

Macao Polytechnic Institute
School of Health Sciences and Sports
Bachelor of Science in Biomedical Technology
(Pharmacy Technology)

Module Outline

Academic Year 2020 / 2021 Semester 2

| | | | | |
|------------------------------|---|---------------------------|-------------------|--|
| Learning Module | Pharmacology II | | Class Code | BSPY2102 |
| Pre-requisite(s) | Nil | | | |
| Medium of Instruction | Chinese / English | | Credit | 6 |
| Lecture Hours | 90 hrs | Lab/Practice Hours | 0 hrs | Total Hours 90 hrs |
| Instructor | Tong Hoi Yee, Henry Pedro Fong Tao Yi, Aaron | | E-mail | henrytong@ipm.edu.mo pedrofong@ipm.edu.mo yitao@ipm.edu.mo |
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Description

This 90-hour learning module is the second in a series of courses that equip students with pharmacological knowledge. The course systemically introduces mechanisms of action, pharmacological effects, clinical indications, drug interactions and adverse effects of various drug classes.

Learning Outcomes

After completing the learning module, students will be able to:

1. Discuss the relationship among mechanisms of action, therapeutic effects and adverse effects of different drugs.
2. Describe the classification, clinical indications, mechanism of actions, and significant adverse effects of commonly used drugs.

Content

Henry's sessions:

1. Drugs for Anemia
 - 1.1 Overview
 - 1.2 Agents used to treat anemias
 - 1.3 Agents used to treat neutropenia
 - 1.4 Agents used to treat sickle cell disease

2. Drugs for Dermatologic Disorders
 - 2.1 Overview
 - 2.2 Topical preparations
 - 2.3 Agents for acne
 - 2.4 Topical antibacterial agents
 - 2.5 Agents used in ectoparasitic infections
 - 2.6 Agents for pigmentation disorders
 - 2.7 Drugs for psoriasis
 - 2.8 Topical corticosteroids
 - 2.9 Trichogenic agents

3. Drugs for Bone Disorders
 - 3.1 Overview
 - 3.2 Bone remodeling
 - 3.3 Treatment of osteoporosis

4. Anti-inflammatory, Antipyretic, and Analgesic Agents
 - 4.1 Overview
 - 4.2 Prostaglandins
 - 4.3 Nonsteroidal anti-inflammatory drugs
 - 4.4 Acetaminophen
 - 4.5 Disease-modifying antirheumatic drugs
 - 4.6 Biologic therapies in rheumatoid arthritis
 - 4.7 Drugs used for the treatment of gout
 - 4.8 Drugs used to treat headache

5. Antimycobacterial Drugs
 - 5.1 Overview
 - 5.2 Chemotherapy for tuberculosis
 - 5.3 Drugs for leprosy

6. Antifungal Drugs
 - 6.1 Overview
 - 6.2 Drugs for subcutaneous and systemic mycotic infections
 - 6.3 Drugs for cutaneous mycotic infections

7. Antiviral Drugs
 - 7.1 Overview
 - 7.2 Treatment of respiratory viral infections
 - 7.3 Treatment of hepatic viral infections
 - 7.4 Treatment of herpesvirus infections
 - 7.5 Overview of the treatment for HIV infection
 - 7.6 NRTIs used to treat HIV infection
 - 7.7 NNRTIs used to treat HIV infection
 - 7.8 Protease inhibitors used to treat HIV infection
 - 7.9 Entry inhibitors used to treat HIV infection
 - 7.10 Integrase inhibitors used to treat HIV infection

