NATS 3057 TOPICS IN PHARMACOLOGY

Credit Points 10

Description This subject builds on basic pharmacological principles and concepts, extending to advanced pharmacokinetics in the study of absorption, distribution, metabolism, and elimination (ADME) of pharmaceutical drugs in human body. Students will understand the processes of bioavailability and bioequivalence testing of generic and innovator drugs. This subject also covers the drug development process including stages of drug discovery, preclinical development, clinical development, drug approval and post-market drug safety monitoring., Phases of clinical development, types and design of clinical trials, drug regulatory and pharmacovigilance procedures will be introduced. This subject will also investigate the research methods used in pharmacological enquiry and investigate the cellular signalling pathways targeted by different life-saving drugs. Pharmacogenetics, genetic polymorphism and its impact on drug metabolism and precision medicine will be covered. Drug toxicity and drug-induced organ toxicity will also be discussed. Practical classes and computer simulations will support the key concepts taught in this subject.

School Science

Student Contribution Band

Check your fees via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 3 subject

Pre-requisite(s) NATS 2045

Restrictions

Students must be enrolled in 3754 Bachelor of Science, 3757 Bachelor of Advanced Science, 3755 Bachelor of Medical Science, 3758 Bachelor of Advanced Medical Science, 3756 Bachelor of Science (Pathway to Teaching Primary/Secondary), 6042 Diploma in Science/ Bachelor of Medical Science, 6043 Diploma in Science. Bachelor of Science

Learning Outcomes

After successful completion of this subject, students will be able to:

1. Explain the concepts and principles of advanced pharmacokinetics in ADME, bioavailability and bioequivalence testing of drugs
2. Demonstrate mathematically the pharmacokinetic and mechanistic aspects of the bioavailability and elimination of drugs in the body
3. Discuss the different sources of drugs and describe research methods used in drug discovery and development
4. Describe the different preclinical stages of drug development and evaluation.
5. Describe the stages of new drug development, the types and phases of clinical trials and the regulatory framework for pharmacotherapies
6. Demonstrate and calculate mathematically the safety and efficacy testing of drugs and its parameters
7. Evaluate the research methods of toxicology and drug/toxin-induced organ toxicity testing

Subject Content

- Principles of advanced pharmacokinetics of absorption, distribution, metabolism, and elimination (ADME) of drugs
- Single-dose pharmacokinetics of drugs: First-order and zero-order kinetics
- Steady-state pharmacokinetics of drugs: Continuous-dose and multi-dose pharmacokinetics
- Calculation of key pharmacokinetic estimates: Time course concentration of the drugs in the body: from dose to time-course concentration of the drug in the plasma, area under the curve, renal clearance, elimination rate, volume of distribution, half-life
- Pharmacogenetics, genetic polymorphisms and its impact on drug metabolism and precision medicine
- Drug discovery from natural, semi-synthetic, synthetic and biotechnology sources.
- Methods of drug discovery including traditional approach and modern methods.
- Approach and stages of preclinical drug screening including safety & efficacy evaluation and preclinical pharmacodynamic testing.
- Drug approval process and post-market drug safety monitoring
- Design of clinical studies, phases of clinical drug evaluation, and aspects of drug regulation and pharmacovigilance.
- Safety and efficacy testing of drugs
- Principles of toxicology, drug toxicity and evaluation of drug-induced organ toxicity
- Therapeutic index: Computation of LD50 and ED50 of using probit analysis
- Mutagenesis, carcinogenesis, and teratogenesis: Mechanisms and testing

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Type	Length	Percent	Threshold	Individual/ Group Task	Mandatory
Participation	2 hours/ week	10	N	Individual	N
Critical Review	1000 words	20	N	Individual	N
Report	1500 words	30	N	Individual	N
Final Exam	2 hours	40	N	Individual	N

Prescribed Texts

- Rang, H.P., Dale, M.M., Ritter, J.M. & Flower, R.J. (2019). Rang and Dale's Pharmacology. 9th Edition: Edinburgh: Churchill Livingstone/ Elsevier.
- Hill RG & Richards D (2021). Drug Discovery and Development, 3rd Edition: Edinburgh: Churchill Livingstone/Elsevier.