



BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE
INSTRUCTION DIVISION
First Semester 2015-2016
Course Handout Part II

Date: 03/08/2015

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

Course No. : **CHEM G551**
Course Title : **Advanced Organic Chemistry**
Instructor-in-charge : **INDRESH KUMAR**

1. Scope and Objective of the Course: The course aims to cover topics in advanced areas of organic chemistry. The main focus will be on the application of structure and theory to the study of organic reactions: nucleophilic aromatic substitution, organometallic reagents in organic synthesis, reaction dynamics, isotope effects and molecular orbital theory applied to pericyclic and photochemical reactions; reactive intermediates including carbenes, carbanions, and benzyne; and asymmetric synthesis and multistep synthesis using disconnection approach. Starting with fundamental principles and their application, the ultimate purpose of this course will be to understand the recent developments in organic chemistry.

2. Text Book:

T1: "Organic Chemistry", J. Clayden, N. Greeves, S. Warren, P. Wothers, Oxford University Press, New York (2001).

Reference Books:

R1: "Advanced Organic Chemistry: Reaction Mechanism and Structure", J. March, 4th Edition, Wiley-Interscience, New York (1992)

R2: "Organic Chemistry", R. T. Morrison, R. N. Boyd, S. K. Bhattacharjee, 7th Edition, Pearson, India (2011)

3. Course Plan/Plan of Work:

Lect. No.	Topics to be covered	Reference
1-3	Some aspects of basic physical organic chemistry	class notes
4-5	Determining reaction mechanisms	Chap 41, T1 Chap 6, R1
6-7	Enol, enolates, and nucleophilic acyl substitution; Controlling reactivity, regioselectivity, and stereoselectivity	Chap 26-28, T1
8-9	Nucleophilic addition to the carbonyl group and Nucleophilic Aromatic Substitution including benzyne mechanism	Chap 6, T1, Chap 13, R1
10-12	Synthesis and reaction of nitrenes and carbenes as reactive intermediates	Chap 40, T1 Chap 5, R1
13-19	Using organometallic reagents to make C-C bonds: Lithium and Magnesium reagents, other organometallic reagents (Si, Sn, B, Cu) and Transition metal catalyzed reactions - Stille, Suzuki, Negishi, Heck, and other couplings	Chap 9, 46-48, T1
20-24	Rearrangement reactions in organic chemistry	Chap 37, T1 Chap 18, R1





25-30	Pericyclic reactions: The effects of orbital symmetry, Diels-Alder reactions, cycloadditions Sigmatropic rearrangements, Electrocyclic reactions.	Chap 35, 36, T1 Chap 20, R2
31-35	Asymmetric synthesis: chiral reagents, chiral catalysts	Chap 45, T1
36-42	Natural products: multi-step synthesis involving protection deprotection and retro synthetic analysis	Chap 51, T1 Reference articles

The numbers of lectures shown above is notional. The students will have to resort largely to self-study, which will be followed by presentations and discussion. Extensive problem solving will be an integral part of the learning process. The instructor will provide references from recent literature in specific advanced areas.

Home Assignments: Assignments will be given periodically to supplement the material discussed in class. Students will also have to deliver seminars on some topics and collect relevant literature on that topic.

4. Evaluation Components:

Components	Weightage (%)	Date/Time/Venue
Mid-term	30	-
Assignments/quizzes	15	10/10 10:00 - 11:30 AM
Seminars/Literature search	15	-
Comprehensive Examination	40	12/12 AN

Instructor-in-charge
CHEM

