

NATS 3058 PHARMACOLOGICAL CHEMISTRY

Credit Points 10

Description This interdisciplinary subject covers the principles of medicinal chemistry, which combines chemistry, physiology, biochemistry, and pharmacology. The subject focuses on the principles of medicinal chemistry and aims to provide students with an understanding of the relationships between atomic interactions and molecular structure to biomolecular targets and quantitative structure-activity relationships of drugs. Through the exploration of lead compounds design and discovery strategies, chemical synthesis, structure-activity relationship analysis, and in silico-aided methods, students will gain an understanding of the principles of drug design. The subject also emphasises on selected topics of medicinal chemistry including anti-microbial and chemotherapeutic agents to understand and explore their chemistry and structure-activity relationships. Practical experience in compound isolation, synthesis, purification, and characterization is also provided, allowing students to gain hands-on knowledge of the dynamic field of medicinal chemistry.

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) CHEM 1012

Restrictions

Successful completion of 120 credit points

Learning Outcomes

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

1. Identify the types of physicochemical forces and functional groups that govern the drug-target interactions
2. Describe the stereochemical and conformational requirements of drug-target interactions that impact drug activity
3. Appreciate the design of drug analogues using quantitative structure-activity relationship (QSAR) methodologies.
4. Compare and contrast the different strategies involved in new lead compound design and discovery.
5. Explore the chemistry and structure-activity relationships of selected antimicrobial and chemotherapeutic agents
6. Apply modern drug synthesis, purification, and analysis techniques through hands-on experiments
7. Present laboratory results using scientific writing conventions and graphical presentations

Subject Content

1. Introduction to pharmacological chemistry
2. Functional groups and impact on drug activity
3. Introduction to Structure-Activity Relationships
4. Quantitative Structure-Activity Relationships (QSAR)
5. Metabolic pathways of drugs and reactions
6. Biotechnology in drug design and discovery

7. Strategies in search for new lead compounds
8. Natural-products-based approach to drug design and discovery
9. Computer-aided drug design and discovery
10. Fragment-based drug design and discovery
11. In silico methods of drug design and discovery
12. Selected topics in pharmacological chemistry - Antibacterial agents.
13. Selected topics in pharmacological chemistry – Antifungal agents
14. Selected topics in pharmacological chemistry - Antiviral agents
15. Selected topics in pharmacological chemistry - Anticancer agents
16. Practical molecular synthesis, compound isolation, purification, and structural characterisation

Special Requirements

Essential equipment

Laboratory PPE including an approved lab coat, enclosed footwear, safety goggles and hair ties for beyond-shoulder-length hair.

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 |
|-----------|---|---------|-----------|---------------------------|-----------|
| Quiz | 8 x MCQs and 2 x short answer responses per each quiz | 25 | N | Individual | N |
| Practical | 180 mins ea.(x6) | 20 | N | Group | N |
| Report | 1000 words | 15 | N | Individual | N |
| Report | 3000 words | 40 | N | Group/ Individual | N |