



FIRST SEMESTER 2019-2020
Course Handout (Part II)

01-08-2019

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 F415**
Course Title : **Frontiers in Organic Chemistry**
Instructor-in-Charge : **TANMAY CHATTERJEE**

Scope and Objective of the Course: This course is designed to give understanding of traditional organic reactions and synthesis up through modern synthetic reactions with concurrent development of strategies for synthesis design. An emphasis will be placed on assembling the most important reaction methodologies in the context of complex molecule synthesis.

Textbooks:

1. Paul Wyatt & Stuart Warren, Organic Synthesis: Strategy and Control, Wiley (2008).

Reference books

1. **R1.** J. Clayden, N. Greeves, S. Warren, P. Wothers, Organic Chemistry, Oxford Univ. Press (Second South Asia Edition, 2012).
2. **R2.** W. Carruthers, I. Coldham, Modern Methods of Organic Synthesis, Cambridge Univ. Press, 4th ed. (2004).

Course Plan:

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
1-6	To learn selectivity concept in design and synthesis of complex and optically active molecules	Background of Chemo-, Regio- and Stereo-Selectivity with relevant examples	TB: Ch 2,3,4
7-12	To have mechanistic knowledge of carbon-carbon bond forming reactions in organic synthesis	Introduction and selective examples on metal-catalyzed sp, sp ² and sp ³ C-C formation and C-X (X = heteroatom) couplings.	TB: Ch 18, Class notes
13-19	To understand the roles of transition metals in constructing carbon-carbon and carbon-heteroatom bonds	Metal-catalyzed carbocyclization: From Ru and Rh-mediated cycloadditions to Pt and Au chemistry; Ring closing metathesis. Baldwin rules for cyclization reactions	R1: Ch 40, Class notes
20-23	To learn the use of cross-	Direct functionalization of olefins,	Class notes



	coupling reactions in multi-step synthesis	including hydroamination, hydrogenation, hydrosilylation, hydroformylation.	
24-26	To gain knowledge on different methods to form radicals and their potential applications in C-C and C-X bond formation	Introduction, generation of radicals using different methods and potential application for C-C and C-X bond formation.	R2: Ch 4.1, Class notes
27-34	To understand the importance of metal free catalysis and their usefulness in organic synthesis	Need of metal free catalysis, introduction to the development of organocatalysis: amine catalysis (enamine and iminium ion); towards metal-free catalysis, phase transfer catalysis.	Class notes
35-42	To have knowledge on multi-bond forming processes and impact on diversity-oriented synthesis; use of advanced concepts in complex organic syntheses leading to bioactive and natural compounds	Introduction and emphasis on Ugi, Mannich, Biginelli reaction, Pauson–Khand reaction, Passerini reaction. Introduction and selective examples of Tandem reactions.	TB: Ch. 36, Class notes

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Mid-Semester Examination	90 min	25	1/10, 11.00 -- 12.30 PM	Close book
Class tests/Quizzes	-	20	Continuous/ to be announced	Close book
Seminar	10 min	10	Continuous/ to be announced	Open book
Comprehensive Examination	3 hr	45	06/12, AN	Open Book (20%) + Close Book (25%)

Note: Active and regular participation in the class room discussions is expected from each student.

Chamber Consultation Hour: To be announced in the class.

Notices: All the notices will be displayed on CMS or Chemistry Department Notice Board.

Make-up Policy: Make-up(s) will be granted only for genuine reasons according to BITS guidelines.

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

