

Pharmacology & Therapeutics Stream

Overview of Stream Content:

Pharmacology & Therapeutics runs as a stream through all five years of the curriculum.

The focus in Years 1, 2 and 3 will be on Pharmacology – the study of what a substance or drug does to a living organism and in particular how the biological effects of a drug can be applied to the treatment and prevention of disease.

In Year 1, teaching and learning in Pharmacology provides a general overview of the topic and deals with the generalities of drug treatment. There is a particular focus on pharmacokinetics (how the cells, tissues, organs and body systems can affect a drug) and on pharmacodynamics (how a drug can affect cells, tissues, organs and body systems).

In Year 2 and 3, following an initial review of the Pharmacology content in Year 1, the focus is on the drugs that are commonly used to treat disorders of individual body systems. In both years, Pharmacology will be closely integrated with other relevant course modules such that, for example, during the cardiovascular course, the focus will be on commonly used cardiovascular drugs.

The focus in Years 4 and 5 will be on Therapeutics – the treatment of disease, involving non-pharmacological strategies as well as pharmacological agents. The term comes from the Greek word *therapeutikos* which translates as “inclination to serve”. Teaching and learning in Pharmacology & Therapeutics in Years 4 and 5 allows students to review the knowledge acquired during the earlier years of the programme and to apply this to the management of the common diseases which students encounter in both classroom and clinical settings. There is also a focus on the process of prescribing, including the prescribing of controlled drugs and on rational prescribing.

The learning outcomes pertaining to the stream are listed below:

GEMD-104 Basic Pharmacology and Physiology

1. Discuss how channels and receptors can be targets for drugs.
2. Describe the drug - receptor interaction and effect.
3. Briefly outline the process of receptor desensitization and sensitization and provide examples of drugs that affect these processes.
4. Describe the various drug terms: agonist, antagonist, affinity, efficacy, potency.
5. Describe the four main processes of pharmacokinetics (absorption, distribution, metabolism and excretion).

6. Define the terms first-pass effect, bioavailability and volume of distribution.
7. Describe briefly the blood brain barrier and list the considerations that determine whether a drug will gain access to the central nervous system.
8. Understand the role of the liver in drug metabolism and how CYP450 inducers or CYP450 can affect overall drug metabolism.
9. Discuss the role of the kidney in drug excretion and overall drug elimination.
10. Classify the different drug categories that work in the peripheral nervous system depending on their mode of action (cholinergic, anti-cholinergic, adrenergic, anti-adrenergic drugs).
11. Define the terms: clearance, steady-state, zero-order and first-order kinetics and understand their clinical relevance.
12. Define the terms half-life, infusion rate, loading dose and maintenance dose and practice on calculations to determine these parameters.
13. Classify the different drug categories that work in the central nervous system depending on their mode of action (sedatives, anti-seizure drugs, local anaesthetics, Parkinson disease drugs, anti-psychotics and anti-depressants).
14. Identify the various routes of administration and outline the considerations for choosing an appropriate route of administration.
15. Briefly discuss the principles of drug abuse, addiction, and dependence.
16. Outline the mechanism of action and uses of muscle relaxants.
17. Describe the mode of action, indications and side effects of non-steroidal anti-inflammatory drugs.
18. Outline the types of drug interactions that can occur from multiple drug therapy.
19. Understand and recognize the different types of adverse drug reactions.
20. Appreciate how drug interactions and adverse drug reactions can be minimized through recognition and prevention of medical errors.
21. Explain the stages of drug discovery and development, including the four types of clinical trials.

GEMD-201 Circulation and Respiration

1. Describe the pharmacology (mechanisms of action, adverse effects, clinical indications, therapeutic roles) of commonly used drugs to treat pulmonary diseases including:

- Bronchodilators
 - Anti-inflammatory agents
 - Surfactants
 - Antitussives
 - Anti-histamines
 - Expectorants, mucolytics
 - Decongestants
2. Describe the pharmacology (mechanisms of action, adverse effects, clinical indications, therapeutic roles) of commonly used cardiovascular drugs including:
- Diuretics
 - Antihypertensive agents
 - Drugs used to treat heart failure
 - Anti-arrhythmic agents
 - Anti-anginal agents
 - Lipid-lowering agents
 - Anti-platelet agents, fibrinolytics and anti-coagulants

GEMD-202 Absorption, Excretion and Endocrine

1. Describe the pharmacology (mechanisms of action, adverse effects, clinical indications, therapeutic roles) of commonly used drugs to treat gastro-intestinal disease diseases including:
- Drugs used to inhibit/neutralize gastric acid secretion
 - Drugs used to treat Helicobacter Pylori infection
 - Drugs used to protect the mucosa
 - Antiemetic drugs
 - Purgatives
 - Antidiarrheal agents
 - Antimotility and spasmolytic agents
 - Drugs for chronic inflammatory bowel diseases
 - Drugs affecting the hepatobiliary system
 - Discuss the principles of drug therapy in patients with liver disease
2. Describe the pharmacology (mechanisms of action, adverse effects, clinical indications, therapeutic roles) of commonly used drugs to treat kidney diseases including:
- Drugs that alter pH of urine
 - Drugs that alter excretion of organic molecules

