Academic Calendar & Plan

Academic Year 2020-21

(Distribution of syllabus into Modules and Units of B.Sc. Honours Course CBCS)

Department of Chemistry

Sarat Centenary College, Dhaniakhali, Hooghly

Semester-1

Orientation Programme – 1st week of July: General outline of Chemistrysyllabus and its Scope & Importance

CC-I: Organic Chemistry-I/ CC-II: Physical Chemistry-I

Credits: Theory-4, Practical-2,

Marks: Theory – 40, Practical – 20, Internal Assessment – 10, Attendance-05=75

1st Module (July-September)

Name of the teacher and Course	Theory	Practical
Dr.Suparna Sadhu CC-1: Organic Chemistry-I	**Fundamentals in Organic chemistry** • Bonding and Physical Properties: Valence Bond Theory Electronic displacements, MO theory, Physical properties • General Treatment of Reaction Mechanism I: Mechanistic classification, Reactive intermediates	▪ Separation of Organic compound
Mrs. PallabiAcharyya CC-2: Physical Chemistry-I	**Kinetic Theory and Gaseous state** 1. Kinetic Theory of gases 2. Maxwell's distribution of speed and energy 3. Real gas and virial equation **Chemical Thermodynamics** 1. Zeroth and 1st law of Thermodynamics 2. Thermochemistry	1 Determination of pH of unknown solution (buffer), by color matching method; 2 Determination of the reaction rate constant of hydrolysis of ethylacetate in the presence of an equal quantity of sodium hydroxide; 3 Study of kinetics of acid-catalyzed hydrolysis of methyl acetate

2nd Module (October to December)

Name of the teacher and Course	Theory	Practical
Dr.Suparna Sadhu CC-1: Organic Chemistry-I	• Stereochemistry-I	▪ Determination of boiling point
Mrs. PallabiAcharyya CC-2: Physical Chemistry-I	**Chemical Thermodynamics** 1. Second Law of Thermodynamics	1. Study of kinetics of decomposition of H_2O_2 by KI;

	2. Thermodynamic relations **Chemical kinetics** 1. Rate law, order and molecularity 2. Role of Temperature and theories of reaction rate 3. Homogeneous catalysis 4. Autocatalysis; periodic reaction sReal gas and virial equation	**2.** Determination of solubility product of PbI2 by titremetric method

Internal Assessment: 1st Week of December

Theory and Practical Examination: as per notification of B.U. (Tentatively on December)

Semester-II

CC 3: Inorganic Chemistry-I/ CC- 4: Organic Chemistry-II

Credits: Theory-4, Practical-2,

Marks: Theory – 40, Practical – 20, Internal Assessment – 10, Attendance-05=75

1st Module (January-March)

Name of the teacher and Course	Theory	Practical
Dr.Suparna Sadhu CC-3: Inorganic Chemistry-II	• Extra nuclear Structure of atom • Chemical periodicity	▪ . Oxidation-Reduction Titrimetric 1. Estimation of Fe(II) using standardized KMnO4 solution 2. Estimation of oxalic acid and sodium oxalate in a given mixture 3. Estimation of Fe(II) and Fe(III) in a given mixture using K2Cr2O7 solution. 4. Estimation of Fe(III) and Mn(II) in a mixture using standardized KMnO4 solution
Dr. Sanjay Mondal CC-4: Organic Chemistry-II	• Stereochemistry II	▪ Organic Preparations

2nd Module (April to June)

Name of the teacher and Course	Theory	Practical
Dr.Suparna Sadhu CC-3: Inorganic Chemistry-II	• Acid-Base • Redox Reactions and precipitation reactions	• Estimation of Fe(III) and Cu(II) in a mixture using K2Cr2O7. ▪ Estimation of Fe(III) and Cr(III) in a

		mixture using K2Cr2O7
Dr. Sanjay Mondal CC-4: Organic Chemistry-II	**Substitution and Elimination Reactions** • Free-radical substitution reaction • Nucleophilic substitution reactions • Elimination reactions	▪ Purification of the crude product by Crystallization

Internal Assessment: 4th Week of May

Theory and Practical Examination: as per notification of B.U. (Tentatively on June)

Semester-III

CC-5: Physical Chemistry/CC 6: Inorganic Chemistry-II/CC 7: Organic Chemistry-III/SEC-1

Credits: Theory-4, Practical-2,
Marks: Theory – 40, Practical – 20, Internal Assessment – 10, Attendance-05=75

1st Module(July to September)

