

Allied Chemistry

Syllabus

AFFILIATED COLLEGES

Program Code:

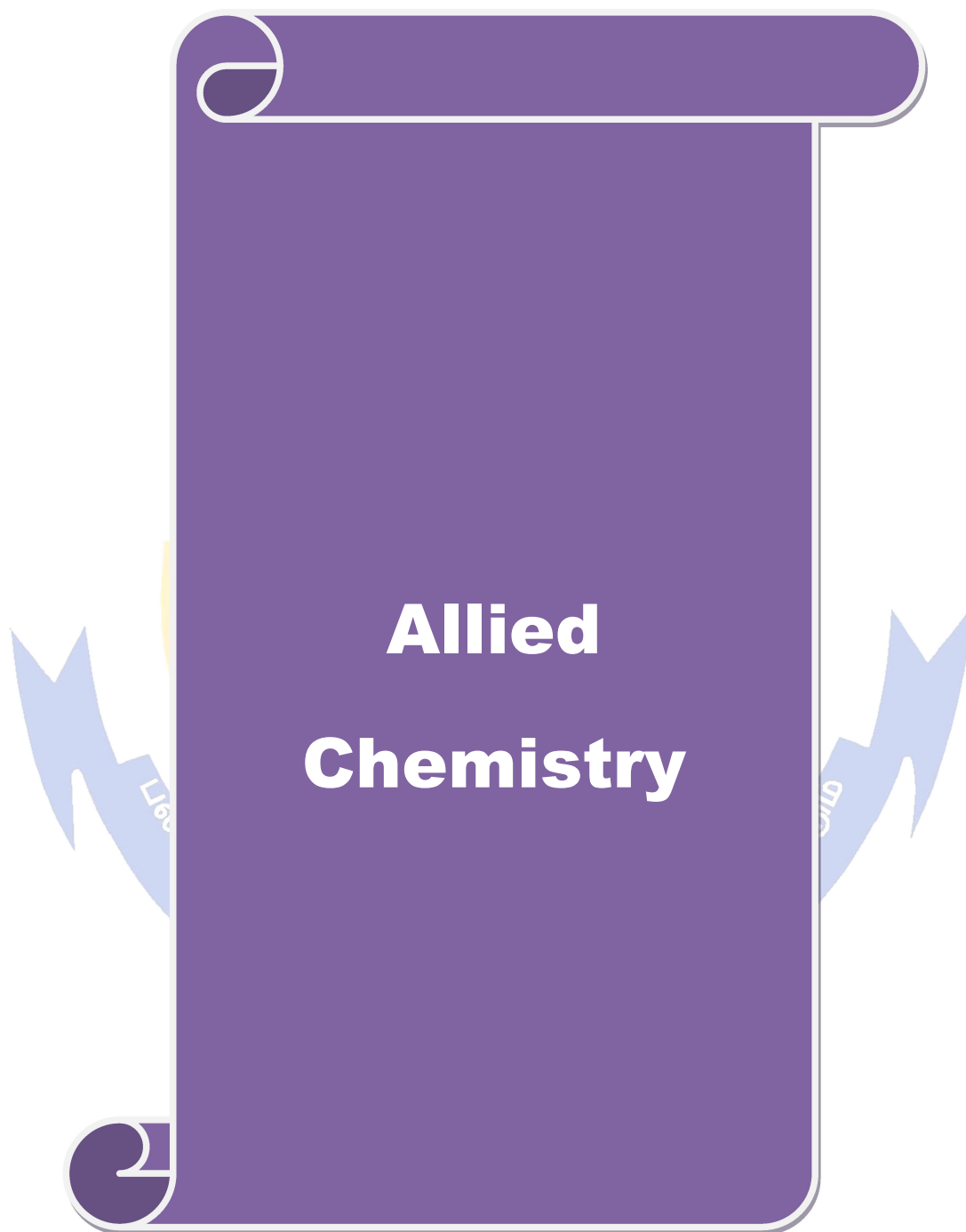
2021 – 2022 onwards



BHARATHIAR UNIVERSITY

(A State University, Accredited with “A” Grade by NAAC,
Ranked 13th among Indian Universities by MHRD-NIRF,
World Ranking: Times -801-1000, Shanghai -901-1000, URAP - 982)