Quiz 1 (2 hour)

| Date | Time | Content |
|-------------------|--------------------|---|
| 2021.01.25 | 14:30-17:30 | Drugs for Anemia |
| 2021.02.01 | 14:30-17:30 | Drugs for Dermatologic Disorders |
| 2021.02.22 | 14:30-17:30 | Drugs for Bone Disorders |
| 2021.03.01 | 14:30-16:30 | Anti-inflammatory, Antipyretic, and Analgesic Agents I |
| 2021.03.08 | 14:30-16:30 | Anti-inflammatory, Antipyretic, and Analgesic Agents II |
| 2021.03.15 | 14:30-16:30 | Antimycobacterial Drugs |
| 2021.03.22 | 14:30-16:30 | Antifungal drugs |
| 2021.03.29 | 14:30-16:30 | Antiviral drugs I |
| 2021.04.12 | 14:30-16:30 | Antiviral drugs II |
| 2021.04.19 | 14:30-16:30 | Revision |
| 2021.04.26 | 14:30-16:30 | Quiz |

Pedro's sessions:

1. Antiprotozoal Drugs (2.5 hours)
 - 1.1 *List the major antiprotozoal drugs and their corresponding drug classes.*
 - 1.2 *Understand and describe the basic pharmacological mechanism of action, indications, contraindications, pharmacokinetics and adverse effects of the chemotherapy for amebiasis, malaria, trypanosomiasis, leishmaniasis, toxoplasmosis and giardiasis.*
 - 1.3 *Demonstrate the knowledge through completing case study questions.*
2. Anthelmintic Drugs (2 hours)
 - 2.1 *List and classify the major anthelmintic drugs.*
 - 2.2 *Understand and explain the basic pharmacological mechanism of action, indications, contraindications, pharmacokinetics and adverse effects of the drug treatments for nematodes, trematodes and cestodes.*
 - 2.3 *Discuss and complete a set of case study question with other course mates and tutor.*

Quiz II (30 minutes)

| Date | Time | Content |
|-------------------|--------------------|---|
| 21/01/2021 | 14:30-16:30 | Antiprotozoal Drugs |
| 28/01/2021 | 14:30-16:00 | Antiprotozoal Drugs Anthelmintic Drugs |
| 04/02/2021 | 14:30-15:30 | Anthelmintic Drugs |
| 04/02/2021 | 15:30-16:00 | Quiz II (30 minutes) |

Aaron's sessions:

1. Pituitary and Thyroid (2 hours)
 - 1.1 Overview
 - 1.2 Hypothalamic and anterior pituitary hormones
 - 1.3 Hormones of the posterior pituitary
 - 1.4 Thyroid hormones

(MASTER: discover the relationship among mechanisms of action, therapeutic effects and adverse effects of drugs, memorize the classification, clinical indications, mechanism of actions, and significant adverse effects of commonly used drugs)
2. Drugs for Diabetes (4 hours)
 - 2.1 Overview
 - 2.2 Diabetes mellitus

- 2.3 Insulin and insulin analogs
- 2.4 Insulin preparations and treatment
- 2.5 Synthetic amylin analog
- 2.6 Incretin mimetics
- 2.7 Oral agents

(MASTER: discover the relationship among mechanisms of action, therapeutic effects and adverse effects of drugs, memorize the classification, clinical indications, mechanism of actions, and significant adverse effects of commonly used drugs)

3. Estrogens and Androgens (4 hours)

- 3.1 Overview
- 3.2 Estrogens
- 3.3 Selective estrogen receptor modulators
- 3.4 Progestogens
- 3.5 Contraceptives
- 3.6 Androgens

(MASTER: discover the relationship among mechanisms of action, therapeutic effects and adverse effects of drugs, memorize the classification, clinical indications, mechanism of actions, and significant adverse effects of commonly used drugs)

4. Adrenal Hormones (2 hours)

- 4.1 Overview
- 4.2 Corticosteroids

(MASTER: discover the relationship among mechanisms of action, therapeutic effects and adverse effects of drugs, memorize the classification, clinical indications, mechanism of actions, and significant adverse effects of commonly used drugs)

