



Birla Institute of Technology & Science, Pilani
Hyderabad Campus

ACADEMIC UNDERGRADUATE STUDIES DIVISION
SECOND SEMESTER 2022-2023

Course Handout (Part II)

Date: 17-01-2023

In addition to part I (the general handout for all courses appended to the timetable), this portion gives specific details regarding the study.

Course No.: CHEM F342

Course Title: Organic Chemistry IV

Instructor: Anupam Bhattacharya

1. Course Description: In this course, the fundamental structural characteristics, synthesis, and reaction of various heterocyclic compounds, natural products, and biomolecules will be discussed.

2. Scope and Objective of the Course: Vast majority of organic compounds are constituted by heterocycles, vital components of pharmaceuticals, agrochemicals, electroactive polymers, flavour, and fragrances. They are also found widely in biologically relevant natural products. The objective of the course is to provide knowledge of different heterocycles, natural products and biomolecules. In the case of natural products, emphasis will be laid on methods of isolation, separation, characterisation, and preparation.

3. Text Books:

Raj K. Bansal, Heterocyclic Chemistry, 5th Ed., New Age International Publishers, 2010. **(TB1)**

I.L. Finar, Organic Chemistry Vol-2, 5th Ed., Pearson Education, 2009. **(TB2)**

Reference Books:

J. A. Joule and K. Mills, Heterocyclic chemistry, 5th Ed, Wiley, 2010. **(R1)**

J. Clayden, N. Greeves, S. Warren, P. Wothers, Organic Chemistry, OUP, 1st Ed., 2000. **(R2)**

4. Course Plan:

Lec. No.	Topic(s) to be Covered	Learning Objectives	Chap(s). No(s).
1-6	Synthesis, physical properties and reactions of amino acids. Protein/polypeptide sequence analysis, structural features and synthesis.	What are natural amino acids, and why are they important? Isoelectric point and its importance in the separation of the α -amino acids. General methods for the preparation of α -amino acids. Methods used for determination of polypeptide and protein sequences. Synthetic methods for the preparation of polypeptides. Basic information on the structural organisation of proteins, the importance of ϕ and ψ dihedral angles.	Lect. notes
7-8	Heterocycles, introduction and nomenclature	What are Heterocycles? Introduction, importance, structural diversity and nomenclature of simple heterocyclic systems.	TB1: Chapter 1, Lect. notes
9-11	Three-membered ring systems	Preparation, properties and reactions of epoxides, aziridines and episulphides.	TB1: Chapter 2, Lect. notes
12-14	Four-membered ring systems	Preparation, properties and reactions of oxetane, azetidine, thietane	TB1: Chapter 4, Lect. notes
15-19	Five-membered ring systems	Synthesis, properties and reactions of furan, pyrrole and thiophene	TB1: Chapter 5, R2: Chapter 43, Lect. notes
20-23	Condensed five-membered heterocycles	Synthesis, properties and reactions of indole(benzopyrrole)	TB1: Chapter 7, Lect. notes
24-28	Six-membered and condensed six-membered ring systems	Synthesis, properties and reactions of pyridine and quinoline	TB1: Chapter 6 & 8, R2: Chapter 43, Lect. notes
29	Natural products	What are natural products? General introduction, their importance and classification.	Lect. notes
30-33	Terpenoids	Introduction, classification, isolation, separation and general biosynthetic route. Structure determination of geraniol and α -terpineol.	TB2: Ch.8 368-369, 467-471, Lect. notes
34-38	Alkaloids	Introduction, isolation of alkaloids, classification, some important reactions that aid in determining the alkaloid structures, structure determination of nicotine and atropine, unusual chemistry of alkaloids like morphine and colchicines, pharmaceutical applications of alkaloids	TB2: Ch.14 710-716, Lect. notes
39-40	Steroids and Lipids	Introduction, nomenclature and biosynthesis. Why are steroids necessary? Various lipids (Fatty acids, fat-soluble vitamins, triglycerides and waxes). Biosynthesis of fatty acids. Systematic organisation of lipids to form cell membranes (mainly brief discussion on the fluid mosaic model of the cell membrane).	TB2: Ch.11 531-532, 553-554, 581-583, Lect. notes

5. Evaluation scheme.

Component	Duration	The weightage (%)	Date Time	Remarks
Quiz*	20 minutes	30	Continuous	Closed Book
Mid-semester Exam.	1.5 hours	25	15/03/2023, 4.00-5.30 pm	Closed Book
Compre. Exam.	180 minutes	45	06/05/2023, FN	25% Closed Book + 20% Open Book

* Best of 75% of the total number of Quizzes conducted.

6. Make-up(s) will be granted only for genuine reasons.

7. Consultation Hour: Tuesday, 4-5 pm; any doubts regarding the topics or lectures can be communicated by email to the Instructor (anupam@hyderabad.bits-pilani.ac.in).

8. Notices related to the course will be displayed on CMS only.

9. Academic Integrity Policy: It is expected that academic integrity should be adhered to in all the evaluation components. Students are responsible for their work and actions related to all academic endeavours. Students should work alone on all the evaluation components unless otherwise directed by the instructor and follow the rules provided for all quizzes and examinations.

If students become aware of a violation of academic integrity, they are encouraged to communicate this to the instructor or during the SFC meetings.

Malpractice in any form will have serious implications.

Instructor-in-charge