list-style-type: none"> Synthesis, storage & release of acetylcholine. Acetylcholinesterase. Cholinergic receptors & signal transduction.
4.	Adrenergic Transmission: <ul style="list-style-type: none"> Synthesis, storage & release of adrenaline. Pre-junctional regulation of adrenaline release. Termination of action of adrenaline.
5.	Adrenergic Receptors: <ul style="list-style-type: none"> Classification. Molecular basis of adrenergic receptor function. α-adrenergic receptors. β-adrenergic receptors.
6.	Pharmacological considerations: <ul style="list-style-type: none"> Drugs interfering with cholinergic transmission. Drugs interfering with adrenergic transmission. Co-transmission in cholinergic & adrenergic nerves. Nonadrenergic & Noncholinergic neurons.
7.	Cholinomimetic drugs: <ul style="list-style-type: none"> Classification. Pharmacokinetics & Pharmacodynamics of Direct-acting Cholinergic drugs.
8.	Indirect-acting Cholinomimetics: <ul style="list-style-type: none"> Classification. Pharmacokinetics & Pharmacodynamics of Indirect-acting Cholinergic drugs.
9.	Clinical Pharmacology of Cholinomimetics: <ul style="list-style-type: none"> Clinical uses. Toxicity
10.	Neuromuscular junction & Autonomic ganglia: <ul style="list-style-type: none"> Neuromuscular blocking agents. Ganglion-blocking drugs.
11.	Cholinoceptor-blocking drugs: <ul style="list-style-type: none"> Basic pharmacology, pharmacokinetics & pharmacodynamics. Clinical pharmacology & adverse effects.
12.	Sympathomimetic drugs: <ul style="list-style-type: none"> Basic pharmacology, pharmacokinetics & pharmacodynamics. Clinical pharmacology & adverse effects.
13.	α -adrenoceptor blocking drugs: <ul style="list-style-type: none"> Basic pharmacology, pharmacokinetics & pharmacodynamics. Clinical pharmacology & adverse effects.

14.	β -adrenoceptor blocking drugs: <ul style="list-style-type: none">• Basic pharmacology, pharmacokinetics & pharmacodynamics.• Clinical pharmacology & adverse effects.
-----	---

Section 6: Learning Resources

Required Textbook

1. Brunton, L., Hilal-Dandan, R. & Knollmann, B. C. (2018). Goodman & Gilman's: The pharmacological basis of therapeutics (13th ed.). McGraw-Hill Education.
2. Katzung, B. G. (2018). Basic and clinical pharmacology (14th ed.). McGraw-Hill Education.

Recommended Textbook

1. Brown, M. J., Sharma, P., Mir, F., & Bennett, P. N. (2018). Clinical Pharmacology (12th ed.). Elsevier Ltd.

PHAR 7374: Central Nervous System Pharmacology

Course Coordinator: Asst. Prof. Dr. Wael Mohamed Yousef Mohamed

Section 1: Course Synopsis

This course aims to expose the student to common diseases affecting the nervous system, general management and pharmacological treatment. Generally, there will be three main parts of each lecture namely the pathophysiology of the diseases, pharmacodynamics and pharmacokinetics of related drugs, and other therapeutics sections.

Section 2: Learning Outcome

1. Distinguish and explain the pathophysiology of diseases of the central nervous system.
2. Distinguish and explain the pharmacokinetics, pharmacodynamics & clinical uses of drugs in patients with diseases of the central nervous system.
3. Recommend and verify the appropriate drugs for the treatment of central nervous system diseases.
4. Consider application of the pharmacological knowledge related to central nervous system to research and explain the reasons.