Name of the teacher and Course	Theory	Practical
Mrs. PallabiAcharyya Core Course 5 **:**Physical Chemistry-II (Theo)	• Transport Processes • Application of Thermodynamics – I	1. Study of viscosity of unknown liquid (glycerol, sugar) with respect to water. 2. Determination of partition coefficient for the distribution of I2 between water and CCl4. 3. Determination of Keq for KI + I2 ⇔ KI3, using partition coefficient between water and CCl4.
Dr.Suparna Sadhu Core Course 6: Inorganic Chemistry-II	• Chemical Bonding-I 1. Ionic bond **2.** Covalent bond • Chemical Bonding-II 1. Molecular orbital concept of bonding **2.** Metallic Bond	▪ Iodo/Iodimetric Titrations 1. Estimation of Cu(II). 2. Estimation of Vitamin C. 3. Estimation of arsenite by iodimetric method
Dr.Suparna Sadhu CC-7: Organic Chemistry-III	• Chemistry of alkenes and alkynes • Addition to C≡C (in comparison to C=C) • Aromatic Substitution	▪ Qualitative Analysis of Single Solid Organic Compounds
Mrs. PallabiAcharyya Skill Enhancement Course (SEC-1)	• Introduction • Analysis of soil • Analysis of wate	▪ N/A

[Credits: Theory-2, Marks – 50, Theory – 40, Internal Assessment – 10]	• Analysis of food products	

2nd Module (October to December)

Name of the teacher and Course	Theory	Practical
Mrs. PallabiAcharyya Core Course 5 :Physical Chemistry-II (Theo)	• Foundation of Quantum Mechanics	4. Conductometric titration of an acid (strong, weak/ monobasic, dibasic) against strong base. 5. Study of saponification reaction conductometrically. 6. Verification of Ostwald's dilution law and determination of Ka of weak acid.
Dr.Suparna Sadhu Core Course 6: Inorganic Chemistry-II	• **Chemical Bonding-II** 1. Weak Chemical Forces • Radioactivity	4. Estimation of Cu in brass. 5. Estimation of Cr and Mn in Steel
Dr.Suparna Sadhu CC-7: Organic Chemistry-III	• Carbonyl and Related Compounds • Exploitation of acidity of α-H of C=O • Aldol, Friedel-Crafts, Michael, Knoevenagel, Cannizzaro, Benzoin condensation and Dieckmann condensation • Nucleophilic addition to α,β-unsaturated carbonyl system • Substitution at sp2 carbon (C=O system) • Organometallics:	▪ Melting point ▪ Preparation of one derivative
Mrs. PallabiAcharyya Skill Enhancement Course (SEC-1) *[Credits: Theory-2, Marks – 50, Theory – 40, Internal Assessment – 10]*	• Chromatography • Ion-exchange • Analysis of cosmetics	▪ N/A

Internal Assessment: 1st Week of December

Theory and Practical Examination: as per notification of B.U. (Tentatively in December)

Semester IV

CC 8:Physical Chemistry-III (Theo)/ CC 9: Inorganic Chemistry-III/ CC 10: Organic Chemistry-IV

Credits: Theory-4, Practical-2,

Marks: Theory – 40, Practical – 20, Internal Assessment – 10, Attendance-05=75

1st Module (January-March)

Name of the teacher and Course	Theory	Practical
Mrs. PallabiAcharyya Core Course 8: Physical Chemistry-III (Theo)	• Application of Thermodynamics – II • Electrical Properties of molecules	1.Determination of solubility of sparingly soluble salt in water, in electrolyte with common ions and in neutral electrolyte (using common indicator). 2. Potentiometric titration of Mohr's salt solution against standard K2Cr2O7 solution. 3. Determination of Ksp for AgCl by potentiometric titration of AgNO3 solution against standard KCl
Dr.Suparna Sadhu Core Course 9: Inorganic Chemistry-III	• General Principles of Metallurgy • Chemistry of s and p Block Elements	▪ Complexometric titration 1. Zn(II) 2. Zn(II) in a Zn(II) and Cu(II) mixture 3. Ca(II) and Mg(II) in a mixture 4. Hardness of water
Dr. Sanjay Mondal CC 10: Organic Chemistry-IV	• Nitrogen compounds Reaction • Rearrangements Reaction • The Logic of Organic Synthesis	▪ Estimation of glucose by titration using Fehling's solution ▪ Estimation of Vitamin-C (reduced) ▪ Estimation of aromatic amine (aniline) by bromination (Bromate-Bromide) method ▪ Estimation of phenol by bromination (Bromate-Bromide) method
Dr. Sanjay Mondal Skill Enhancement Course (SEC) **SEC-2: Pharmaceuticals Chemistry** *[Credits: Theory-2, Marks – 50, Theory – 40, Internal Assessment – 10]*	• Drugs & Pharmaceuticals	▪ N/A

