



SECOND SEMESTER 2020-21
COURSE HANDOUT

Date: 16.01.2021

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 F342
Course Title : ORGANIC CHEMISTRY IV
Instructor-in-Charge : RAJEEV SAKHUJA
Instructor(s) : -
Tutorial/Practical Instructors: -

1. Course Description: The course aims at covering topics in synthesis and reaction of various heterocyclic compounds, natural products and biomolecules. Structure, nomenclature, and common reactions of heterocyclic compounds; synthesis, properties, and reactions of three-, four-, five-, and six-membered ring systems; condensed five- and six-membered ring systems; introduction to natural products; terpenoids, steroids, lipids, alkaloids, amino acids, peptides, proteins, and vitamins.

2. Scope and Objective of the Course:

At the end of the course, the student should be able to:

- Name simple three-, four-, five-, and six-membered heterocycles
- Devise synthesis of three-, four-, five-, and six-membered and benzo fused heterocyclic systems
- Recognize five important natural products and state why they are important
- Design simple synthesis and solve reaction related problems of the natural products discussed in the class

3. Text Books: TB1. Raj K Bansal, heterocyclic Chemistry, 5th edition, 2010 (TB), New Age International publishers; TB2. I. L. Finar, Organic chemistry Vol. 2 2nd Ster & The Chemistry of Natural Products, 5th Ed., 2005; Pearson.

4. Reference Books: R1. J. Clayden, N. Greeves, S. Warren, P. Wothers, Organic Chemistry, Oxford University Press; R2. R. T. Morrison, R. Boyd, and S. K. Bhattacharjee, Organic Chemistry, 7th edition.

5. Course Plan:

Module No.	Lecture/Tutorial Session	Reference	Learning outcome
1	L1-L3: Introduction and nomenclature of few heterocyclic compounds T1: Exercise problems on nomenclature of heterocyclic compounds	TB1: Chapter 1 Class notes	Apply IUPAC nomenclature rules for naming three-, four-, five-, and six-membered heterocyclic ring systems
2	L4-L9: Chemistry of Three & Four-membered heterocycles T2: Exercise problems on reactions of Three & Four-membered heterocycles	TB1: Chapter 2 & 4 Refer class notes	Devise synthesis of Aziridines, Oxirane, Thiiranes, oxetane, Thietane, Azetidine, and carry their conversion to other heterocyclic systems
3	L10-L15: Chemistry of five-membered heterocycles	TB1: Chapter 5 R1: Chapter 43	Devise synthesis of Pyrroles, Furan and thiophenes and carry



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	T3-T4: Exercise problems on reactions of five-membered heterocycles		their conversion to other heterocyclic systems
4	L16-L17 Chemistry of Six-membered heterocycles T5: Exercise problems on reactions of six-membered heterocycles	TB1: Chapter 6 R1: Chapter 43	Devise synthesis of Pyridines and carry their conversion to other heterocyclic systems
5	L18-L20: Chemistry of Benzo-fused heterocycles T6-T7: Exercise problems on reactions of Benzo-fused heterocycles	TB1: Chapter 7, 8 R1: Chapter 43	Devise synthesis of quinoline, isoquinoline and indoles and carry their conversion to other heterocyclic systems
6	L21-L27: Introduction to natural products and Chemistry of selective terpenes and steroids T8-T9: Exercise problems on the chemistry of steroids and terpenoids	General TB2: Chapter VIII, XI: Class notes	Understand the importance of natural products & classify them. Application of isoprene and isoprenoids in biosynthesis of terpenes, and perform structure determination of α -pinene, citral, camphor, sterols, estrogen, bile acids, and cholesterol
7	L28-L30: Importance and Chemistry of Alkaloids T11: Exercise problems on chemistry Alkaloids	TB2: Chapter XIV	Understand the role of alkaloids and chemically determine the structure of epinephrine, pyrrolidine-pyridine group alkaloids, cocoa alkaloids, and quinine
8	L31-L36: Importance and Chemistry of peptides and proteins T12: Exercise problems on chemistry Amino acids, Peptides, and Proteins	TB2: Chapter XIII	Understand the role of amino acids and peptides in biologically active proteins, Devise the synthesis of Peptides by Sanger, Edman & Dansyl methods Obtain the enzymatic cleavage of peptides and the apply protection de-protection groups in synthesizing peptides and proteins
9	L37-L38: Importance and Chemistry of lipids T10: Exercise problems on chemistry of lipids	R2: Chapter 25, See class notes for details	Classify lipids including phospholipids, sphingolipids, nomenclature, and devise synthesis of prostaglandins
10	L39-L40: Importance and Chemistry of Vitamins T13: Exercise problems on chemistry of Vitamins	TB2: Chapter XVII	Categorize types of vitamins and design the synthesis of Vitamins A, C, and B-complex



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6. Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time
Mid-Semester Test	90 Min.	30 (60 M)	To be announced by AUGSD
Comprehensive Examination	120 Min.	40 (80 M)	08/05 FN
Quiz/Assignment	15 min.	30 (60 M)	Continuous

\$ The nature of the component will be announced before the specific examination.

7. Chamber Consultation Hour: Saturday, 9.00-10.00 AM

8. Notices: Notices concerning the course will be communicated by emails.

9. Make-up Policy: As per Institute's policy

10. Note (if any):

Instructor-in-charge
Course No. CHEM F342