Section 3: Teaching Format and Guidelines

1. Lecture
2. Assignment
3. Seminar
4. Self-directed learning

Section 4: Course Assessment

Assignment	30%
Examination	60%
Participation/Attendance	10%

Section 5: Course Content

No.	Topic
1.	Neurotransmission in CNS <ul style="list-style-type: none"> • Organizational principles of the brain • Integrative chemical communication • Identification of central transmitters • Central neurotransmitters
2.	Drugs in Parkinsonism & Other Movement Disorders I <ul style="list-style-type: none"> • Pathogenesis of parkinsonism • Pharmacology of drugs used in Parkinson's disease treatment.
3.	Drugs in Parkinsonism & Other Movement Disorders II <ul style="list-style-type: none"> • Pathogenesis of other movement diseases. • Pharmacology of drugs used in the treatment
4.	The Eicosanoids and NSAIDs <ul style="list-style-type: none"> • Prostaglandins, Thromboxanes, Leukotrienes, Related compounds • Nonsteroidal Anti-Inflammatory Drugs: Therapeutic strategies: NSAIDs, Disease-Modifying Antirheumatic Drugs (DMARDs); Pharmacotherapy of gout
5.	Opioid Analgesics & Antagonists <ul style="list-style-type: none"> • Basic pharmacology of opioid analgesics • Clinical pharmacology of opioid analgesics • Opioid antagonists
6.	Antipsychotic Agents <ul style="list-style-type: none"> • Basic pharmacology of antipsychotic agents • Clinical pharmacology of antipsychotic agents • Antimanic mood-stabilizing agents <ul style="list-style-type: none"> – Lithium
7.	Antidepressants and Anti-anxiety Drugs I <ul style="list-style-type: none"> • Basic pharmacology of antidepressants • Clinical pharmacology of antidepressants • Pharmacotherapy of anxiety
8.	Antidepressants and Anti-anxiety Drugs II <ul style="list-style-type: none"> • Basic pharmacology of antidepressants • Clinical pharmacology of antidepressants • Pharmacotherapy of anxiety
9.	Sedative-Hypnotic Drugs I <ul style="list-style-type: none"> • Basic pharmacology of benzodiazepines • Clinical pharmacology of benzodiazepines • Novel Benzodiazepine-receptor agonists
10.	Epilepsy I <ul style="list-style-type: none"> • Terminology & epileptic seizure classification • Nature & mechanisms of seizures
11.	Epilepsy II <ul style="list-style-type: none"> • Basic pharmacology of conventional antiseizure drugs. • Clinical pharmacology of conventional antiseizure drugs
12.	Epilepsy III <ul style="list-style-type: none"> • Basic pharmacology of recently developed antiseizure drugs. • Clinical pharmacology of recently developed antiseizure drugs
13.	Drug Addiction & Drug Abuse

- | | |
|--|---|
| | <ul style="list-style-type: none">• Drug dependence• Pharmacology of drug of addiction• Medical aspects of drug addiction |
|--|---|

Section 6: Learning Resources

Required Textbook

1. Brunton, L., Hilal-Dandan, R. & Knollmann, B. C. (2018). Goodman & Gilman's: The pharmacological basis of therapeutics (13th ed.). McGraw-Hill Education.
2. Katzung, B. G. (2018). Basic and clinical pharmacology (14th ed.). McGraw-Hill Education.

Recommended Textbook

1. Brown, M. J., Sharma, P., Mir, F., & Bennett, P. N. (2018). Clinical Pharmacology (12th ed.). Elsevier Ltd.

PHAR 7375: Cardiovascular and Renal Systems Pharmacology

Course Coordinator: Asst. Prof. Dr. Hidayatul Radziah Ismawi

Section 1: Course Synopsis

This course aims to expose the student to common diseases affecting the cardiovascular and renal systems, general management and pharmacological treatment. Generally, there will be three main parts of each lecture namely the pathophysiology of the diseases, pharmacodynamics and pharmacokinetics of related drugs, and other therapeutics sections

Section 2: Learning Outcome

1. Distinguish and explain the pathophysiology of diseases of the cardiovascular and renal systems.
2. Distinguish and explain the pharmacokinetics, pharmacodynamics & clinical uses of drugs in patients with diseases of the cardiovascular and renal systems.
3. Recommend and verify the appropriate drugs for the treatment of cardiovascular/ renal diseases.
4. Consider application of the pharmacological knowledge related to cardiovascular system in research and explain the reasons.