Coimbatore - 641 046, Tamil Nadu, India



Course code	1AH	Allied Chemistry - I	L	T	P	C
Allied		Allied I – Paper - I	4		-	3
Pre-requisite		Higher Secondary Level Chemistry	Syllabus Version	2021 - 2022		
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none">1. Explain the conducting properties of metals.2. Outline the reactivity of boron compounds, the principles of bonding, hybridisation and stereochemistry3. To imbibe the knowledge of silicones, fuel gases, dyes and their industrial applications4. To inculcate the chemistry behind day to day used items like toiletries, detergents etc5. Explain the physical chemistry behind the reaction rates and solutions.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the properties metals and their conductivity, the principle behind the synthesis and applications of boron compounds.					K1-K4
2	Understand about silicones fuels gases and their industrial applications. The theory behind colours and dyes, their preparation and dyeing.					K2-K4, K6
3	Understand the bonding and structure of various hydrocarbons and electronic effects. Appericiate the optical properties of compounds and how it determines the compounds nature itself					K1-K4
4	Explain the chemistry behind toiletries and cleaning agents.					K2-K5
5	Understand the kinetics benind chemical reactions and the nature of solutions					K1-K3
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create						
Unit:1						
		Conductivity of Metals and Boron Compounds	12 hours			
1. Conductivity of metals: Band theory, Explanation of thermal and electrical conductivity of metals, limitations, Definition and examples of conductors, semiconductors and insulators.						
2. Boron compounds: Structure, preparation, properties and uses of NaBH ₄ , Diborane and Borazole						
Unit:2						
		Industrial and Dye Chemistry	12 hours			
1. Industrial Chemistry: Synthesis, properties and uses of silicones. Fuel gases: composition and uses of natural gas, water gas, semi water gas, carbureted water gas, producer gas, oil gas.						
2. Dye Chemistry: Terms: Chromophore – auxochrome - bathochromic shift - hypsochromic shift - hyperchromic effect - hypsochromic effect - Dyes: Azo and triphenyl methane dyes - Preparation of Methyl Orange and Malachite green						
Unit:3						
		Covalent Bonding and Stereoisomerism	12 hours			
1. Covalent bond: Orbital overlap – hybridization - geometry of organic molecules- CH ₄ , C ₂ H ₄ , and C ₂ H ₂ . Definition with example: Inductive, Electromeric, Mesomeric, hyperconjugative and steric effect.						

2. Stereoisomerism: Conditions of optical activity - optical isomerism of lactic acid and tartaric acid - geometrical isomerism of maleic and fumaric acids.		
Unit:4	Chemistry of Toiletries and Cleaning Agents	12 hours
1. Toiletries: Bath soap – shower gel - water softeners - tooth pastes-ingredients - their characteristic functions-mouth washes-shaving creams-after shave preparations.		
2. Cleaning Agents: Detergents - classification - formulation-cleansing action-optical brightners-bleachers-phenols - hand sanitizer.		
Unit:5	Physical Chemistry: Solutions and Kinetics	12 hours
1. Solutions: Raoult's law - Deviation from ideal behaviour - positive deviation - Negative deviation - Fractional distillation.		
2. Kinetics: Rate - order - molecularity - pseudo first order - determination of order by graphical method - Effect of temperature on the rate - Energy of activation		
	Total Lecture hours	60 hours
Text Book(s)		
1	Principles of Inorganic Chemistry, B.R. Puri L.R. Sharma, S.Chand & Co.	
2	Inorganic Chemistry, P.L.Soni, Sultan Chand & Sons.	
3	Principles of physical chemistry, B.P. Puri, L.R. Sharma and M.S. Phathania, S.Chand & Company	
Reference Books		
1	Advanced Organic Chemistry, B.S.Bahl, Arun bahl, S.Chand & Co.,	
2	Perfumes, Cosmetics and Soaps, W.A.Poucher (Vol.3), 9th Edition, Springer Science Business Media, 1993.	
3	Handbook of Cosmetic Science and Technology, Barel, A.O.; Paye, M.; Maibach, H.I.(2014), CRC Press.	
4	Pharmaceutics and Cosmetics, Gupta, P.K.; Gupta, S.K.(2011), Pragati Prakashan	
5	Chemical Process Industries, R. Norris Shreve and Joseph A.Brink,Jr.,4 th Edition, McGraw Hill, 1977.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://nptel.ac.in/courses/104/103/104103071/	
2	https://www.youtube.com/watch?v=zdmEaXnB-5Q	
3	https://www.britannica.com/science/band-theory	
4	https://www.chem.purdue.edu/gchelp/solutions/whatis.html	
Designed By: Dr. S. P. Rajasingh		

Mapping with Programme Outcomes							
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M	S	M	S	S	S	S
CO2	S	S	S	S	S	M	S
CO3	M	M	S	S	S	M	S
CO4	S	S	S	S	M	M	S
CO5	S	S	M	S	S	M	M