2nd Module (April to June)

Name of the teacher and Course	Theory	Practical
Mrs. PallabiAcharyya Core Course 8: Physical Chemistry-III (Theo)	• Quantum Chemistry	4. Effect of ionic strength on the rate of Persulphate – Iodide reaction. 5. Study of phenol-water phase diagram
Dr.Suparna Sadhu Core Course 9: Inorganic	• Noble Gases • Inorganic Polymers	▪ Inorganic preparations 1. [Cu(CH3CN)4]PF6/ClO4

Chemistry-III	• Coordination Chemistry-I	2. Potassium dioxalatodiaquachromate(III) 3. Tetraamminecarbonatocobalt (III) ion 4. Potassium tris(oxalate)ferrate(III) 5. Tris-(ethylenediamine) nickel(II) chloride. 6. [Mn(acac)3] and Fe(acac)3] (acac= acetylacetonate)
Dr. Sanjay Mondal CC 10: Organic Chemistry-IV	• Organic Spectroscopy	▪ Estimation of formaldehyde (Formalin) ▪ Estimation of acetic acid in commercial vinegar ▪ Estimation of urea (hypobromite method) ▪ Estimation of saponification value of oil/fat/ester
Dr. Sanjay Mondal Skill Enhancement Course (SEC) **SEC-2: Pharmaceuticals Chemistry** *[Credits: Theory-2, Marks – 50, Theory – 40, Internal Assessment – 10]*	• Drugs & Pharmaceuticals	▪ N/A

Internal Assessment: 4th Week of May
Theory and Practical Examination: as per notification of B.U. (Tentatively on June)

Semester V

CC11: Inorganic Chemistry-IV/ CC 12: Organic Chemistry-V/ DSE 1: Advanced Physical Chemistry (Theo)

Credits: Theory-4, Practical-2,
Marks: Theory – 40, Practical – 20, Internal Assessment – 10, Attendance-05=75

1st Module(July to September)

Name of the teacher and Course	Theory	Practical
Dr.Suparna Sadhu CC11: Inorganic Chemistry-IV	• Coordination Chemistry-II	▪ **Chromatography of metal ions** Principles involved in chromatographic separations. Paper chromatographic separation of following metal ions: 1. Ni (II) and Co (II) 2. Fe (III) and Al (III). ▪ **Spectrophotometry** 1. Measurement of 10Dq of 3d metal complexes by spectrophotometric method.

		2. Determination of λmax of KMnO4 and K2Cr2O7
Dr.Suparna Sadhu CC 12: Organic Chemistry-V	• Carbocycles and Heterocycles • Cyclic Stereochemistry • Pericyclic reactions	▪ Chromatographic Separations.
Mrs. PallabiAcharyya DSE 1: Advanced Physical Chemistry (Theo)	• Crystal Structure • Statistical Thermodynamics	**Computer Programming based on numerical methods for**: 1. Roots of equations: (e.g. volume of van der Waals gas and comparison with ideal gas, pH of a weak acid) 2. Numerical differentiation (e.g., change in pressure for small change in volume of a van der Waals gas, potentiometric titrations)
Mrs. PallabiAcharyyaDSE- 2 : Analytical methods in chemistry	Qualitative and quantitative aspects of analysis Optical methods of analysis Thermal methods of analysis	▪ **Separation Techniques – Chromatography** 1. Separation of mixtures Separation and identification of the monosaccharides in a mixture (glucose & fructose) by paper chromatography. Reporting the Rf values. 2. Separate a mixture of Sudan yellow and Sudan Red by TLC technique and identify them on the basis of their Rf values. 3. Separation of the active ingredients of plants, flowers and juices by TLC ▪ **Spectrophotometry** 1. Determination of pKa values of indicator using spectrophotometry 2. Determination of chemical oxygen demand (COD) 3. Determination of Biological oxygen demand (BOD)

2nd Module (October to December)

Name of the teacher and Course	Theory	Practical
Dr.Suparna Sadhu CC11: Inorganic Chemistry-IV	• Chemistry of d- and f- block elements Transition Elements Lanthanoids and Actinoids	▪ Gravimetry 1. Estimation of nickel (II) using Dimethylglyoxime (DMG). 2. Estimation of copper as CuSCN 3. Estimation of Al (III) by precipitating with oxine and weighing as Al(oxine)3 (aluminium oxinate) 4. Estimation of chloride.