Section 3: Teaching Format and Guidelines

1. Lecture
2. Assignment
3. Seminar
4. Self-directed learning

Section 4: Course Assessment

Assignment	30%
Examination	60%
Participation/Attendance	10%

Section 5: Course Content

No.	Topic
1.	Cardiovascular Pharmacology <ul style="list-style-type: none"> • Antihypertensive agents I • An overview • Diuretics • Sympatholytic drugs <ul style="list-style-type: none"> – Centrally acting agents – β blockers, α blockers – Mixed adrenergic blockers – Adrenergic neuron blockers
2.	Cardiovascular Pharmacology Antihypertensive agents II <ul style="list-style-type: none"> • Calcium channel blockers • Vasodilators • Arterial and venous • ACE inhibitors • Angiotensin II receptor antagonists
3.	Antiarrhythmic drugs I <ul style="list-style-type: none"> • Class I: Fast sodium (Na) channel blockers <ul style="list-style-type: none"> – Quinidine, procainamide, disopyramide – Lidocaine, phenytoin, mexiletine – Flecainide, propafenone, moricizine • Class II: Beta blockers <ul style="list-style-type: none"> – Propranolol – Esmolol – Timolol – Metoprolol – Atenolol
4.	Antiarrhythmic drugs II <ul style="list-style-type: none"> • Class III: Potassium (K) channel blockers <ul style="list-style-type: none"> – Amiodarone – Sotalol – Ibutilide – Dofetilide • Class IV: Slow calcium (Ca) channel blockers <ul style="list-style-type: none"> – Verapamil – Diltiazem • Class V: Variable mechanism
5.	Cardiovascular Pharmacology Treatment of Ischemic Heart Disease (IHD) I <ul style="list-style-type: none"> • Pathophysiology of IHD • Organic nitrates • Calcium channel blockers
6.	Cardiovascular Pharmacology Treatment of Ischemic Heart Disease (IHD) II <ul style="list-style-type: none"> • β blockers • Antiplatelet & antithrombotic agents

7.	<p>Cardiovascular Pharmacology Pharmacotherapy of Heart Failure I</p> <ul style="list-style-type: none"> • Pathophysiology of Heart Failure
8.	<p>Cardiovascular Pharmacology Pharmacotherapy of Heart Failure II</p> <ul style="list-style-type: none"> • Positive inotropic drugs <ul style="list-style-type: none"> – Cardiac glycosides – Phosphodiesterase inhibitors agonists
9.	<p>Cardiovascular Pharmacology Pharmacotherapy of Heart Failure III</p> <ul style="list-style-type: none"> • Non-positive inotropic drugs <ul style="list-style-type: none"> – Diuretics – ACE-inhibitors & ARBs – Vasodilators – β blockers
10.	<p>Drug Therapy for Hypercholesterolemia and Dyslipemia I Drug therapy of Dyslipidemia I</p> <ul style="list-style-type: none"> • Statins • Bile-acid sequestrants
11.	<p>Drug Therapy for Hypercholesterolemia and Dyslipemia II Drug therapy of Dyslipidemia II</p> <ul style="list-style-type: none"> • Niacin (Nicotinic acid) • Fibric acid derivatives: PPAR activators • Ezetimibe • Inhibition of dietary cholesterol uptake
12.	<p>Blood Coagulation and Anticoagulant, Fibrinolytic and Antiplatelet Drugs</p> <ul style="list-style-type: none"> • Basic pharmacology of anticoagulant drugs • Basic pharmacology of Antiplatelets • Basic pharmacology of drugs to prevent clotting • Basic pharmacology of drugs in bleeding
13.	<p>Renal Pharmacology I</p> <ul style="list-style-type: none"> • Renal tubule transport mechanisms <ul style="list-style-type: none"> – Proximal tubule – Loop of Henle – Distal convoluted tubule – Collecting tubule • Basic pharmacology of diuretic agents <ul style="list-style-type: none"> – Carbonic anhydrase inhibitors – Loop diuretics
14.	<p>Renal Pharmacology II Basic pharmacology of diuretic agents</p> <ul style="list-style-type: none"> • Thiazides • Potassium-sparing diuretics • Osmotic diuretics

Section 6: Learning Resources

Required Textbook

1. Brunton, L., Hilal-Dandan, R. & Knollmann, B. C. (2018). Goodman & Gilman's: The pharmacological basis of therapeutics (13th ed.). McGraw-Hill Education.
2. Katzung, B. G. (2018). Basic and clinical pharmacology (14th ed.). McGraw-Hill Education.

