

STEREOCHEMISTRY AND SYNTHESIS OF ORGANIC COMPOUNDS (SCH 302)

Introduction:

SCH 302 is a 3rd year unit that covers stereochemistry and synthesis of organic compounds. It recognizes that life is 3-dimensional and delves into how this three-dimensionality influences how synthetic drugs interact with biological systems to elicit the desired therapeutic effect.

SCH 302 is covered in the programmes leading towards the award of the degrees of Bachelor of Science (Chemistry, Analytical Chemistry and Industrial Chemistry) of the University of Nairobi.

Course Outcomes:

By the end of this unit, the student should be able to:

1. Classify stereoisomers into their respective forms of stereoisomerism
2. Assign appropriate configurations to various forms of stereoisomers
3. Discuss the strategies for resolving mixtures of enantiomers
4. Identify axially chiral systems
5. Identify the strategies for asymmetric synthesis
6. Demonstrate the application of good leaving groups in asymmetric synthesis
7. Employ the common protecting groups in multi-step organic syntheses
8. Employ Michael Addition and Robinson Annulation reactions in organic synthesis
9. Generate retrosynthetic pathways for strategically important organic compounds.
10. Develop synthetic schemes for pharmacologically relevant organic compounds

Course Content:

1. This course covers the following topics:
2. Overview of Stereoisomerism: Types of Stereoisomers
3. Geometric Isomers and Assignment of Configuration
4. Overview of Chirality: Enantiomerism and Diastereomerism
5. Assignment of Relative and Absolute Configurations of Stereoisomers
6. Separation of Stereoisomers: Separation of enantiomers by crystallization, chemical separation of enantiomers via diastereomers

7. Chirality in molecules lacking chiral centres: Atropisomerism in biphenyl systems
8. Protecting groups in Organic synthesis
9. Asymmetric synthesis
10. Use of good leaving groups and protecting groups in asymmetric synthesis
11. The Chemistry of Unsaturated carbonyl compounds (Michael addition reaction, Robinson annulation): Conjugate Addition Reactions.
12. Retrosynthetic approach to organic synthesis
13. Highlights of linear versus convergent syntheses

Instructor Details:

Lecturer: Dr Albert Ndakala	Office Location: Chemistry Department	Telephone: 0720443386	Email address: andakala@uobi.ac.ke
Consultation Hours:			
Day Programme: Mondays and Wednesday (9 – 10 am)			
Evening Programme: Wednesdays (4 pm –5 pm)			

Lecture Hours:

The course is conducted by lectures and examinations.

Lectures:
Day Course: Mon 8 – 9 am (MH1) and Wed 8 – 9 am (LLT), Thur 8 – 9 am (Chem Lab I, G25)
Evening Course: Wed 5.30 -8.30 pm (Chem Lab II)

Course Evaluation

This course will be evaluated based on the following attributes:

- (a) Continuous Assessment Tests: Two CATs covering: (i) Stereochemistry (15%) and (ii) Organic Synthesis (15%)
- (b) Final Exam (70%)

Reference Books:

- (1) Organic Chemistry, Fourth Edition by Paula Bruice
- (2) Organic Chemistry, Third Edition, by Francis A. Carey
- (3) Fundamentals of Organic Chemistry by T. W. Solomons