

**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI – Hyderabad Campus**  
**SECOND SEMESTER 2022-23**  
**Course Handout Part II**

Date:

16-01-2023

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

Course No: **CHEM F243**  
Course Title: **Organic Chemistry-II**  
Instructor-in-charge: **Manab Chakravarty**  
Instructor: **Arijit Mukherjee**

**1. Scope and objective of the course:** Stereochemistry is highly important to most life-saving drugs, many materials that cater to our essential needs. Hence, this course will familiarize the students with stereochemical concepts and their applications in organic synthesis; important functional group transformations, and pericyclic reactions. Emphasis will be placed not only on the mechanistic and stereoelectronic features but also on how they are utilized in target synthesis.

**2. Text Books:** E. L. Eliel, S. H. Wilen & L. N. Mander, Stereochemistry of Organic Compounds, John Wiley & Sons, 1<sup>st</sup> Ed., 2004. **(T1)**

Michael B. Smith & Jerry March, Advanced Organic Chemistry, John Wiley & Sons, 6<sup>th</sup> ed., 2012. **(T2)**

**Reference Books:**

J. Clayden, N. Greeves, S. Warren, P. Wothers, Organic Chemistry, OUP, 1<sup>st</sup> ed., 2000. **(R1)**

R. T. Morrison, R. Boyd and S. K. Bhattacharjee, Organic Chemistry, 7<sup>th</sup> ed. **(R2)**

Subrata Sengupta, Basic Stereochemistry of organic molecules, Oxford University press **(R3)**

**3. Course Plan:**

Lec. No.	Topics to be Covered	Learning objectives	Text book (topic no.)
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1-2	Nature of stereoisomers, Enantiomers and Diastereomers	Introduction to stereoisomers; identifying enantiomers and diastereomers; also to understand their difference	<b>T1:</b> Ch. 3, pg. 49-69.
3-5	Symmetry elements, symmetry operators, symmetry and molecular properties.	Introduction to symmetry elements; to identify symmetry elements in molecules; associate molecules with symmetry point groups.	<b>T1:</b> Ch. 4, pg. 71-87, 92-97
6-8	Relative and absolute configuration, relative configuration and notation, determination of relative configuration	What is meant by relative and absolute configuration? How relative configuration is determined? Rules governing R/S nomenclature (absolute configuration).	<b>T1:</b> Ch. 5, pg. 101-112, 117-123, 126-128, 130-144
9-10	Introduction, nomenclature, allenes	Chirality in molecules devoid of chiral centers – 1. Why these molecules are considered as chiral? Important examples and their applications.	<b>T1:</b> Ch. 14, pg. 1119-24, 1132
11-13	Alkylidenecycloalkanes, Spiranes, Biphenyl atropisomerism, Molecules with planar chirality	Chirality in molecules devoid of chiral centers -2. Why these molecules are considered as chiral? Important examples and their applications.	<b>T1:</b> Ch. 14, pg. 1133-50, 1166-76
14-15	<i>cis-trans</i> isomerism, determination of configuration of <i>cis-trans</i> isomers by chemical & physical methods	Stereochemistry of alkenes; E-Z nomenclature of alkenes; methods for the determination of configuration.	<b>T1:</b> Ch. 9, pg. 539-574
16-17	Conformation of unsaturated acyclic and miscellaneous molecules	What is conformation of a molecule? Importance and important examples. Conformation of acyclic molecules;	<b>T1:</b> Ch. 10, pg. 597-627

		identifying stable and unstable conformations. What are the various interactions leading to stable/unstable conformations?	
18-20	Conformational aspects of the chemistry of six membered ring compounds	Understanding the conformations of cyclic molecules; identifying stable and unstable conformations. What are the various interactions leading to stable/unstable conformations in cyclohexane?	<b>T1:</b> Ch. 10, pg. 665-754
21-26	Different reaction mechanisms involved in organic transformations such as SN1/SN2/SN'/S <sub>N</sub> i, neighboring group mechanism E1, E2, E1cB, addition to C=C double bond.	Understand diverse reaction mechanism, ranging from substitution to elimination. Non-classical carbocations, reason for their stability and examples.	<b>T2 :</b> Ch. 10: 425-519, Ch. 17: 1477-1506, Lecture notes
27-31	Resolution and stereoselective synthesis	Asymmetric synthesis; common approaches	<b>R1 :</b> Ch.16, 399-404, Ch.34, 881-904, Lecture notes
32-40	Types of Pericyclic reactions (electrocyclic, cycloaddition & sigmatropic), correlation diagrams, FMO approach & PMO approach, Woodward-Hofmann rules	Pericyclic reactions; type; mechanism and applications	<b>R2:</b> Ch. 20 1032-1048, Lecture notes

#### 4. Evaluation Scheme:

Component	Duration	Weightage	Date & Time	Remarks
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Midsem Examination	90 min	30	14/03 9.30 - 11.00AM	<b>Closed Book</b>
Class tests*	15 min	20	Continuous	<b>Open Book</b>
Assignment/HW/Seminar	-	10	Continuous	<b>Open book</b>
Comprehensive Examination	3 hrs	40	10/05 FN	<b>Closed book</b>

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

**6. Chamber consultation hours:** To be announced in the class.

**7. Notices:** All the notices pertaining to this course will be displayed on **Chemistry Department Notice Board and CMS.**

**8. Course Policies:**

(a) **Absences:** Students are responsible for all materials presented in the course as well as for acquiring missed information.

(b) **Electronic Devices: Cell phones must be turned off in class.** All electronic devices must be off during class or exams. This includes laptop computers as well as programmable calculators. You will be allowed only a simple scientific calculator for exams (if required). **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  
CHEM F243**