5. Drugs for Obesity (2 hours)

- 5.1 Overview
- 5.2 Anorexiant (appetite suppressants)
- 5.3 Lipase inhibitors
- 5.4 Serotonin agonists
- 5.5 Combination drugs

(MASTER: discover the relationship among mechanisms of action, therapeutic effects and adverse effects of drugs, memorize the classification, clinical indications, mechanism of actions, and significant adverse effects of commonly used drugs)

6. Principles of Antimicrobial Therapy (3 hours)

- 6.1 Overview
- 6.2 Selection of antimicrobial agents

- 6.3 Route of administration
- 6.4 Determinants of rational dosing
- 6.5 Chemotherapeutic spectra
- 6.6 Combinations of antimicrobial drugs
- 6.7 Drug resistance
- 6.8 Prophylactic use of antibiotics
- 6.9 Complications of antibiotic therapy
- 6.10 Sites of antimicrobial actions

(UNDERSTAND: describe the basic concepts and principles of antimicrobial therapy)

7. Cell Wall Inhibitors (4 hours)

- 7.1 Overview
- 7.2 Penicillins
- 7.3 Cephalosporins
- 7.4 Other β -lactam antibiotics
- 7.5 β -lactamase inhibitors
- 7.6 Vancomycin
- 7.7 Daptomycin
- 7.8 Telavancin
- 7.9 Fosfomycin
- 7.10 Polymyxins

(MASTER: discover the relationship among mechanisms of action, therapeutic effects and adverse effects of drugs, memorize the classification, clinical indications, mechanism of actions, and significant adverse effects of commonly used drugs)

8. Protein Synthesis Inhibitors (4 hours)

- 8.1 Overview
- 8.2 Tetracyclines
- 8.3 Glycylcyclines
- 8.4 Aminoglycosides
- 8.5 Macrolides and ketolides
- 8.6 Fidaxomicin
- 8.7 Chloramphenicol
- 8.8 Clindamycin
- 8.9 Quinupristin/dalfopristin
- 8.10 Linezolid

(MASTER: discover the relationship among mechanisms of action, therapeutic effects and adverse effects of drugs, memorize the classification, clinical indications, mechanism of actions, and significant adverse effects of commonly used drugs)

9. Test (2 hours)

10. Quinolones, Folic Acid Antagonists, and Urinary Tract Antiseptics (3 hours)

- 10.1 Fluoroquinolones
- 10.2 Overview of the folate antagonists
- 10.3 Sulfonamides
- 10.4 Trimethoprim
- 10.5 Cotrimoxazole
- 10.6 Urinary tract antiseptics/antimicrobials

(MASTER: discover the relationship among mechanisms of action, therapeutic effects and adverse effects of drugs, memorize the classification, clinical indications, mechanism of actions, and significant adverse effects of commonly used drugs)

11. Anticancer Drugs (6 hours)

- 11.1 Overview
- 11.2 Principles of cancer chemotherapy
- 11.3 Antimetabolites
- 11.4 Antibiotics
- 11.5 Alkylating agents
- 11.6 Microtubule inhibitors
- 11.7 Steroid hormones and their antagonists
- 11.8 Monoclonal antibodies
- 11.9 Platinum coordination complexes
- 11.10 Topoisomerase inhibitors
- 11.11 Tyrosine kinase inhibitors
- 11.12 Miscellaneous agents

(MASTER: describe the basic concepts and principles of anticancer therapy, discover the relationship among mechanisms of action, therapeutic effects and adverse effects of drugs, memorize the classification, clinical indications, mechanism of actions, and significant adverse effects of commonly used drugs)

12. Immunosuppressants (2 hours)

- 12.1 Overview
- 12.2 Selective inhibitors of cytokine production and function
- 12.3 Immunosuppressive antimetabolites
- 12.4 Antibodies
- 12.5 Corticosteroids

(MASTER: discover the relationship among mechanisms of action, therapeutic effects and adverse effects of drugs, memorize the classification, clinical indications, mechanism of actions, and significant adverse effects of commonly used drugs)