- Drugs used in renal failure
 - Drugs used in urinary tract disorders
3. Describe the pharmacology (mechanisms of action, adverse effects, clinical indications, therapeutic roles) of commonly used drugs to treat endocrine diseases including:
- Drugs to treat diabetes mellitus
 - Drugs to treat obesity
 - Hypothalamic hormones
 - Anterior pituitary hormones
 - Adrenocorticotrophic hormones
 - Vasopressin
 - Glucocorticoids
 - Mineralocorticoids
 - Thyroid hormones
 - Parathyroid hormones

GEMD-203 Movement and Control

1. Explain the mode of action, indications and side effects of opiate analgesics
2. Explain the mode of action, uses and side effects of non-steroidal anti-inflammatory drugs.
3. Explain the uses and list the potential adverse effects of corticosteroids in the treatment of musculoskeletal disease.
4. Explain the uses, side effects and monitoring of the disease modifying antirheumatic drugs (DMARDs) with emphasis given on:
 - Methotrexate
 - Sulfasalazine Hydroxychloroquine
 - Leflunomide
5. Explain the mode of action, uses and side effects of the biologic agents in musculoskeletal diseases.

GEMD-204 Reproduction, Growth and Development

1. Describe drugs affecting the reproductive system (drugs used for contraception, hormone replacement therapy, drugs affecting uterus, drugs to treat erectile dysfunction).
2. Describe the pharmacology of drugs used in infertility
3. Describe considerations for prescribing in pregnancy and during breastfeeding

GEMD-301 Mental Health

1. Describe the indications, mechanism of action and side-effects of commonly used antipsychotic medications.
2. Describe the signs, symptoms, and treatment of overdose or withdrawal for the various drugs of abuse.

GEMD-302 Infection and Immunity

1. Discuss the major classes of antibacterial, antiviral, antifungal, antiprotozoal and antihelminthic their mechanism of action and their main side effects.
2. Discuss the main classes of antiviral agents, their pharmacology and mechanisms of action.
 - Apply this information to opportunities and limitations for disease control.

GEMD-303 Cancer

1. Explain the mechanism of action and major side effects of the most common forms of chemotherapy, hormone therapy and monoclonal antibody therapy

GEMD-304 Polymorbidity

1. Explain why therapeutic strategies which aim to alleviate a problem in one body system can cause or exacerbate a problem in another system

GEMD-401 Clinical Specialties

➤ Gastroenterology, endocrinology

1. Prescribe medications to treat patients with gastrointestinal and endocrine disorders and make appropriate therapeutic/ management decisions.

➤ Nephrology, Urology

1. Prescribe medications to treat patients with kidney and urinary tract diseases/disorders and make appropriate therapeutic/management decisions.

➤ Cardiology and respiratory

1. Prescribe medications to treat patients with cardiovascular and respiratory diseases and make appropriate therapeutic/management decisions.

➤ **Rheumatology, Orthopaedics, Dermatology**

1. Prescribe medications to treat patients with disorders of the joints, muscles, ligaments and skin make appropriate therapeutic/management decisions.

➤ **Paediatrics**

1. Prescribe medications to treat children and make appropriate therapeutic/management decisions.

➤ **Obstetrics and Gynaecology**

1. Prescribe medications to treat patients with gynaecological diseases and in pregnancy, and make appropriate therapeutic decisions.

➤ **Psychiatry**

1. Prescribe medications to treat psychiatric patients and make appropriate therapeutic/management decisions.

➤ **Neurology (Neurology, Neurosurgery and Palliative Care), ENT, Ophthalmology**

1. Prescribe medications to treat neurological disorders-and in palliative care, and make appropriate therapeutic/management decisions.

GEMD-501 Clinical Practice

➤ **Internal Medicine**

1. Demonstrate how to prescribe at hospital admission, on-call in hospital and at hospital discharge.

➤ **Emergency Medicine and Intensive Care**

1. Prepare and explain a treatment management plan for the patient to present to the responsible clinician to include medical, pharmacological, surgical options as appropriate.
2. Demonstrate effective history taking with relation to prescribed drugs, over the counter medication, complementary and alternative therapies, illicit drug use and allergies.
3. Prescribe drugs safely
 - a. Demonstrate how to write a prescription for a patient, including effective prescription of controlled drugs.
 - b. Demonstrate the correct use of an in-patient prescription chart.

- c. Inject drugs, at the correct dose, intramuscularly, subcutaneously and intravenously.
 - d. Correctly prescribe oxygen, "As Required" medication, fluids and blood products, under supervision.
 - e. Administer nebulized drugs.
4. Calculate the strength of an infusion based on the required rate of drug administration.
 5. Describe the emergency assessment and resuscitation of a patient following a drug overdose.