Recommended Textbook

1. Brown, M. J., Sharma, P., Mir, F., & Bennett, P. N. (2018). Clinical Pharmacology (12th ed.). Elsevier Ltd.

PHAR 7376: Respiratory and Gastrointestinal Pharmacology

Course Coordinator: Asst. Prof. Dr. Nour El Huda Abd Rahim

Section 1: Course Synopsis

This course aims to expose the student to respiratory and gastrointestinal and the pharmacological treatment. Generally, there will be three main parts of each lecture namely the pathophysiology of the diseases, pharmacodynamics and pharmacokinetics of related drugs, and other therapeutics sections.

Section 2: Learning Outcome

1. Distinguish and explain the pathophysiology of diseases of the respiratory and gastrointestinal systems.
2. Distinguish and explain the pharmacokinetics, pharmacodynamics & clinical uses of drugs in patients with diseases of the respiratory and gastrointestinal systems.
3. Recommend and verify the appropriate drugs for the treatment of respiratory and gastrointestinal systems.
4. Consider application of the pharmacological knowledge related to respiratory and gastrointestinal system to research and explain reasons.

Section 3: Teaching Format and Guidelines

1. Lecture
2. Assignment
3. Seminar
4. Self-directed learning

Section 4: Course Assessment

Assignment	30%
Examination	60%
Participation/Attendance	10%

Section 5: Course Content

No.	Topic
1.	Tuberculosis I <ul style="list-style-type: none"> • Pathology and clinical features of tuberculosis (Pulmonary) • Pharmacotherapy of tuberculosis • Antimycobacterial agents • The first line drugs
2.	Tuberculosis II <ul style="list-style-type: none"> • The alternative drugs • Management of multidrug resistant TB
3.	Mucolytic and Expectorants I <ul style="list-style-type: none"> • Diseases associated with increased secretion and cough. • The anti-tussive agents • The mucolytics • The expectorants • Decongestants
4.	Pharmacotherapy of Asthma I <ul style="list-style-type: none"> • Pathophysiology of asthma • β_2 adrenergic receptor agonists • Glucocorticoids • Leukotriene inhibitors
5.	Pharmacotherapy of Asthma II <ul style="list-style-type: none"> • Anti-IgE therapy • Cromolyn sodium • Anticholinergic agents • Theophylline
6.	Pharmacotherapy of Chronic Obstructive Pulmonary Disease I <ul style="list-style-type: none"> • Bronchodilators (selective β_2-agonists, anticholinergic antimuscarinic agents and methylxanthines) • Glucocorticoids
7.	Pharmacotherapy of Chronic Obstructive Pulmonary Disease II <ul style="list-style-type: none"> • Other types of medication (vaccines, antibiotics, α_1-antitrypsin augmentation therapy, mucolytic agents, antioxidants, immunoregulators, antitussives and vasodilators).
8.	Pharmacotherapy of Peptic Ulcer I <ul style="list-style-type: none"> • Overview of peptic ulcer diseases • Physiology of gastric secretion • Proton pump inhibitors • H_2 receptor antagonists
9.	Pharmacotherapy of Peptic Ulcer II <ul style="list-style-type: none"> • Prostaglandin analogs: Misoprostol • Mucosal protective agents • Other acid suppressants
10.	Pharmacotherapy of Inflammatory Bowel Disease I <ul style="list-style-type: none"> • Pathogenesis of IDH • Mesalamine-based therapy • Glucocorticoids
11.	Pharmacotherapy of Inflammatory Bowel Disease II <ul style="list-style-type: none"> • Immunosuppressive agents

	<ul style="list-style-type: none"> • Anti-TNF therapy
12.	Prokinetic Agents, Antiemetics and Agents for Irritable Bowel Syndrome <ul style="list-style-type: none"> • Prokinetic agents • Antinausea and antiemetic • Pharmacotherapy for irritable bowel syndrome
13.	Agents Used for Diarrhoea, Constipation, Agents Used for Biliary and Pancreatic Diseases I <ul style="list-style-type: none"> • Overview of diseases • Agents used for diarrhoea • Constipation
14.	Agents Used for Diarrhoea, Constipation, Agents used for Biliary and Pancreatic Diseases II <ul style="list-style-type: none"> • Agents used for biliary and Pancreatic diseases

Section 6: Learning Resources

Required Textbook

1. Brunton, L., Hilal-Dandan, R. & Knollmann, B. C. (2018). Goodman & Gilman's: The pharmacological basis of therapeutics (13th ed.). McGraw-Hill Education.
2. Katzung, B. G. (2018). Basic and clinical pharmacology (14th ed.). McGraw-Hill Education.