13. Antihistamines (2 hours)

13.1 Overview

13.2 H₁ antihistamines

13.3 Histamine H₂-receptor blockers

(MASTER: discover the relationship among mechanisms of action, therapeutic effects and adverse effects of drugs, memorize the classification, clinical indications, mechanism of actions, and significant adverse effects of commonly used drugs)

14. Drugs for Disorders of the Respiratory System (3 hours)

14.1 Overview

14.2 Preferred drugs used to treat asthma

14.3 Alternative drugs used to treat asthma

14.4 Drugs used to treat chronic obstructive pulmonary disease

14.5 Inhaler technique

14.6 Drugs used to treat allergic rhinitis

14.7 Drugs used to treat cough

(MASTER: discover the relationship among mechanisms of action, therapeutic effects and adverse effects of drugs, memorize the classification, clinical indications, mechanism of actions, and significant adverse effects of commonly used drugs)

15. Gastrointestinal and Antiemetic Drugs (4 hours)

15.1 Overview

15.2 Drugs used to treat peptic ulcer disease and gastroesophageal reflux disease

15.3 Drugs used to control chemotherapy-induced nausea and vomiting

15.4 Antidiarrheals

15.5 Laxatives

(MASTER: discover the relationship among mechanisms of action, therapeutic effects and adverse effects of drugs, memorize the classification, clinical indications, mechanism of actions, and significant adverse effects of commonly used drugs)

16. Drugs for Urologic Disorders (1 hours)

16.1 Overview

16.2 Drugs used to treat erectile dysfunction

16.3 Benign prostatic hyperplasia

(MASTER: discover the relationship among mechanisms of action, therapeutic effects and adverse effects of drugs, memorize the classification, clinical indications, mechanism of actions, and significant adverse effects of commonly used drugs)

17. Clinical Toxicology (1 hours)

- 17.1 Overview
- 17.2 Emergency treatment of the poisoned patient
- 17.3 Select pharmaceutical and occupational toxicities
- 17.4 Antidotes

(MASTER: discover the relationship among mechanisms of action, therapeutic effects and adverse effects of drugs, memorize the classification, clinical indications, mechanism of actions, and significant adverse effects of commonly used drugs)

18. Active learning and presentation (9 hours)

- 18.1 Thyroid disease
- 18.2 Diabetes
- 18.3 Asthma
- 18.4 Chronic obstructive pulmonary disease
- 18.5 Peptic ulcer disease and gastroesophageal reflux disease
- 18.6 Erectile dysfunction
- 18.7 Benign prostatic hyperplasia
- 18.8 Lung cancer and its treatment
- 18.9 Clinical Toxicology

(UNDERSTAND: describe the cause, clinical classification, diagnosis and treatment of the diseases)

19. Final (2 hours)

| Date | Time | Content |
|-------------------|--------------------|--|
| 22/01/2021 | 14:30-17:30 | Pituitary and Thyroid Drugs for Diabetes (I) |
| 29/01/2021 | 14:30-17:30 | Drugs for Diabetes (II) |
| 05/02/2021 | 14:30-17:30 | Estrogens and Androgens (I) |
| 25/02/2021 | 14:30-17:30 | Active learning I (Group discussion and presentation): Thyroid disease Active learning II (Group discussion and presentation): Diabetes Estrogens and Androgens (II) |
| 26/02/2021 | 14:30-17:30 | Adrenal Hormones Drugs for obesity (I) |
| 04/03/2021 | 14:30-17:30 | Drugs for obesity (II) Principles of Antimicrobial Therapy (I) |
| 05/03/2021 | 14:30-17:30 | Principles of Antimicrobial Therapy (II) Cell Wall Inhibitors (I) |

