



Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2023-2024

Course Handout (Part II)

Date:

09-01-2024

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-In-Charge: Tanmay Chatterjee

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 organization of proteins, the importance of ϕ and ψ dihedral angles.	Lect. notes
7	Natural products	What are natural products? General introduction, their importance, and classification.	Lect. notes
8-12	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
13-18	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
19-20	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 organization 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
21-23	Heterocycles, introduction	What are Heterocycles? Introduction, importance, structural diversity, and	TB1: Chapter 1,

	and nomenclature	nomenclature of simple heterocyclic systems.	Lect. notes
24-26	Three-membered ring systems	Preparation, properties, and reactions of epoxides, aziridines, and episulphides.	TB1: Chapter 2, Lect. notes
27-29	Four-membered ring systems	Preparation, properties, and reactions of oxetane, azetidine, thietane	TB1: Chapter 4, Lect. notes
30-33	Five-membered ring systems	Synthesis, properties, and reactions of furan, pyrrole and thiophene	TB1: Chapter 5, R1: Chapter 16-18, R2: Chapter 43
34-36	Condensed five-membered heterocycles	Synthesis, properties, and reactions of indole(benzopyrrole)	TB1: Chapter 7, R1: Chapter 20 Lect. notes
37-40	Six-membered and condensed six-membered ring systems	Synthesis, properties, and reactions of pyridine and quinoline	TB1: Chapter 6&8, R1: Chapter 8-9, R2: Chapter 43, Lect. notes

5. Evaluation scheme.

Component	Duration	The weightage (%)	Date	Remarks
Quiz*	20 minutes	20	Continuous	Closed Book
Seminar [#]	15 min	10	TBA	Open Book
Mid-semester Exam.	1.5 hours	30	14/03 - 9.30 - 11.00AM	Closed Book
Compre. Exam.	180 minutes	45	13/05 FN	30% Closed Book + 15% Open Book

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

[#]Two seminars will be conducted, one before midsem and another after midsem.

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

7. Consultation Hour: To be announced.

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

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

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