Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2020-2021

Course Handout (Part II)

Date: 17-08-2020

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

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, which are 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, characterization, 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, 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	Synthesis, properties and reactions of pyridine, quinoline and isoquinoline	**TB1:** Chapter

	condensed six membered ring systems		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-terpeniol.	**TB2:** Ch.8 368-369, 467-471, Lect. notes
34-38	Alkaloids	Introduction, isolation of alkaloids, classification, some important reaction 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	Steroids	Introduction, nomenclature and biosynthesis. Why steroids are important?	**TB2:** Ch.11 531-532, 553-554, 581-583, Lect. notes
40-41	Lipids	Various types of 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 fluid mosaic model of cell membrane).	Lect. notes
42-43	Plant pigments	Introduction, nomenclature, structure determination and synthesis of some plant pigments, biosynthesis.	Lecture notes

5. Evaluation scheme.

Component	Duration(min)	Weightage (%)	Date Time	Remarks
Quiz*	**15**	**15**	**Continuous**	**Open Book**
Class interaction$	**Variable**	**5**	**Continuous**	**Open Book**
Test I	**30**	**15**	September 10 –September 20 (During scheduled class hour)	**Open Book**
Test II	**30**	**15**	October 09 –October 20 (During scheduled class hour)	**Open Book**
Test III	**30**	**15**	November 10 – November 20 (During scheduled class hour)	**Open Book**
Compre. Exam.	**120**	**35**	**TBA**	**Open Book**

* Best of 75% of the total number of Quizzes conducted; $ based on participation in the class.

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

7. Online consultation Hour: **Any doubts regarding the topics or lectures can be communicated by email. Instructor will try to clear the doubt at the earliest by email or over phone. anupam@hyderabad.bits-pilani.ac.in**

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

9. 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