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|-------------------|--------------------|--|
| 11/03/2021 | 14:30-17:30 | Cell Wall Inhibitors (II) Protein Synthesis Inhibitors (I) |
| 12/03/2021 | 14:30-17:30 | Protein Synthesis Inhibitors (II) |
| 18/03/2021 | 14:30-17:30 | Quinolones, Folic Acid Antagonists, and Urinary Tract Antiseptics |
| 19/03/2021 | 14:30-17:30 | Anticancer Drugs (I) |
| 25/03/2021 | 14:30-16:30 | Test |
| 26/03/2021 | 14:30-17:30 | Anticancer Drugs (II) |
| 01/04/2021 | 14:30-16:30 | Active learning III (Group discussion and presentation): Lung cancer and its treatment |
| | | Immunosuppressants (I) |
| 08/04/2021 | 14:30-17:30 | Immunosuppressants (II) Antihistamines |
| 15/04/2021 | 14:30-17:30 | Active learning IV (Group discussion and presentation): Asthma Active learning V (Group discussion and presentation): Chronic obstructive pulmonary disease |
| | | Drugs for Disorders of the Respiratory System (I) |
| 22/04/2021 | 14:30-17:30 | Drugs for Disorders of the Respiratory System (II) Active learning VI (Group discussion and presentation): Peptic ulcer disease and gastroesophageal reflux disease |
| 29/04/2021 | 14:30-17:30 | Gastrointestinal and Antiemetic Drugs (I) |
| 06/05/2021 | 14:30-17:30 | Gastrointestinal and Antiemetic Drugs (II) Active learning VII (Group discussion and presentation): Erectile dysfunction Active learning VIII (Group discussion and presentation): Benign prostatic hyperplasia |
| 13/05/2021 | 14:30-17:30 | Drugs for Urologic Disorders Active learning IX (Group discussion and presentation): Clinical Toxicology |
| 24/05/2021 | 14:30-16:30 | Final exam |

Teaching Method

Lectures, case studies, active learning, presentations, and class discussion. Approximately 10% of the course contents will be taught using active learning instructional strategies.

Attendance

Attendance requirements are governed by the “Academic Regulations Governing Bachelor’s Degree Programmes of Macao Polytechnic Institute”. Students are not eligible to attend the final examination and re-sit examination, moreover, an “F” will be given as the final grade to students who have less than the stated attendance for the enrolled module.

Assessment

This learning module is graded on a 100 point scale, with 100 being the highest possible score and 50 being the passing score. Any students scoring less than 35% of the total mark in the final examination will be given an “F” grade for the course even if the overall grade is 50% or higher.

| | Item | Description | Percentage |
|--------------------------|---------------------|---|-------------------|
| 1. | Presentation | Active learning (Aaron) | 7% |
| 2. | In Class oral Tests | Question answering competitions (Aaron) | 5% |
| 3. | Group discussions | Case studies (Aaron) | 5% |
| 4. | Test | (Aaron) | 25% |
| 5. | Quiz I | (Henry) | 27% |
| 6. | Quiz II | (Pedro) | 6% |
| 7. | Final exam | | 25% |
| Total Percentage: | | | 100% |

Teaching Material(s)

Textbook(s)

- Harvey RA, Clark MA, Finkel R, et al. 2018, Lippincott’s illustrated reviews: pharmacology. 7th ed. Baltimore, MD: Lippincott Williams & Wilkins.

Reference

Reference book(s)

- Katzung B, Masters S, Trevor A. 2015, Basic and clinical pharmacology. 13th ed. New York: McGraw-Hill Medical.
- Brunton L, Chabner B, Knollman. 2011, Goodman and Gilman’s the pharmacological basis of therapeutics. 12th ed. New York: McGraw-Hill Professional.
- Lexicomp. 2017, *Drug information handbook: a clinically relevant resource for all healthcare professionals*. 26th ed. Lexi-Comp.
- Joint Formulary Committee. 2017, *British National Formulary 73*. Pharmaceutical Press.