Birla Institute of Technology & Science, Pilani
Hyderabad Campus

ACADEMIC-GRADUATE STUDIES AND RESEARCH DIVISION

FIRST SEMESTER 2021-2022

Course Handout (Part II)

Date: 01/09/2021

In addition to part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : **CHEM G531**
Course Title : **Recent Advances in Chemistry**
Instructor-in-charge : **KVG CHANDRA SEKHAR**
Instructors : **Anupam Bhattacharya**

1. Scope and Objective of the Course: The course aims at covering topics in heterocyclic chemistry of professional interest. It provides the fundamental structural characteristics; synthesis and reactions of various heterocycles with nitrogen, oxygen and sulfur heteroatom in the ring. The specific heterocycles are furan, thiophene, pyrrole, imidazole, thiazole, oxazole. This course also emphasizes the disconnection or *synthon* approach in organic synthesis. In *disconnection* or *synthon* approach the target molecule is broken down by a series of disconnections into possible starting materials followed by synthesis.

2.Text Book:

TB1: J. A. Joule and K Mills, Heterocyclic Chemistry, fifth edition, Wiley-Blackwell publishers

TB2: Stuart Warren: Organic Synthesis: The Disconnection Approach: John Wiley & Sons, 2004.

3.Reference Books:

R1. Raj K Bansal, Heterocyclic Chemistry, 5th edition, New Age International (P) Limited, Publishers.

R2. Thomas L. Gilchrist, Heterocyclic Chemistry, 3rd edition, Prentice Hall, Inc.1997.

4.Course Plan:

Lec. No.	Topic	Learning Objectives	Reference to text book
1-3	Heterocyclic nomenclature and chemistry of three, four membered heterocycles	How to name the aromatic and non-aromatic heterocycles	**TB1**: Chapter 1 and lecture notes
4-5	Reactivity of aromatic heterocycles	Oxidation and reduction, electrophilic, nucleophilic and radical reactions	**TB1**: Chapter 3
6-8	Synthesis of aromatic heterocycles	Reaction type used in synthesis of heterocycles and different synthetic methods	**TB1**: Chapter 6
9-20	Five and six membered ring systems including condensed five and six-membered ring systems	Synthesis and reactions of furan, thiophene, pyrrole, indole, benzofuran, pyridine, quinoline and isoquinoline	**TB1**: Chapters 8, 9, 16-18, 20, 21 and 24
21	Basic principles of	Define reterosynthesis	**TB2:** 1

	disconnection approach in organic synthesis	and basis for mathematical approach towards synthesizing organic compounds	
22-29	One group C-C disconnections (Synthesis of alcohols, general strategy of choosing disconnection, stereoselectivity, synthesis of carbonyl compounds, regioselectivity, alkene synthesis, use of acetylenes for synthesis)	Use retrosynthetic analysis to work out and compare alternative syntheses of complex organic compounds. Outline important classical and modern reactions used in organic synthesis. Discuss how reaction conditions influence the outcome of important reactions with respect to regioselectivity, stereospecificity and stereoselectivity.	**TB2:** 10-16
30-40	Two group C-C disconnections (Diels-Alder reactions, reversal of polarity, cyclisation reactions, summary of strategy, amine synthesis, 1,3-difuntionalised compounds and α,β-unsaturated carbonyl compounds, control in carbonyl condensations, 1,5-difuntionalised compounds, michael addition and Robinson annelation, use of aliphatic nitro compounds in synthesis, 1,2-difuntionalised compounds, FGA and its reverse, reconnections, 1,4- and 1,6-difuntionalised compounds, strategy of carbonyl disconnections)		**TB2:** 17-28

5.Evaluation Scheme:

Component	Duration	Weightage (%)	Date and Time	Nature of component
Midsem Test	90 mins	35	TBA	Closed Book
Presentations*	15 mins.	20	TBA	Open Book
Comprehensive Examination[$]	3 hrs	45	TBA	Closed Book / Open Book

*Student need to give presentation on the assigned topics. One will be conducted before midsem and the other presentation post midsem

[$]20 % of the exam will be open book component and rest 25% will be closed book

6. **Chamber Consultation Hours**: To be announced through a separate notice.

7. **Notices**: Notices concerning the course will be displayed on the **Chemistry Department Notice Board as well as in CMS**.

8. 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.

9. Make-up-policy: Make up would be considered only for very **genuine reasons**.

Instructor-In charge CHEM-G531

KV G Chandra Sekhar