*S-Strong; M-Medium; L-Low

Course code	2AH	Allied Chemistry - II	L	T	P	C
Allied		Allied I – Paper - II	4		-	3
Pre-requisite		Higher Secondary Level Chemistry	Syllabus Version	2021-2022		
Course Objectives:						
The main objectives of this course are to:						
1. To explain bioinorganic chemistry in biological systems. 2. Appreciate the need for paints and explosives. 3. To understand the role of polymers and rubbers to mankind. 4. Show the importance of fertilizers and the unavailability of insecticides in agriculture. 5. Explain the electrochemistry and electrical storage.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Appreciate the role of metals in biological system and their therapeutic effects					K1-K3
2	Understand about the importance of paints and the need for explosives as well as the bad face of war.					K2-K5
3	Understand the importance of polymers and rubbers in our day to day life					K1-K4
4	Appreciate the need for fertilizers and insecticides in the Agricultural sector					K2-K5
5	Understand the importance of electrochemistry and energy storage devices					K2-K4
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create						
Unit:1	Cordination Chemistry and The Importance of Metals					12 hours
1. Coordination chemistry: Chelation examples - Hemoglobin – Chlorophyll - Applications of EDTA in qualitative and quantitative analysis. 2. Metals in Health: Application of therapeutic chelating agents- Metal-based drugs cis-platin, carboplatin, platinum anti-cancer drugs, gadolinium MRI contrast agents, Gold arthritic agents						
Unit:2	Paints and Explosives					12 hours
1. Paints: classification – constituents – Pigment Volume Concentration – Distemper – Varnishes – Lacquers - Pigments – name and formula of different coloured pigments and their uses – Toners – Nano paints 2. Explosives: classification – characteristics – chemistry of Nitrocellulose – nitroglycerine - gun powder - RDX – mustard gas – phosgene - nerve gas – Screening smokes						
Unit:3	Polymers and Rubbers					12 hours
1. Polymers: Preparation, properties and uses of: Poly olefins – Polythene – PTFE – PVC – Polypropylene – Polystyrene 2. Rubbers: Natural and synthetic rubbers: Constitution of natural rubber – Butyl – Buna-N – Neoprene – Thiocol – Polyurethane – Silicone rubbers						

Unit:4	Agricultural Chemistry – Fertilizers and Insecticides	12 hours
1. Fertilizers: Classification of fertilizers- Preparation and uses of Urea, DAP, NPK, SSP, TSP and bio-fertilizers (vermicompost, coircompost, panchakavia) – types and advantages of biofertilizers		
2. Insecticides: Classification of insecticides – Structure and effects of dinitro phenols, DDT, methoxychlor and BHC – comparison of artificial pesticides and bio-pesticide.		
Unit:5	Electrochemisry, Fuel cells and Energy Storage	12 hours
1. Electrochemistry: EMF (Definition) - Daniel cell - Reference electrode - Standard Hydrogen Electrode (SHE) -Saturated Calomel Electrode (SCE). Determination of pH - glass electrodes		
2. Fuel cell and Energy storage: Hydrogen - Oxygen fuel cell – Batteries: Lead-storage battery - Batteries of future:Lithium ion batteries.		
	Total Lecture hours	60 hours
Text Book(s)		
1	Principles of physical chemistry, B.P. Puri, L.R. Sharma and M.S. Phathania, S.Chand & Company	
2	Inorganic Chemistry, P.L.Soni, Sultan Chand & Sons.	
3	Principles of Inorganic Chemistry, B.R. Puri L.R. Sharma, S.Chand & Co.	
4	Engineering Chemistry by Jain and Jain; Dhanpat Rai Publication Co. 2014.	
Reference Books		
1	Environmental Chemistry, A.K.De, 6th Edition, New Age International, New Delhi, 2006	
2	A Text Book of Environmental Chemistry and Pollution Control, S.S. Dara–S. Chand Publication 2012.	
3	Chemical Process Industries, R. Norris Shreve and Joseph A.Brink,Jr.,4 th Edition, McGraw Hill, 1977.	
4	History of fertilizer chemistry by T.P. Hignett, SPRINGER ,1985	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://onlinecourses.nptel.ac.in/noc19_cy26/preview	
2	https://nptel.ac.in/courses/126/105/126105014/	
3	https://nptel.ac.in/content/storage2/courses/103107086/module1/lecture1/lecture1.pdf	
4	https://nptel.ac.in/content/storage2/courses/108103009/download/M9.pdf	
5	https://nptel.ac.in/courses/113105028/	
6	https://www.youtube.com/watch?v=no4vRKvKxcU	
7	https://www.youtube.com/watch?v=5XKpJ24P-KE	
Designed By: Dr. S. P. Rajasingh		

Mapping with Programme Outcomes							
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	M	M	M	S	S	S
CO2	S	S	S	M	S	M	S
CO3	S	M	S	S	S	S	M
CO4	S	S	S	M	S	M	S
CO5	S	S	M	S	S	S	S

*S-Strong; M-Medium; L-Low

Course code	2PH	Chemistry Practical	L	T	P	C
Allied		Allied Chemistry	-	-	2	3
Pre-requisite		Higher Secondary Level Lab Knowledge	Syllabus Version		2021-2022	
Course Objectives:						
The main objectives of this course are to:						
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1	https://nptel.ac.in/courses/104/106/104106108/
2	https://www.youtube.com/watch?v=n4esSHxz_J8
3	https://www.toppr.com/guides/chemistry/organic-chemistry/qualitative-analysis-of-organic-compounds/
4	https://www.youtube.com/watch?v=7bmQkQW8bbs
5	https://www.youtube.com/watch?v=wRAo-M8xBHM
Designed By: Dr. S. P. Rajasingh	

Mapping with Programme Outcomes							
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	S	M	S	S	S
CO2	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

