



ACADEMIC-GRADUATE STUDIES AND RESEARCH DIVISION

SECOND SEMESTER 2021-2022

Course Handout (Part II)

Date: 13/01/2022

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 G561**
Course Title : **Heterocyclic Chemistry**
Instructor-in-charge : **Tanmay Chatterjee**

Description:

The fundamental structural characteristics; synthesis and reactions of various heterocycles with nitrogen, oxygen and Sulphur heteroatom in the ring; heterocycles such as pyrrole, thiophene, furan, imidazole, thiazole, oxazole, indole, benzofuran, pyridine and quinoline; advanced synthesis and reaction mechanism of heterocyclic compound.

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 oxirane, thiirane, aziridines, pyrrole, thiophene, furan, imidazole, thiazole, oxazole, indole, benzofuran, pyridine and quinoline. The emphasis will be on advanced synthesis and reaction mechanism of heterocyclic compounds.

2. Text Book:

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

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 |
|----------|--|--|-----------------------------|
| 1-4 | Heterocyclic nomenclature and chemistry of three, four membered heterocycles | How to name the aromatic and non-aromatic heterocycles | Chapter 1 and lecture notes |
| 5-7 | Reactivity of aromatic heterocycles | Oxidation and reduction, electrophilic, nucleophilic and radical reactions | Chapter 3 |
| 8-10 | Synthesis of aromatic heterocycles | Reaction type used in synthesis of heterocycles and different synthetic methods | Chapter 6 |
| 10-21 | Five membered ring systems | Synthesis and reactions of furan, thiophene, pyrrole, imidazole, thiazole, oxazole | Chapter 16-18 and 24 |

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|-------|--------------------------------------|---|----------------------------------|
| 22-25 | Condensed five membered heterocycles | Synthesis and reactions of indole and benzofurans | Chapter 20 and 21 |
| 26-34 | Six membered ring systems | Synthesis and reactions of pyridine, quinolone and isoquinoline | Chapter 8 and 9 |
| 35-40 | Heterocycles at work | Synthesis of selected natural products and synthesis of drugs | Chapter 32, 33 and lecture notes |

5. Evaluation Scheme:

| Component | Duration | Weightage (%) | Date and Time | Nature of component |
|--|----------|---------------|---------------|-------------------------|
| Midsem Test | 90 min | 30 | TBA | Closed Book |
| Presentations* | 15 min | 30 | | Open Book |
| Comprehensive Examination [§] | 120 min | 40 | TBA | Closed Book / Open Book |

*Students need to give presentation on the assigned topics. One will be conducted before midsem and another after midsem

[§]10% of the exam will be open book component and rest 30% 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 BITS-G513

Tanmay Chatterjee