Recommended Textbook

1. Brown, M. J., Sharma, P., Mir, F., & Bennett, P. N. (2018). Clinical Pharmacology (12th ed.). Elsevier Ltd.

PHAR 7377: Endocrine System Pharmacology

Course Coordinator: Asst. Prof. Dr. Nour El Huda Abd Rahim

Section 1: Course Synopsis

This course aims to expose the student to common diseases affecting the endocrine system, general management and pharmacological treatment. Generally, there will be three main parts of each lecture namely the pathophysiology of the diseases, pharmacodynamics and pharmacokinetics of related drugs, and other therapeutics sections.

Section 2: Learning Outcome

1. Distinguish and explain the pathophysiology of diseases of the endocrine systems.
2. Distinguish and explain the pharmacokinetics, pharmacodynamics & clinical uses of drugs in patients with diseases of the endocrine systems.
3. Recommend and verify the appropriate drugs for the treatment of endocrine systems.
4. Consider application of the pharmacological knowledge related to endocrine system to research and explain reasons.

Section 3: Teaching Format and Guidelines

1. Lecture
2. Assignment
3. Seminar
4. Self-directed learning

Section 4: Course Assessment

Assignment	30%
Examination	60%
Participation/Attendance	10%

Section 5: Course Content

No.	Topic
1.	Hypothalamic and Pituitary Hormones I <ul style="list-style-type: none"> • Anterior pituitary hormones • Posterior pituitary hormones
2.	Hypothalamic and Pituitary Hormones II <ul style="list-style-type: none"> • Anterior pituitary hormones • Posterior pituitary hormones
3.	Thyroid and Antithyroid Drugs I <ul style="list-style-type: none"> • Physiology of thyroid • Overview of disease
4.	Thyroid and Antithyroid Drugs II <ul style="list-style-type: none"> • Hypothyroidism • Drugs for hyperthyroidism
5.	Adrenocorticosteroids and Adrenocortical Antagonists I <ul style="list-style-type: none"> • The naturally occurring glucocorticoids; cortisol • Overview of diseases
6.	Adrenocorticosteroids and Adrenocortical Antagonists II <ul style="list-style-type: none"> • Clinical pharmacology • Antagonists of adrenocortical agents
7.	The Gonadal Hormones and Inhibitors I <ul style="list-style-type: none"> • General overview of the gonads • Estrogens and progestins • The contraceptives
8.	The Gonadal Hormones and Inhibitors II <ul style="list-style-type: none"> • Estrogen and progesterone inhibitors and antagonists
9.	The Gonadal Hormones and Inhibitors III <ul style="list-style-type: none"> • The testis – overview • Androgens, anabolic steroids • Antiandrogens and male contraceptions
10.	Pancreatic hormones and antidiabetic drugs I <ul style="list-style-type: none"> • The endocrine pancreas • Diabetes –pathophysiology • Classification of diabetes • Insulin
11.	Pancreatic hormones and antidiabetic drugs II <ul style="list-style-type: none"> • Oral antidiabetic agents 1
12.	Pancreatic hormones and antidiabetic drugs III <ul style="list-style-type: none"> • Oral antidiabetic agents 2
13.	Agents that affect bone mineral homeostasis I <ul style="list-style-type: none"> • Basic pharmacology • The parathyroid – anatomy and physiology – an overview • Principal hormonal regulators of bone mineral homeostasis • Secondary hormonal regulators • Non hormonal agents
14.	Agents that affect bone mineral homeostasis II <ul style="list-style-type: none"> • Clinical pharmacology • Abnormal serum calcium and phosphate levels • Specific disorders involving the bone mineral-regulating hormones

- | | |
|--|---|
| | <ul style="list-style-type: none">• Other disorders of bone mineral homeostasis |
|--|---|

Section 6: Learning Resources

Required Textbook

1. Brunton, L., Hilal-Dandan, R. & Knollmann, B. C. (2018). Goodman & Gilman's: The pharmacological basis of therapeutics (13th ed.). McGraw-Hill Education.
2. Katzung, B. G. (2018). Basic and clinical pharmacology (14th ed.). McGraw-Hill Education.

