BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani
Pilani Campus
AUGS/ AGSR Division

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. : PHA F241
Course Title : Pharmaceutical Chemistry
Instructor-in-charge : Dr. Sandeep Sundriyal
Lab Instructors : Mr. Amritansh Bhanot, Ms. Sharyu Kesharwani, Mr. Ansari Imran K., Mr. Prabhjeet Singh, Mr. Amit Kumar

1. Course Description: This course deals with study of important classes of organic compounds such as alcohols, ethers, esters, aldehydes etc and their reactions. The mechanisms for various reactions will also be dealt with to comprehensively cover the basics of chemical reactions. Some important five and six member heterocycles with their reactions will also be part of the course. This course also emphasizes the use of inorganic compounds in pharmacy.

2. Scope and Objective of the Course: The objective of the course is to teach fundamentals of organic chemistry as applied to pharmaceutical and medicinal chemistry. This basic understanding is required to comprehend the advanced concepts in pharmaceutical chemistry such as structure-activity relationships, synthetic chemistry, rational drug design, retrosynthetic analysis, etc. After taking this course the students should be able to (i) explain the observed physical and chemical properties of various FGs (ii) mechanistically explain important chemical reactions of various FGs such as alcohols, amines, carbonyl compounds, etc. (iii) describe various reagents and reactions used to identify organic FGs (iv) identify various heterocyclic rings and explain their common chemical reactions (v) describe medicinal properties of selected inorganic compounds.

3. Text Books: L. G. Wade and Maya Shankar Singh, Organic Chemistry, Pearson, 6th Edition.

4. Reference Books:

1. J Clayden, N Greeves, and S Warren, Organic Chemistry, 2nd Edition, Oxford University Press, South Asia edition, 2001.
2. R T Morrison and R N Boyd Organic Chemistry PHI, 6Th Edition
3. T W Grahm Soloman and Craig B Fryhle , Organic Chemistry, 8th Edition, John Wiley and Sons, New York , 2004.
4. K A Strohfeldt, Essentials of Inorganic Chemistry: For Students of Pharmacy, Pharmaceutical Sciences and Medicinal Chemistry, John Wiley and Sons. New York, 2015.
5. Vogel's text book of Practical Organic Chemistry, V edition, Longman Scientific Publications, 1989

5. Course Plan:

Module No.	Lecture Session	Reference	Learning outcomes
1 – 3	Introduction and review; nomenclature and introduction to various functional groups	TB 1.10A-1.10H	Systematic nomenclature, General principles, saturated branched and unbranched chain, alkene, alkyne, carbonyl, carboxylic acid, halogens, amines etc.
4-6	Chemistry of alcohols	TB 10.1,10.2, 10.6,10.12	Structure and classification, general synthesis and various reactions
7-9	Chemistry of ethers	TB 13.1,13.2,13.5	complexes of ethers, reagents, crown ethers, synthesis and cleavage, auto oxidation,
10–15	Chemistry of ketones and aldehydes	TB 16.1,2,4,7, 12,14,16,21	Structure and physical properties, synthesis and various reactions

		RB 3: units 6, 10, 11	
16-19	Chemistry of amines	TB 17.3,5,6, 13, 15,20,22	Structure, preparation and reactions of nitro, nitrile, azide, amide, imine. Rearrangements and reactions involving above
20-24	Chemistry of carboxylic acid and its derivatives	TB 19.9,15, 20.1,5,9,10-20.	Structure, synthesis and reactions of carboxylic acids, malonic ester
25-27	Condensation and alpha substitution of carbonyl compounds	TB 21.2,21.12-21.19 RB 3: unit 20	Keto enol tautomerism, Claisen condentation, malonic ester synthesis, Cross claisen, Michael addition
28-29	Free radical reactions	RB 3: unit 37	Structure, generation and fate of free radicals, and free radical substitution reactions.
30-34	Heterocyclic compounds	RB 3 : unit 29	Identification and reactions of various 5/6-membered and benzo-fused heterocyclic ring systems
35-40	Inorganic compound in pharmacy	RB: 4	Selective examples of inorganic compounds with medicinal/diagnostic uses belonging to alkali, alkaline earth metals, Group 13, 15, Transition metals etc. Examples: Gastrointestinal agents Acidifying agents, antacids, protective and absorbents, saline cathartics), Radiopharmaceutical used in medicine etc.

6. Practicum experience:

Experiments	**No of practical hours**	**References/ chapters**
Solubility characterization of organic compounds, qualitative tests for various organic functional groups	As in timetable	Different chapters of text book/ reference books

7. Evaluation Scheme:

Component	**Duration**	**Weightage (%)**	**Date & Time**	**Nature of component (Close Book/ Open Book)**
Mid-Sem Test	90 min	30	--	CB
Continuous assessment*		35	Continuous	Class Quiz (CB) Lab Quiz/viva/day-to-day evaluation (CB)
Comprehensive Exam	120 min	35	02/05 AN	CB and/or OB

Continuous assessment will be based on class tests/practicum components/viva, etc. **(announced or surprise)*

8. Chamber Consultation Hour: To be announced in class. Prior appointment *via* Email is strongly encouraged.

9. Notices: Due to the ongoing mode of online teaching all notices concerning this course will be displayed Google Classroom or will be communicated *via* emails. Students should make sure that their official Email accounts are working and are expected to their check inbox regularly.

10. Make-up Policy: Generally, make-up is considered in exceptional circumstances and only for regular students (~ **80% attendance** in lecture classes). Prior permission for all make-up applications is a must. The application must accompany supporting documents to the satisfaction of IC..

11. NOTE(s):

1. Quiz(zes) may/will be conducted as a part of evaluation component, at random, during contact hours including lecture, tutorial hours, as convenient, **with/without prior intimation** and sometimes outside class contact hours (for both theory and practical) and hence it is expected that the students come prepared to every class on topics covered in earlier contact hours. Regular classes will be held in designated tutorial hour to maintain continuity.
2. For practical sessions, only procedure/methodology would be provided. **Students must come prepared with the theoretical background for the experiments** which would be covered in theory classes. Viva voce may be conducted during the practical session on regular basis.
3. It is strongly advised that all students prepare their own class notes and relevant information during lectures or from text/reference books. During 'open-book' exams/tests **photocopies/printed material, loose/stapled sheets, will not be allowed.**
4. For all evaluation components, information given during classroom instruction, aforementioned text books and reference books in the same order, will be considered as correct. Students are advised to follow the text, reference material as given in hand-out.
5. **All evaluation components are equally important, irrespective of weightage**. Hence, students failing to attend scheduled classes, or absenting themselves in one or many of the evaluation components, may become ineligible for obtaining a valid grade at the end of the semester. Attendance in lectures, tutorials and practicum experience are all equally important as they are all integral components of learning, irrespective of weightage and may be taken into consideration, during grading, especially in borderline cases
6. **Clearing the course would require adequate performance in all evaluation components** (quizzes, tests, examinations, and in practicum experience, etc.), separately (i.e. procuring low marks in evaluation components, aforementioned, would not suffice, to clear the course).

Instructor-in-charge: Dr. Sandeep Sundriyal
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