Dr.Suparna Sadhu CC 12: Organic Chemistry-V	• Carbohydrates • Biomolecules • Alkaloids and Terpenoids	▪ Spectroscopic Analysis of Organic Compounds
Mrs. PallabiAcharyya DSE 1: Advanced Physical Chemistry (Theo)	**Special selected topics** Specific heat of solid 3rd law Polymers Dipole moment and polarizability	3. Numerical integration (e.g. entropy/ enthalpy change from heat capacity data), probability distributions (gas kinetic theory) and mean values 4. Matrix operations (Application of Gauss-Siedel method in colourimetry)
Mrs. PallabiAcharyyaDSE- 2 : Analytical methods in chemistry	• Electroanalytical methods • Separation techniques	▪ **Solvent Extractions** 1. To separate a mixture of Ni2+ & Fe2+ by complexation with DMG and extracting the Ni2+- DMG complex in chloroform, and determine its concentration by spectrophotometry. ▪ **Analysis of soil**: a. Determination of pH of soil. b. Total soluble salt c. Estimation of calcium, magnesium, phosphate, nitrate 3. Ion exchange: a. Determination of exchange capacity of cation exchange resins and anion exchange resins.

Internal Assessment: 1st Week of December

Theory and Practical Examination: as per notification of B.U. (Tentatively on December)

Semester VI

CC 13: Inorganic Chemistry-V/ CC 14: Physical Chemistry-IV / DSE-3: Polymer Chemistry/ **DSE-4 :**Inorganic materials of industrial importance "or" Dissertation followed by power point presentation

Credits: Theory-4, Practical-2,
Marks: Theory – 40, Practical – 20, Internal Assessment – 10, Attendance-05=75

1st Module(January - March)

Name of the teacher and Course	Theory	Practical
Dr.Suparna Sadhu	• Bioinorganic Chemistry	▪ Qualitative semimicro analysis

CC 13: Inorganic Chemistry-V	• Reaction Kinetics and Mechanism	Qualitative semimicro analysis of mixtures containing four radicals
Mrs. PallabiAcharyya CC 14: Physical Chemistry-IV	• Molecular Spectroscopy • Photochemistry	1. Determination of surface tension of a liquid using Stalagmometer **2.** Determination of CMC from surface tension measurements.
Dr. Sanjay Mondal **DSE-3:** Polymer Chemistry	• Introduction and history of polymeric materials • Functionality and its importance • Kinetics of Polymerization	▪ Polymer Synthesis
Dr.Suparna Sadhu DSE-4: Inorganic materials of industrial importance Or Dissertation followed by power point presentation	• Silicate Industries • Fertilizers • Surface Coatings	1. Determination of free acidity in ammonium sulphate fertilizer. 2. Estimation of Calcium in Calcium ammonium nitrate fertilizer. 3. Estimation of phosphoric acid in superphosphate fertilizer. 4. Determination of composition of dolomite (by complexometric titration).

2nd Module (April to June)

Name of the teacher and Course	Theory	Practical
Dr.Suparna Sadhu CC 13: Inorganic Chemistry-V	• Organometallic Chemistry • Catalysis by Organometallic Compounds	▪ Qualitative semimicro analysis of mixtures containing **unknown** four radicals (Analysis of minimum 10 unknown samples)
Mrs. PallabiAcharyya CC 14: Physical Chemistry-IV	• Surface phenomenon	3. Verification of Beer and Lambert's Law for KMnO4 and K2Cr2O7 solution. 4. Determination of pH of unknown buffer, spectrophotometrically
Dr. Sanjay Mondal **DSE-3:** Polymer Chemistry	• Determination of molecular weight of polymers • Glass transition temperature (Tg) and determination of Tg • Polymer Solution • Properties of Polymer	▪ Polymer Characterization ▪ Polymer Analysis
Dr.Suparna Sadhu DSE-4: Inorganic materials of industrial importance Or Dissertation followed by power point presentation	• Batteries • Alloys • Catalysis • Chemical explosives	5. Analysis of (Cu, Ni); (Cu, Zn) in alloy or synthetic samples. 6. Analysis of Cement. 7. Preparation of pigment (zinc oxide).

Internal Assessment: 4th Week of May

Theory and Practical Examination: as per notification of B.U. (Tentatively on June)

Counselling Programme – Final week of June- General outline on the admission and scope of higher education and related jobs