Recommended Textbook

1. Brown, M. J., Sharma, P., Mir, F., & Bennett, P. N. (2018). Clinical Pharmacology (12th ed.). Elsevier Ltd.

PHAR 7378: Antimicrobial Agents I

Course Coordinator: Asst. Prof. Dr Hidayatul Radziah Ismawi

Section 1: Course Synopsis

This course has been designed to expose the students towards understanding the various antimicrobial agents i.e. the general antibiotics and antituberculosis drugs. Their mechanism of actions, drug- resistance, drug interactions, pharmacokinetics, clinical uses, and adverse effects will be covered. The course can assist students to produce a research proposal in this field. Relevant ethical and Islamic issues on antimicrobial agents' use will also be highlighted.

Section 2: Learning Outcome

5. Distinguish and explain the different antimicrobial agents (antibiotics) based on the pharmacodynamics and pharmacokinetics characteristics.
6. Distinguish and explain use of antimicrobial agents (antibiotics) for a particular disease and recognize the role of combined antimicrobial agents.
7. Distinguish and explain the significance of inappropriate use and adverse effects of antimicrobial agents (antibiotics).
8. Distinguish and explain the appropriate clinical application in term of dosing, duration and monitoring.

Section 3: Teaching Format and Guidelines

2. Lecture
4. Assignment
5. Seminar
6. Self-directed learning

Section 4: Course Assessment

Assignment	30%
Examination	60%
Participation/Attendance	10%

Section 5: Course Content

No.	Topic
15.	General Principles of Antimicrobial Therapy <ul style="list-style-type: none">• Bacterial resistance• Selection of an antimicrobial agent• Advantages & disadvantages with combined antimicrobial therapy
16.	General Principles of Antimicrobial Therapy <ul style="list-style-type: none">• Superinfections• Misuse of antibiotics
17.	Beta-Lactam Antibiotics <ul style="list-style-type: none">• Penicillin I
18.	Beta-Lactam Antibiotics <ul style="list-style-type: none">• Penicillin II
19.	Beta-Lactam Antibiotics <ul style="list-style-type: none">• Penicillin II
20.	Beta-Lactam Antibiotics <ul style="list-style-type: none">• Cephalosporins I
21.	Beta-Lactam Antibiotics <ul style="list-style-type: none">• Cephalosporins II
22.	Other Beta-Lactam Drugs
23.	Sulfonamides <ul style="list-style-type: none">• Classification• Pharmacokinetics and pharmacodynamics Quinolones <ul style="list-style-type: none">• Classification• Pharmacokinetics and pharmacodynamics
24.	Tetracyclines, Chloramphenicol <ul style="list-style-type: none">• Classification• Pharmacokinetics and pharmacodynamics
25.	Macrolides <ul style="list-style-type: none">• Classification• Pharmacokinetics and pharmacodynamics
26.	Aminoglycosides <ul style="list-style-type: none">• Classification• Pharmacokinetics and pharmacodynamics.
27.	Antimycobacterial Drugs I <ul style="list-style-type: none">• Overview of disease• First-line agents
28.	Antimycobacterial Drugs II <ul style="list-style-type: none">• Second-line agents• Drugs active against Atypical Mycobacteria

Section 6: Learning Resources

Required Textbook

3. Brunton, L., Hilal-Dandan, R. & Knollmann, B. C. (2018). Goodman &

Gilman's: The pharmacological basis of therapeutics (13th ed.). McGraw-Hill Education.

4. Katzung, B. G. (2018). Basic and clinical pharmacology (14th ed.). McGraw-Hill Education.

Recommended Textbook

2. Brown, M. J., Sharma, P., Mir, F., & Bennett, P. N. (2018). Clinical Pharmacology (12th ed.). Elsevier Ltd.