

Course Code	Course Name	Credits
26CH109	RECENT TRENDS IN CHEMISTRY	04

Course Objectives

- To introduce students to modern trends in organic chemistry.
- To provide knowledge of recent developments in material chemistry.
- To give an overview of drug study and its current advancements.
- To familiarize students with concepts in biological chemistry.
- To expose students to cutting-edge research in various fields of chemistry.

Learning Outcomes

Upon successful completion of this course it is intended that a student will be able to:

- Understand the structure, properties, and acid–base behavior of organic acids, bases, solvents, and buffer systems.
- Explain drug discovery principles including lead optimization, QSAR, molecular modeling, and drug mechanisms.
- Apply concepts of material science and smart materials in conductors, semiconductors, and responsive systems.
- Analyze modern carbohydrate transformations using green chemistry, electrochemical, and advanced synthetic methods.

Unit 1 - Organic Acids, Bases and Solvents (12 Hrs.)

pKa and pH; carboxylic acids; alcohols; phenols; amines; approximate pKa values; effect of structure on pKa. Electronegativity; inductive effect; resonance effect; effect of pH on structure: buffer solutions; Lewis acids and bases; polarity of solvents; solvent index.

Unit 2 – Discovery and Design of Drugs (12 Hrs.)

Naming of drugs; proprietary and generic names; lead compounds; molecular modifications; random screening; serendipity in drug discovery; receptors; drugs as enzyme inhibitors; drug resistance; therapeutic index; QSAR: Quantitative Structure Activity Relationship; molecular modeling; combinatorial organic synthesis; antiviral drugs; economics of drugs.

Unit 3 - Material Science (12 Hrs.)

Conductors; insulators; semi–conductors; superconductors; capacitors; super–capacitors; organic conductors; optical materials; NLO – theory and processing; chemical and biosensors.

Unit 4 – Smart Materials (12 Hrs.)

Types of smart materials; piezoelectric and electrostrictive materials; magnetostriuctive materials; electrorheological and magnetorheological effects; shape memory alloys; photochromism; intelligent gels.

Unit 5 - Carbohydrate (12 Hrs.)

Introduction; synthetic transformation using: nonhazardous solvents; microwave; photoinduced reactions; transformations of carbohydrates in: water and ionic liquids; Electrochemical glycosylation.

Reference Books:

1. P.Y Bruice, Organic Chemistry, 8th edition, Pearson Ltd, University of California, 2011 Santa Barbara.
2. J.D Lee, Concise Inorganic Chemistry, 5th Edition, Blackwell Science Ltd, 1996 Oxford, London.
3. Newton D E, Chemistry of New Materials, Facts on File, Inc, New York.
4. V.Rajendran and M. Kani Material Sciences, 11 th reprint, TATA McGraw Hill, 2010 New Delhi.
5. J. Ghosh. A Text Book of Pharmaceutical Chemistry, Tata McGraw Hill publishing, 1993 New Delhi.
6. Ameila pilar Rauter, E. Bjorn christeneson, Laszolosomsak, paulkosma, Roberto Adamo, Recent trends in carbohydrate chemistry: synthesis, structure and function of carbohydrates, Volume 1, 2020 Elsevier.

Websites and eLearning Sources:

1. nptel.ac.in/courses/104103071
2. QSAR | PPTX
3. <https://youtu.be/leBLST-XGwU?si=go4RWnGGNVE9Jozu>

COs and Bloom's Taxonomy Mapping – 26CH109		
Course Outcomes	On completing U.G. program the students will be able to	BTL
CO1	Memorize and define all key terms and approximate pKa values of organic acid, base and solvent.	K1, K2
CO2	Design or optimize different drug by modeling binding modes, scoring affinities, and refining lead compounds based on docking results.	K3
CO3	Analyse the different type of conductor, superconductor as well as development of biosensors.	K4
CO4	Synthesized smart material and gel for the application of storage devices.	K5
CO5	Development of engineering materials utilizing microwave and green reagent for producing robust miniaturized devices.	K6

BTL K1 and K2 – remembering and understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6- Create

Relationship Matrix – 26CH109													
Course Outcomes	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)						Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	
CO1	3	2	2	2	1	1	3	2	2	1	1	2	1.83
CO2	3	3	2	2	1	1	3	2	2	2	1	3	2.08
CO3	3	3	3	2	2	1	3	3	2	1	1	3	2.25
CO4	3	3	3	2	1	1	3	3	2	2	2	3	2.33
CO5	3	3	3	3	1	1	3	3	3	2	2	3	2.50
Total													2.19

Mean Score: 3- High, 2- Medium/Moderate, 1-Low