Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2019-2020

Course Handout (Part II)

Date: 06-01-2020

In addition to 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**
Instructors : **Manab Chakravarty (IC) and 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 key components of pharmaceuticals, agrochemicals, electroactive polymers, flavour and fragrances. They are also found widely in biologically important natural products. The objective of the course is to provide knowledge of different heterocycles, natural products and biomolecules. In 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	Chapter in the Text Book
1-2	Heterocycles, introduction and nomenclature	What are Heterocycles? Introduction, importance, structural diversity and nomenclature of simple heterocyclic systems.	**TB1:**Chapter 1, Lect. notes
3-5	Three-membered ring systems	Preparation, properties and reactions of epoxides, aziridines and episulphides.	**TB1:** Chapter 2, Lect. notes
6-8	Four- membered ring systems	Preparation, properties and reactions of oxetane, azetidine, thietane	**TB1:** Chapter 4, Lect. notes
9-13	Five-membered ring systems	Synthesis, properties and reactions of furan, pyrrole and thiophene	**TB1:** Chapter 5, R2: Chapter 43, Lect. notes
14-17	Condensed five membered heterocycles	Synthesis, properties and reactions of indole(benzopyrrole)	**TB1:** Chapter 7, Lect. notes
18-20	Six-membered and condensed six membered ring systems	Synthesis, properties and reactions of pyridine, quinoline and isoquinoline	**TB1:** Chapter 6 & 8, R2: Chapter 43, Lect. notes
21-26	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
27	Natural products	What are natural products? Importance and classification	Lect. notes
28-31	Terpenoids	Introduction, classification, isolation, separation and general biosynthetic route.	**TB2:** Ch.8

		Structure determination of geraniol.	368-369, 467-471, Lect. notes
32-36	Alkaloids	Introduction, classification, isolation, general methods for determining structure, structure determination of nicotine and atropine, chemistry of some common alkaloids like quinine, morphine, reserpine and colchicines, pharmaceutical applications.	**TB2:** Ch.14 710-716, Lect. notes
37	Steroids	Introduction, nomenclature and biosynthesis	**TB2:** Ch.11 531-532, 553-554, 581-583, Lect. notes
38	Lipids	Various types of lipids (Fatty acids, triglycerides and waxes). Biosynthesis of fatty acids. Systematic organization of lipds to form cell membranes (Fluid mosaic model of cell membrane).	Lect. notes
39-41	Plant pigments	Introduction, nomenclature, structure determination and synthesis of some plant pigments, biosynthesis.	**Lecture notes**

5. Evaluation scheme.

Component	Duration	Weightage (%)	Date Time	Nature of Component
Mid Sem Exam	**1.5 hr**	**30**	**3/3 11.00 -12.30 PM**	**Closed Book**
Class Tests	**10 min.**	**30**	**Continuous**	**Closed Book**
Compre. Exam.	**3 hrs.**	**40**	**04/05 AN**	**Open Book (20%) + Closed Book (20%)**

***There will be 5 class tests before mid-semester examination and 5 class tests after mid-semester examination. Best 3 out of 5 tests will be considered for each half (pre and post mid-semester exam).**

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

7. Chamber Consultation Hour: Will be announced in the class

8. Notices concerning the course will be displayed on **Chemistry Department Notice Board and 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.

Instructor-in-charge